Managing Faults on Avaya Virtual Services Platform 7200 Series and 8000 Series

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Contents

Chapter 1: Introduction

Purpose

This document provides information on features in VSP Operating System Software (VOSS). VOSS runs on the following product families:

- Avaya Virtual Services Platform 4000 Series
- Avaya Virtual Services Platform 7200 Series
- Avaya Virtual Services Platform 8000 Series

Fault Management provides information about how to prevent faults and improve the performance of the Avaya Virtual Services Platform 7200 Series and 8000 Seriesswitches. This includes procedures for RMON, link state change, key health indicators, and logs and traps.

The fault management function supports tasks related to managing or preventing faults, troubleshooting, and monitoring and improving the performance of the network or product.

For information on fault management function on Avaya Virtual Services Platform 4000 Series, see *Fault Management of Avaya Virtual Services Platform 4000 Series*, NN46251-702.

Examples and network illustrations in this document may illustrate only one of the supported platforms. Unless otherwise noted, the concept illustrated applies to all supported platforms.

Related resources

Documentation

See the *Documentation Reference for Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-100 for a list of the documentation for this product.

Training

Ongoing product training is available. For more information or to register, you can access the Web site at http://avaya-learning.com/.

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Procedure

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  - In **Search**, type the product name. On the Search Results page, select **Video** in the **Content Type** column on the left.
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  - Enter a key word or key words in the **Search Channel** to search for a specific product or topic.
  - Scroll down Playlists, and click the name of a topic to see the available list of videos posted on the website.

Note:

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About this task

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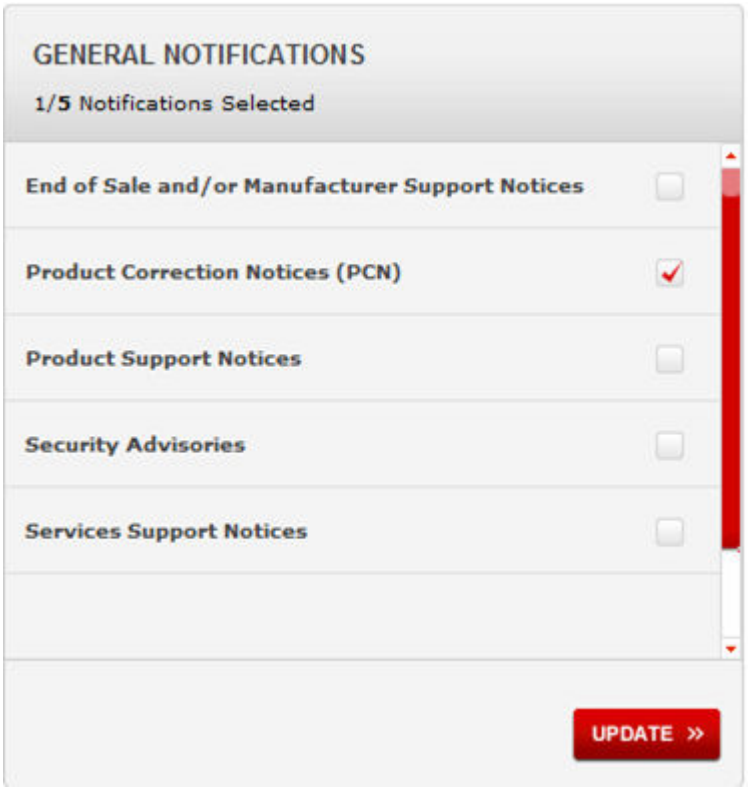
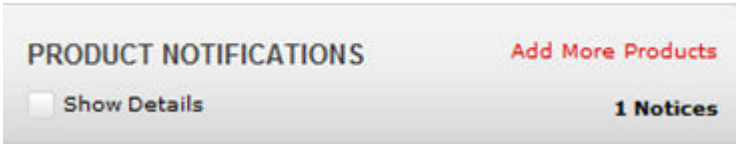
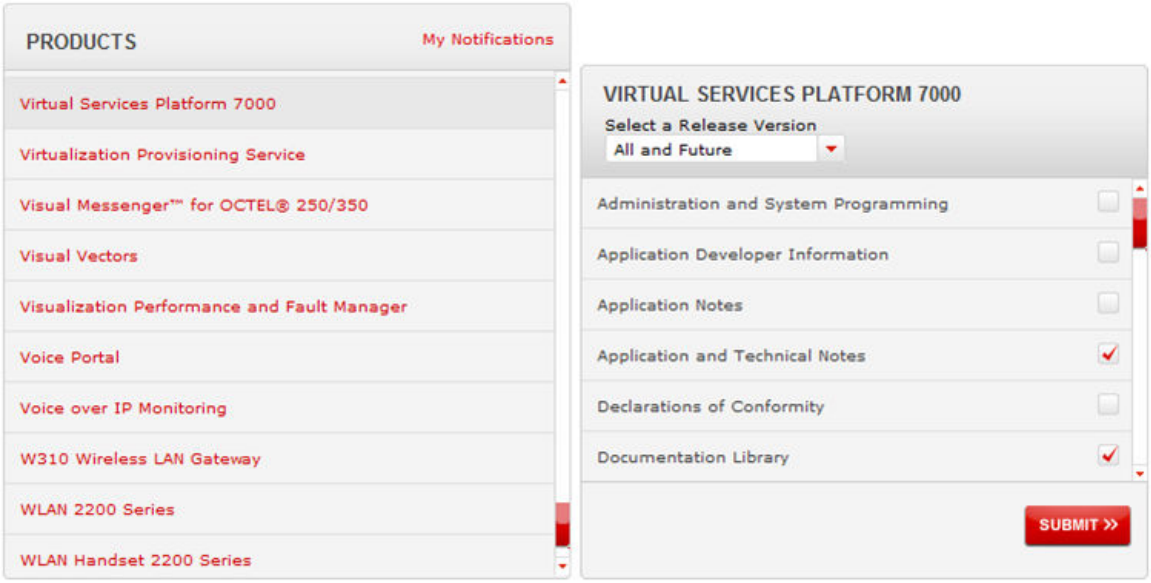
4. Click **E-NOTIFICATIONS**.
5. In the GENERAL NOTIFICATIONS area, select the required documentation types, and then click **UPDATE**.



6. Click **OK**.
7. In the PRODUCT NOTIFICATIONS area, click **Add More Products**.



8. Scroll through the list, and then select the product name.
9. Select a release version.
10. Select the check box next to the required documentation types.



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Before you begin

- Download the documentation collection zip file to your local computer.
- You must have Adobe Acrobat or Adobe Reader installed on your computer.

Procedure

1. Extract the document collection zip file into a folder.
2. Navigate to the folder that contains the extracted files and open the file named <*product_name_release*>.pdx.

3. In the Search dialog box, select the option **In the index named <*product_name_release*>.pdx**.
4. Enter a search word or phrase.
5. Select any of the following to narrow your search:
   - Whole Words Only
   - Case-Sensitive
   - Include Bookmarks
   - Include Comments
6. Click **Search**.

   The search results show the number of documents and instances found. You can sort the search results by Relevance Ranking, Date Modified, Filename, or Location. The default is Relevance Ranking.

Chapter 2: New in this release

The following sections detail what is new in *Managing Faults on Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-702.

VOSS 4.2.1

Features

See the following sections for information about feature changes.

RMON2

VOSS 4.2.1 adds EDM support for RMON2. For more information, see the following tasks:

- Enabling RMON on a port or VLAN on page 48
- Viewing the protocol directory on page 61
- Viewing the data source for protocol distribution statistics on page 62
- Viewing protocol distribution statistics on page 63
- Viewing the host interfaces enabled for monitoring on page 64
- Viewing address mappings on page 65
- Viewing the data source for host statistics on page 65
- Viewing network host statistics on page 66
- Viewing application host statistics on page 67

VOSS 4.2

Features

See the following sections for information about feature changes.

Channelization

VOSS 4.2 adds support for channelization of 40 Gbps ports on Avaya Virtual Services Platform 8000 Series. Some commands now support a sub-port parameter to show or configure a specific channel.

Log file updates with enhanced secure mode

Enhanced secure mode allows the system to provide role-based access levels, stronger password requirements, and stronger rules on password length, password complexity, password change intervals, password reuse, and password maximum age use.

If you enable enhanced secure mode, the system encrypts the entire log file using AES encryption.

With enhanced secure mode enabled, only individuals in the administrator or auditor role can view log files to analyze switch access and configuration activity. However, no access level role can modify the content of the log files, not even the administrator or the auditor access level roles. The administrator has access to the **`remove`** and **`delete`** commands.

If you enable enhanced secure mode, you cannot access the following commands for log files at any role-based access level:

- **`more`**
- **`edit`**
- **`rename`**
- **`copy`**

If someone attempts to access a log file with the preceding commands a warning message displays on the screen.

With enhanced secure mode enabled, authorized users can use SFTP to transfer files to a remote server with the content encrypted.

For more information on changes to log files, see:

- Log and trap fundamentals on page 73.
- Viewing logs on page 90.
- Configuring ACLI logging on page 92.
- Enabling SNMP trap logging on page 102.

Log message format

VOSS 4.2 updates the log message format. The output for the log message format now displays the following additional fields:

- CP slot number
- context
- sequence number
- user name
- ACLI commands

For more information, see: Log message format on page 76.

Remote Monitoring (RMON)

VOSS 4.2 adds support for Remote Monitoring 2 (RMON2) and updates information about RMON1.

Remote Monitoring (RMON) is a management information base (MIB) or a group of management objects that you use to obtain or configure values using the Simple Network Management Protocol (SNMP).

RMON1 is the original version of the protocol, which collects information for OSI Layer 1 and Layer 2 in Ethernet networks. RMON1 provides traffic statistics at the MAC layer, and provides statistics on Ethernet segments for packets and bytes received and transmitted.

RMON2 monitors network and application layer protocols on configured network hosts that you enable for monitoring. RMON2 expands the capacity of RMON1 to upper layer protocols in the OSI model.

For more information, see:

- Remote Monitoring on page 15.
- RMON2 on page 19.
- Configuring RMON on page 38.
- Enabling Remote Monitoring on an interface on page 42.
- Displaying RMON information on page 44.
- RMON configuration using EDM on page 47.

Secure Copy (SCP)

The current release does not support Secure Copy (SCP). For this VOSS release, use Secure File Transfer Protocol (SFTP) to transfer files securely. For more information, see:

- Log file transfer on page 80.

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Other changes

There are no other changes.

Chapter 3: Fault management fundamentals

Fault management includes the tools and features available to monitor and manage faults. This section provides overview for local alarms, remote monitoring (RMON), traps and logs, and link stage changes (port flapping).

Local alarms

The switch contains a local alarms mechanism. Local alarms are raised and cleared by applications running on the switch. Active alarms are viewed using the `show alarm database` command in ACLI. Local alarms are an automatic mechanism run by the system that do not require any additional user configuration. Check local alarms occasionally to ensure no alarms require additional operator attention. The raising and clearing of local alarms also creates a log entry for each event.

Remote Monitoring (RMON)

This section provides information on Remote Monitoring (RMON1) and RMON2.

Remote Monitoring

Remote Monitoring (RMON) is a management information base (MIB) or a group of management objects that you use to obtain or configure values using the Simple Network Management Protocol (SNMP). Use ACLI, or EDM, to globally enable RMON on the system. After you globally enable RMON, you enable monitoring for individual devices on a port-by-port basis.

RMON1 is the original version of the protocol, which collects information for OSI Layer 1 and Layer 2 in Ethernet networks. RMON1 provides traffic statistics at the MAC layer, and provides statistics on Ethernet segments for packets and bytes received and transmitted.

You can use RMON1 to:

- Configure alarms for user-defined events.
- Collect Ethernet statistics.
- Log events.
- Send traps for events.

Within EDM, you can configure RMON1 alarms that relate to specific events or variables. You can also specify events associated with alarms to trap or log-and-trap. In turn, the system traps or logs tripped alarms.

You can view all RMON1 information using ACLI or EDM. Alternatively, you can use any management application that supports SNMP traps to view RMON1 trap information.

This section describes RMON1 alarms, RMON1 history, RMON1 events, and RMON1 statistics.

RMON1 alarms

You can configure alarms to alert you if the value of a variable goes out of range. You can define RMON1 alarms on any MIB variable that resolves to an integer value. You cannot use string variables (such as system description) as alarm variables.

You can use RMON1 alarms for the MAC layer in the network. You cannot use RMON1 alarms for application and network layer protocols.

All alarms share the following characteristics:

- A defined upper and lower threshold value.
- A corresponding rising and falling event.
- An alarm interval or polling period.

After you activate alarms, you can:

- View the activity in a log or a trap log.
- Create a script directing the system to sound an audible alert at a console.
- Create a script directing the system to send an e-mail.
- Create a script directing the system to call a pager.

The system polls the alarm variable and the system compares the result against upper and lower limit values you select when you create the alarm. If the system reaches or crosses the alarm variable during the polling period, the alarm fires and generates an event that you can view in the event log or the trap log. You can configure the alarm to either create a log, or have the alarm send a Simple Network Management Protocol (SNMP) trap to a Network Management System (NMS). You can view the activity in a log or a trap log, or you can create a script to cause a console to beep, send an e-mail, or call a pager.

The upper limit of the alarm is the rising value, and the lower limit is the falling value. RMON1 periodically samples data based upon the alarm interval. During the first interval that the data passes above the rising value, the alarm fires as a rising event. During the first interval that the data drops below the falling value, the alarm fires as a falling event.

The following figure shows how alarms fire:

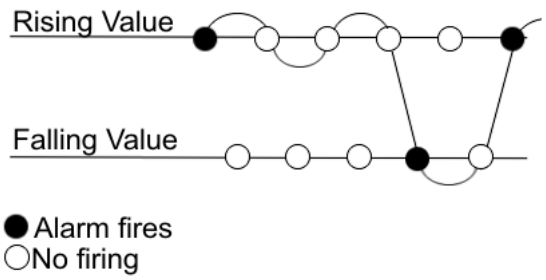

Figure 1: How alarms fire

The alarm fires during the first interval that the sample goes out of range. No additional events generate for that threshold until the system crosses the opposite threshold. Therefore, you must carefully define the rising and falling threshold values for alarms. Incorrect thresholds cause an alarm to fire at every alarm interval, or never at all.

You can define one threshold value to an expected, baseline value, and then define the opposite threshold as the out-of-bounds limit. Because of sample averaging, the value is equal to ±1 baseline unit. For example, assume you define an alarm with octets leaving a port as the variable. The intent of the alarm is to notify you if excessive traffic occurs on that port. You enable spanning tree, and then 52 octets transmit from the port every 2 seconds, which is equivalent to baseline traffic of 260 octets every 10 seconds. This alarm notifies you if you define the lower limit of exiting octets at 260 and you define the upper limit at 320 (or at any value greater than 260 + 52 = 312).

The rising alarm fires the first time outbound traffic, other than spanning tree Bridge Protocol Data Units (BPDUs), occurs. The falling alarm fires after outbound traffic, other than spanning tree, ceases. This process provides the time intervals of any nonbaseline outbound traffic.

If you define the alarm with a falling threshold of less than 260 and the alarm polling interval is at 10 seconds, for example, 250, then the rising alarm can fire only once, as shown in the following example. The falling alarm (the opposite threshold) must fire for the rising alarm to fire a second time. The falling alarm cannot fire unless the port becomes inactive or you disable spanning tree, which causes the value for outbound octets to drop to zero, because the baseline traffic is always greater than the value of the falling threshold. By definition, the failure of the falling alarm to fire prevents the rising alarm from firing a second time.

The following figure shows an example of the alarm threshold:

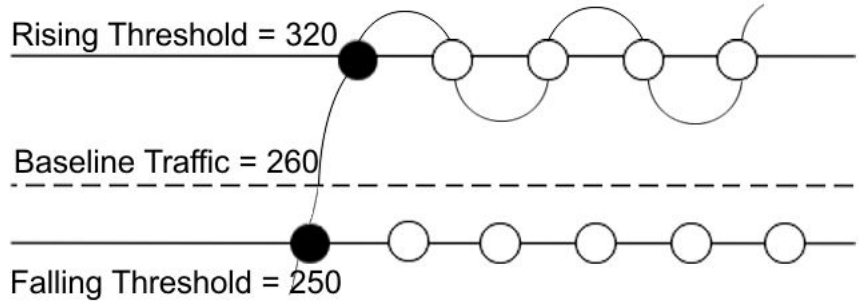

Figure 2: Alarm example, threshold less than 260

When you create an alarm, you select a variable from the variable list and a port, or another system component to which it connects. Some variables require port IDs, card IDs, or other indexes, for example, spanning tree group IDs. You then select a rising and a falling threshold value. The rising

and falling values compare to the actual value of the variable that you choose. If the variable falls outside of the rising or falling value range, an alarm triggers, and the system logs an event or trap.

When you create an alarm, you also select a sample type, which can be either absolute or delta. Define absolute alarms for alarms based on the cumulative value of the alarm variable. An example of an absolute alarm value is card operating status. Because this value is not cumulative, but instead represents states, such as card up (value 1) and card down (value 2), you configure the value as the absolute value. Therefore, you can create an alarm with a rising value of 2 and a falling value of 1 to alert you whether the card is up or down.

Configure most alarm variables related to Ethernet traffic as a delta value. Define delta alarms for alarms based on the difference in the value of the alarm variable between the start of the polling period and the end of the polling period. The system samples delta alarms twice for each polling period. For each sample, the system adds and compares the last two values to the threshold values. This process increases precision and detects threshold crossings that span the sampling boundary. Therefore, if you track the current values of a delta-valued alarm and add the current values, the result is twice the actual value. This result is not an error in the software.

RMON1 history

The RMON1 history group records periodic statistical samples from a network. A sample is a history and the system gathers the sample in time intervals referred to as buckets.

You can use RMON1 history for the MAC layer in the network. You cannot use RMON1 history for application and network layer protocols.

You enable and create histories to establish a time-dependent method to gather RMON1 statistics on a port. The following are the default values for history:

- Buckets are gathered at 30-minute intervals.
- The number of buckets gathered is 50.

You can configure both the time interval and the number of buckets. However, after the system reaches the last bucket, the system dumps bucket 1 and recycles the bucket to hold a new bucket of statistics. Then the system dumps bucket 2, and so forth.

RMON1 events

RMON1 events and alarms work together to notify you when values in your network go out of a specified range. After a value passes the specified range, the alarm fires. The event specifies how the system records the activity.

You can use RMON1 events for the MAC layer in the network. You cannot use RMON1 events for application and network layer protocols.

An event specifies whether a trap, a log, or both a trap and a log generates to view alarm activity. After you globally enable RMON, two default events generate:

- RisingEvent
- FallingEvent

The default events specify that after an alarm goes out of range, both a trap and a log track the firing of the alarm. For example, after an alarm fires at the rising threshold, the rising event specifies to send this information to both an SNMP trap to the NMS, and a log on the switch. Likewise, after an alarm passes the falling threshold, the falling event specifies to send this information to a trap and a log.

RMON1 statistics

You can use EDM to gather and graph statistics in a variety of formats, or you can save the statistics to a file and export the statistics to a third-party presentation or graphing application.

This implementation of RMON1 requires a control row for Ethernet statistics. This control row appears as port 0/1 when you choose **RMON** > **Control** > **Ethernet Statistics**. The row ID is reserved for the control row. Therefore, some automated tests, such as ANVL, can fail when the test attempts to create a row 1.

RMON2

The RMON2 feature monitors network and application layer protocols on configured network hosts, either VLAN or port interfaces, that you enable for monitoring. The RMON2 feature expands the capacity of RMON1 to upper layer protocols in the OSI model.

The following figure shows which form of RMON monitors which layers in the OSI model:

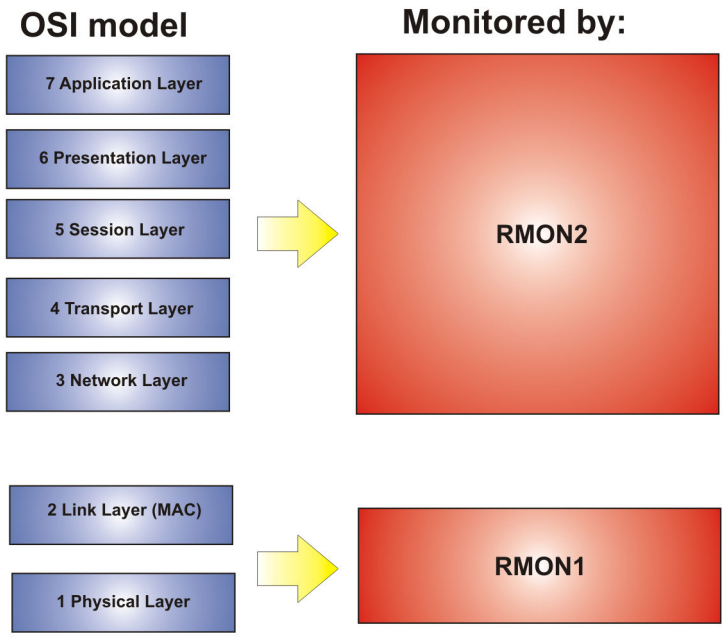

Figure 3: OSI model and RMON

The RMON2 feature is a management information base (MIB) or a group of management objects that you use to obtain or configure values using the Simple Network Management Protocol (SNMP). Avaya supports a partial implementation of RMON2. The RMON2 feature adds the following MIBS: protocol directory, protocol distribution, address map, network-layer host and application layer host for the traffic passing through the (Control Processor) CP for these MIB tables.

The system only collects statistics for IP packets that pass through the CP. RMON2 does not monitor packets on other interfaces processed on the switch that do not pass through the CP.

After you globally enable RMON2, you enable monitoring for individual devices. You identify the network hosts for the system to monitor with a manual configuration on the interfaces you want to monitor.

The RMON2 feature monitors a list of predefined protocols. The system begins to collect protocol statistics immediately after you turn on RMON.

The RMON2 feature collects statistics on:

- Protocols predefined by the system.
- Address mapping between physical and network address on particular network hosts that you configure for monitoring.
- Network host statistics for particular hosts on a network layer protocol (IP) that you configure for monitoring.
- Application host statistics for a particular host on an application layer protocol that you configure for monitoring.

RMON2 MIBs

This section describes the following MIBs, on which RMON2 can collect statistics: protocol directory, protocol distribution, address map, network-layer host, and application layer host.

Protocol directory MIB

The protocol directory is a master directory that lists all of the protocols RMON2 can monitor. The protocols include network layer, transport layer, and application layer protocols, under the OSI model. The system only monitors statistics for the predefined protocols. You cannot delete or add additional protocols to this table. The protocol directory MIB is enabled by default for the predefined protocols.

The predefined protocols include:

- Internet Protocol (IP)
- Secure Shell version 2 (SSHv2)
- Transmission Control Protocol (TCP)
- User Datagram Protcol (UDP)
- File Transfer Protocol (FTP)
- Hypertext Transfer Protocol (HTTP)
- Telnet
- Remote login (rlogin)
- Trivial File Transfer Protocol (TFTP)
- Simple Network Management Protocol (SNMP)

Protocol distribution MIB

The protocol distribution MIB collects traffic statistics that each protocol generates by local area network (LAN) segment. The VSP switch acts as the probe and the system collects protocol statistics for the entire switch as part of the group for all of the protocols predefined in the protocol directory table. The protocol distribution control table is part of this group. The protocol distribution control table is predefined with an entry for the management IP for the switch to represent the

network segment where the system collects the statistics. No ACLI or EDM support exists to add or delete entries in this table.

Address map MIB

The address map MIB maps the network layer IP to the MAC layer address.

The system populates the address map control table MIB with an entry for each host interface that you enable for monitoring on the switch.

Network layer host MIB

The network layer host MIB monitors the Layer 3 traffic statistics for each host. The network layer host MIB monitors traffic packets in and out of hosts based on the network layer address. The network layer host controls the network and application layer host tables.

The system populates an entry for the management IP of the switch to represent the network segment where the system collects the statistics. You have to enable each host interface that you want to monitor on the switch.

The system only collects statistics for this group from packets that go to the CP.

Application layer host MIB

The application layer host MIB monitors traffic statistics by application protocol for each host.

The system populates an entry for the management IP of the switch to represent the network segment where the system collects the statistics. You have to enable each host interface that you want to monitor on the switch.

The system only collects statistics for this group from packets that go to the CP.

Link state change control

Rapid fluctuation in a port link state is called link flapping.

Link flapping is detrimental to network stability because it can trigger recalculation in spanning tree and the routing table.

If the number of port down events exceeds a configured limit during a specified interval, the system forces the port out of service.

You can configure link flap detection to control link state changes on a physical port. You can set thresholds for the number and frequency of changes allowed.

You can configure the system to take one of the following actions if changes exceed the thresholds:

- send a trap
- bring down the port

If changes exceed the link state change thresholds, the system generates a log entry.

Connectivity Fault Management

The Shortest Path Bridging MAC (SPBM) network needs a mechanism to debug connectivity issues and isolate faults. This function is performed at Layer 2, not Layer 3. Connectivity Fault Management (CFM) operates at Layer 2 and provides an equivalent of the **`ping`** and **`traceroute`** commands. The switch supports a subset of CFM functionality to support troubleshooting of the SPBM cloud. For more information about CFM see *Configuring Avaya Fabric Connect on VSP Operating System Software*, NN47227-510.

Chapter 4: Key Health Indicators using ACLI

The Key Health Indicators (KHI) feature of the switch provides a subset of health information that allows for quick assessment of the overall operational state of the device.

Note:

The KHI feature is not intended to provide a comprehensive debugging solution. Instead, KHI identifies key information that could lead Avaya support personnel towards discovery of a specific failure. After the technician assesses the KHI information, further debugging is required to determine the specific reason for the fault.

Avaya recommends that you capture KHI information during normal operations to provide a baseline for Avaya support personnel when detecting fault situations.

Displaying KHI performance information

Use the following commands to display information about the performance of the Key Health Indicator feature.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display buffer performance and utilization statistics for KHI:

   ```
   show khi performance buffer-pool [{slot[-slot][,...]}]
   ```

3. Show current utilization, 5-minute average utilization, and 5-minute high water mark with date and time of event:

   ```
   show khi performance cpu [{slot[-slot][,...]}]
   ```

4. Display memory performance and utilization statistics for KHI on the specified slot or all slots:

   ```
   show khi performance memory [{slot[-slot][,...]}]
   ```

5. Display process performance and utilization statistics for KHI on the specified slot or all slots:

   ```
   show khi performance process [{slot[-slot][,...]}]
   ```

6. Display thread performance and utilization statistics for KHI on the specified slot or all slots:

```
show khi performance pthread [{slot[-slot][,...]}]
```

7. Display internal memory management resource performance and utilization statistics for KHI on the specified slot or all slots:

```
show khi performance slabinfo [{slot[-slot][,...]}]
```

Example

```
Switch:1>show khi performance buffer-pool 1
    Slot:1
      CPP:
         UsedFBuffs: 12
         FreeFBuffs: 3060
         RxQ0FBuffs: 0
         RxQ1FBuffs: 0
         RxQ2FBuffs: 0
         RxQ3FBuffs: 0
         RxQ4FBuffs: 0
         RxQ5FBuffs: 0
         RxQ6FBuffs: 0
         RxQ7FBuffs: 0
         TxQueueFBuffs: 0
         NoFbuff: 0

      Network stack system:
         UsedMbuf: 244
         FreeMbuf: 47606
         SocketMbuf: 19

      Network stack data:
         UsedMbuf: 4
         FreeMbuf: 10748

      Letter API message queue:
         QHigh: 0
         QNormal: 0
         FreeQEntries: 51200
```

```
Switch:1>show khi performance cpu 1
    Slot:1
         Current utilization: 8
         5-minute average utilization: 8
         5-minute high water mark: 13 (02/13/13 14:00:47)
```

```
Switch:1>show khi performance memory 1
    Slot:1
         Used: 514560 (KB)
         Free: 521260 (KB)
         Current utilization: 49 %
         5-minute average utilization: 49 %
         5-minute high water mark: 22 (10/08/14 14:48:01)
```

```
Switch:1>show khi performance process 1
Slot:1
--------------------------------------------------------------------------------
PID  PPID  PName           VmSize  VmLck   VmRss   VmData  VmStk   VmExe  VmLib
--------------------------------------------------------------------------------
1    0     init            1936    0       656     164     88      32     1556
2    0     kthreadd        0       0       0       0       0       0      0
3    2     migration/0     0       0       0       0       0       0      0
4    2     ksoftirqd/0     0       0       0       0       0       0      0
5    2     watchdog/0      0       0       0       0       0       0      0
```

```
6    2     migration/1     0       0       0       0       0       0       0
7    2     ksoftirqd/1     0       0       0       0       0       0       0
8    2     watchdog/1      0       0       0       0       0       0       0
9    2     events/0        0       0       0       0       0       0       0
10   2     events/1        0       0       0       0       0       0       0
11   2     khelper         0       0       0       0       0       0       0
12   2     netns           0       0       0       0       0       0       0
13   2     async/mgr       0       0       0       0       0       0       0
14   2     sync_supers     0       0       0       0       0       0       0
15   2     bdi-default     0       0       0       0       0       0       0
16   2     kblockd/0       0       0       0       0       0       0       0
17   2     kblockd/1       0       0       0       0       0       0       0
18   2     khubd           0       0       0       0       0       0       0
19   2     kmmcd           0       0       0       0       0       0       0
22   2     rpciod/0        0       0       0       0       0       0       0
23   2     rpciod/1        0       0       0       0       0       0       0
24   2     khungtaskd      0       0       0       0       0       0       0
25   2     kswapd0         0       0       0       0       0       0       0
26   2     aio/0           0       0       0       0       0       0       0
27   2     aio/1           0       0       0       0       0       0       0
28   2     nfsiod          0       0       0       0       0       0       0
29   2     mtdblockd       0       0       0       0       0       0       0
38   2     mmcqd           0       0       0       0       0       0       0
55   1     udevd           2356    0       832     264     88      96      1672
1351 2     wdd             0       0       0       0       0       0       0
1749 1     portmap         1920    0       416     164     88      16      1556
1762 1     rc              3156    0       1368    128     88      736     1808
1773 1     sshd            4948    0       904     372     88      392     3376
1779 1     syslogd         2476    0       664     172     88      564     1556
1781 1     klogd           2476    0       620     172     88      564     1556
1782 1762  S25vsp          3292    0       1532    264     88      736     1808
4366 1782  rc.appfs.vsp8k  3180    0       1424    152     88      736     1808
4660 2     i2c_wq          0       0       0       0       0       0       0
4672 2     fan_q           0       0       0       0       0       0       0
4700 2     workqueue_0     0       0       0       0       0       0       0
4702 2     workqueue_1     0       0       0       0       0       0       0
4749 4366  start           3176    0       1392    148     88      736     1808
4780 4749  lifecycle       15664   0       4856    5016    88      284     6936
4785 4780  logger          2480    0       580     176     88      564     1556
4794 4780  sockserv        4404    0       1024    72      88      8       3708
4795 4780  oom95           114768  0       107244  106084  88      84      6432
4796 4780  oom90           115032  0       107240  106348  88      84      6432
4797 4780  imgsync.x       12656   0       4332    2952    88      120     6768
4798 4794  logger          2480    0       580     176     88      564     1556
4799 4795  logger          2480    0       696     176     88      564     1556
4800 4797  logger          2480    0       696     176     88      564     1556
4801 4796  logger          2480    0       696     176     88      564     1556
4839 4780  logServer       16228   0       5284    4340    88      1384    7604
4840 4780  trcServer       11264   0       3580    2544    88      124     6432
4841 4780  oobServer       10300   0       3524    1520    88      104     6444
4842 4780  cbcp-main.x     556732  0       447832  505748  88      25184   14080
4843 4780  rssServer       11236   0       3424    2544    88      96      6432
4844 4780  dbgServer       11240   0       3516    2544    88      100     6432
4845 4780  dbgShell        11084   0       3604    2412    88      84      6432
4846 4780  coreManager.x   11056   0       3576    1896    88      124     6612
4847 4780  ssio            256364  0       147604  216088  88      23328   7236
4848 4780  hckServer       11252   0       3560    2544    88      112     6432
4849 4780  remCmdAgent.x   11684   0       3960    2672    88      88      6564
4850 4839  logger          2480    0       696     176     88      564     1556
4851 4841  logger          2480    0       696     176     88      564     1556
4852 4840  logger          2480    0       696     176     88      564     1556
4853 4842  logger          2480    0       696     176     88      564     1556
4854 4844  logger          2480    0       696     176     88      564     1556
4855 4843  logger          2480    0       696     176     88      564     1556
4856 4845  logger          2480    0       700     176     88      564     1556
```

```
4857 4847  logger           2480    0       696     176     88      564     1556
4858 4846  logger           2480    0       696     176     88      564     1556
4859 4848  logger           2480    0       696     176     88      564     1556
4860 4849  logger           2480    0       696     176     88      564     1556
4907 4847  logger           2480    0       696     176     88      564     1556
4946 4780  slamon.sh        3152    0       1336    124     88      736     1808
4949 4946  logger           2480    0       580     176     88      564     1556
4973 4946  slamon_second.s  3136    0       1272    108     88      736     1808
4982 4973  ns_exec          4324    0       1020    68      88      8       3696
4989 4982  slac             4944    0       1172    460     88      8       3728
```

```
Switch:1>show khi performance pthread 1
 Slot:1
--------------------------------------------------------------------------------
TID   PID   PName            CPU(%) 5MinAvg CPU(%) 5MinHiWater CPU(%(time stamp))
--------------------------------------------------------------------------------
1     1     init             0.0    0.0
2     2     kthreadd         0.0    0.0
3     3     migration/0      0.0    0.0
4     4     ksoftirqd/0      0.0    0.0
5     5     watchdog/0       0.0    0.0
6     6     migration/1      0.0    0.0
7     7     ksoftirqd/1      0.0    0.0
8     8     watchdog/1       0.0    0.0
9     9     events/0         0.0    0.0
10    10    events/1         0.1    0.0         0.1(10/08/14 14:27:31)
11    11    khelper          0.0    0.0
12    12    netns            0.0    0.0
13    13    async/mgr        0.0    0.0
14    14    sync_supers      0.0    0.0
15    15    bdi-default      0.0    0.0
16    16    kblockd/0        0.0    0.0
17    17    kblockd/1        0.0    0.0
18    18    khubd            0.0    0.0
19    19    kmmcd            0.0    0.0
22    22    rpciod/0         0.0    0.0
23    23    rpciod/1         0.0    0.0
24    24    khungtaskd       0.0    0.0
25    25    kswapd0          0.0    0.0
26    26    aio/0            0.0    0.0
27    27    aio/1            0.0    0.0
28    28    nfsiod           0.0    0.0
29    29    mtdblockd        0.0    0.0
38    38    mmcqd            0.0    0.0         0.2(10/08/14 14:27:31)
55    55    udevd            0.0    0.0
1351  1351  wdd              0.0    0.0
1749  1749  portmap          0.0    0.0
1762  1762  rc               0.0    0.0
1773  1773  sshd             0.0    0.0
1779  1779  syslogd          0.0    0.0
1781  1781  klogd            0.0    0.0
1782  1782  S25vsp           0.0    0.0
4366  4366  rc.appfs.vsp8k   0.0    0.0
4660  4660  i2c_wq           0.0    0.0
4672  4672  fan_q            0.0    0.0
4700  4700  workqueue_0      0.0    0.0
4702  4702  workqueue_1      0.0    0.0
4749  4749  start            0.0    0.0
4780  4780  lifecycle        0.0    0.0
4781  4780  _Z15nd_ipc_disp  0.0    0.0
4782  4780  _Z18nd_ipc_send  0.0    0.0
4783  4780  _Z21nd_ipc_rece  0.0    0.0
4784  4780  _ZN10nd_tmr_grp  0.0    0.0
4786  4780  dpmXportRxMonit  0.0    0.0
4787  4780  dpmXportTxMonit  0.0    0.0
```

```
4788  4780  ltrBulkTimerThr 0.0    0.0
4789  4780  lc_wd_exception 0.0    0.0
4790  4780  lc_hwwd_feed    0.0    0.0
4791  4780  lc_swwd_feed    0.0    0.0
4792  4780  worker_thread   0.0    0.0
4793  4780  lc_master       0.0    0.0
4785  4785  logger          0.0    0.0
4794  4794  sockserv        0.0    0.0
4795  4795  oom95           0.0    0.0
4802  4795  _Z15nd_ipc_disp 0.0    0.0
4803  4795  _Z18nd_ipc_send 0.0    0.0
4804  4795  _Z21nd_ipc_rece 0.0    0.0
4808  4795  _ZN10nd_tmr_grp 0.0    0.0
4796  4796  oom90           0.0    0.0
4805  4796  _Z15nd_ipc_disp 0.0    0.0
4806  4796  _Z18nd_ipc_send 0.0    0.0
4807  4796  _Z21nd_ipc_rece 0.0    0.0
4809  4796  _ZN10nd_tmr_grp 0.0    0.0
4797  4797  imgsync.x       0.0    0.0
4810  4797  _Z15nd_ipc_disp 0.0    0.0
4811  4797  _Z18nd_ipc_send 0.0    0.0
4812  4797  _Z21nd_ipc_rece 0.0    0.0
4813  4797  _ZN10nd_tmr_grp 0.0    0.0
4814  4797  dpmXportRxMonit 0.0    0.0
4815  4797  dpmXportTxMonit 0.0    0.0
4816  4797  ltrBulkTimerThr 0.0    0.0
4798  4798  logger          0.0    0.0
4799  4799  logger          0.0    0.0
4800  4800  logger          0.0    0.0
4801  4801  logger          0.0    0.0
4839  4839  logServer       0.0    0.0
4873  4839  _Z15nd_ipc_disp 0.0    0.0
4874  4839  _Z18nd_ipc_send 0.0    0.0
4875  4839  _Z21nd_ipc_rece 0.0    0.0
4876  4839  _ZN10nd_tmr_grp 0.0    0.0        0.1(10/08/14 14:45:12)
4840  4840  trcServer       0.0    0.0
4865  4840  _Z15nd_ipc_disp 0.0    0.0
4866  4840  _Z18nd_ipc_send 0.0    0.0
4867  4840  _Z21nd_ipc_rece 0.0    0.0
4868  4840  _ZN10nd_tmr_grp 0.0    0.0
4841  4841  oobServer       0.0    0.0
4861  4841  _Z15nd_ipc_disp 0.0    0.0
4862  4841  _Z18nd_ipc_send 0.0    0.0
4863  4841  _Z21nd_ipc_rece 0.0    0.0
4864  4841  _ZN10nd_tmr_grp 0.0    0.0
4842  4842  cbcp-main.x     0.0    0.0
4908  4842  _Z15nd_ipc_disp 0.0    0.0
4909  4842  _Z18nd_ipc_send 0.0    0.0
4910  4842  _Z21nd_ipc_rece 0.1    0.0
4911  4842  _ZN10nd_tmr_grp 0.0    0.0
4912  4842  tUsrRoot        0.0    0.0
4913  4842  tExcTask        0.5    0.4        0.4(10/08/14 14:47:51)
4914  4842  tExcJobTask     0.0    0.0
4915  4842  tNetTask        0.1    0.0
4916  4842  traceOutput     0.0    0.0
4917  4842  nd_profile_cmd  0.0    0.0        0.3(10/08/14 14:44:51)
4918  4842  tRlogind        0.1    0.0
4919  4842  tRshd           0.0    0.0
4920  4842  tTftpdTask      0.0    0.0
4921  4842  tFtpdTask       0.1    0.0
4922  4842  dpmXportRxMonit 0.0    0.0
4923  4842  dpmXportTxMonit 0.0    0.0
4924  4842  tndMiscServTask 0.0    0.0
4925  4842  tLoggerTask     0.0    0.0
4926  4842  _ZN10CLimServer 0.1    0.0
```

```
4927  4842  BootpServer     0.0    0.0
4928  4842  tSioMsgRx       0.0    0.0
4929  4842  chEvmTask       0.0    0.0
4930  4842  chFsmTask       0.0    0.0
4931  4842  chServiceTask   0.0    0.0
4933  4842  tSnmpTmr        0.0    0.0
4934  4842  tSnmpd          0.0    0.0
4935  4842  tTacacspTask    0.0    0.0
4936  4842  tTacacsqTask    0.0    0.0
4937  4842  tMainTask       4.5    4.2        15.7(10/08/14 14:48:41)
4938  4842  rtMainTask      0.0    0.0
4939  4842  tCppSend        0.0    0.0
4940  4842  tCppInterruptTa 0.4    0.1        0.9(10/08/14 14:28:21)
4941  4842  cfmMain         0.5    0.3        0.3(10/08/14 14:27:31)
4942  4842  tTalkClient     0.0    0.0
4943  4842  tSlaClient      0.0    0.0
4944  4842  cfmClock        0.0    0.0
4947  4842  tTrapd          0.0    0.0
4948  4842  tOspf6SpfTimer  0.0    0.0
4955  4842  tTrapd          0.0    0.0
4961  4842  tTdpTimer       0.0    0.0
4962  4842  chHealthMonitor 0.0    0.0
4963  4842  tSpfTimer       0.0    0.0
4965  4842  tIsisTask       0.1    0.0
4968  4842  tBgpTask        0.0    0.0
4984  4842  tWebSrv         0.0    0.0
4995  4842  Http0           0.0    0.0
4996  4842  Http1           0.0    0.0
4997  4842  Http2           0.0    0.0
4998  4842  Http3           0.0    0.0
4999  4842  Http4           0.0    0.0
5000  4842  Http5           0.0    0.0
5001  4842  Http6           0.0    0.0
5002  4842  Http7           0.0    0.0
5003  4842  Http8           0.0    0.0
5004  4842  Http9           0.0    0.0
5005  4842  Http10          0.0    0.0
5006  4842  Http11          0.0    0.0
5007  4842  Http12          0.0    0.0
5008  4842  Http13          0.0    0.0
5009  4842  Http14          0.0    0.0
5010  4842  Http15          0.0    0.0
5011  4842  Http16          0.0    0.0
5012  4842  Http17          0.0    0.0
5013  4842  Http18          0.0    0.0
5014  4842  Http19          0.0    0.0
5015  4842  cppTapMain      0.0    0.0
5072  4842  tShell-cli      0.0    0.0        0.5(10/08/14 14:27:31)
5074  4842  tTelnetd        0.0    0.0
5075  4842  smltSlave       0.3    0.0        0.1(10/08/14 14:30:51)
5084  4842  tTeOut_19637cc0 0.0    0.0
5085  4842  tTeIn_19637cc0  0.0    0.0
5086  4842  tShell-cli      0.0    0.0
4843  4843  rssServer       0.0    0.0
4869  4843  _Z15nd_ipc_disp 0.0    0.0
4870  4843  _Z18nd_ipc_send 0.0    0.0
4871  4843  _Z21nd_ipc_rece 0.0    0.0
4872  4843  _ZN10nd_tmr_grp 0.0    0.0
4844  4844  dbgServer       0.0    0.0
4877  4844  _Z15nd_ipc_disp 0.0    0.0
4878  4844  _Z18nd_ipc_send 0.0    0.0
4879  4844  _Z21nd_ipc_rece 0.0    0.0
4880  4844  _ZN10nd_tmr_grp 0.0    0.0
4845  4845  dbgShell        0.0    0.0
4881  4845  _Z15nd_ipc_disp 0.0    0.0
```

```
4882  4845  _Z18nd_ipc_send 0.0    0.0
4883  4845  _Z21nd_ipc_rece 0.0    0.0
4885  4845  _ZN10nd_tmr_grp 0.0    0.0
4846  4846  coreManager.x   0.0    0.0
4901  4846  _Z15nd_ipc_disp 0.0    0.0
4902  4846  _Z18nd_ipc_send 0.0    0.0
4903  4846  _Z21nd_ipc_rece 0.0    0.0
4904  4846  _ZN10nd_tmr_grp 0.0    0.0
4847  4847  ssio            0.0    0.0
4896  4847  _Z15nd_ipc_disp 0.0    0.0
4897  4847  _Z18nd_ipc_send 0.0    0.0
4898  4847  _Z21nd_ipc_rece 0.0    0.0
4899  4847  _ZN10nd_tmr_grp 0.0    0.0
4900  4847  tUsrRoot        0.0    0.0
4905  4847  tExcTask        0.2    0.1        0.1(10/08/14 14:27:31)
4906  4847  tty             0.0    0.0
5016  4847  dpmXportRxMonit 0.0    0.0
5017  4847  dpmXportTxMonit 0.0    0.0
5018  4847  ltrBulkTimerThr 0.1    0.0
5019  4847  nd_profile_cmd  0.0    0.0
5020  4847  tMainTask       0.5    0.3        13.5(10/08/14 14:48:21)
5022  4847  bcmDPC          0.0    0.0
5023  4847  bcmINTR         2.9    2.6        3.5(10/08/14 14:28:21)
5024  4847  socdmadesc.0    0.5    0.5        0.5(10/08/14 14:27:31)
5056  4847  bcmTX           0.0    0.0        0.1(10/08/14 14:45:51)
5057  4847  bcmXGS3AsyncTX  0.0    0.0
5058  4847  bcmL2MOD.0      0.0    0.0        0.1(10/08/14 14:45:31)
5059  4847  bcmCNTR.0       4.7    4.5        4.7(10/08/14 14:44:40)
5060  4847  bcmL2age.0      0.0    0.0
5061  4847  bcmRX           0.4    0.2        1.2(10/08/14 14:27:31)
5062  4847  listener        0.1    0.1        0.7(10/08/14 14:47:41)
5063  4847  bcmLINK.0       2.3    2.3        2.4(10/08/14 14:28:21)
5064  4847  tUsrRoot        0.0    0.0
5065  4847  tRspDebugPollTa 0.0    0.0
5066  4847  tLcdIntrTask    0.0    0.0
5067  4847  tTimerTask      0.0    0.0
5068  4847  tScanSfp        0.1    0.0
5071  4847  tExcJobTask     0.0    0.0
4848  4848  hckServer       0.0    0.0
4884  4848  _Z15nd_ipc_disp 0.0    0.0
4886  4848  _Z18nd_ipc_send 0.0    0.0
4887  4848  _Z21nd_ipc_rece 0.0    0.0
4888  4848  _ZN10nd_tmr_grp 0.0    0.0
4849  4849  remCmdAgent.x   0.0    0.0
4889  4849  _Z15nd_ipc_disp 0.0    0.0
4890  4849  _Z18nd_ipc_send 0.0    0.0
4891  4849  _Z21nd_ipc_rece 0.0    0.0
4892  4849  _ZN10nd_tmr_grp 0.0    0.0
4893  4849  dpmXportRxMonit 0.0    0.0
4894  4849  dpmXportTxMonit 0.0    0.0
4895  4849  ltrBulkTimerThr 0.0    0.0
4850  4850  logger          0.0    0.0
4851  4851  logger          0.0    0.0
4852  4852  logger          0.0    0.0
4853  4853  logger          0.0    0.0
4854  4854  logger          0.0    0.0
4855  4855  logger          0.0    0.0
4856  4856  logger          0.0    0.0
4857  4857  logger          0.0    0.0        0.1(10/08/14 14:44:40)
4858  4858  logger          0.0    0.0
4859  4859  logger          0.0    0.0
4860  4860  logger          0.0    0.0
4907  4907  logger          0.0    0.0
4946  4946  slamon.sh       0.0    0.0
4949  4949  logger          0.0    0.0
```

```
4973  4973  slamon_second.s 0.0    0.0
4982  4982  ns_exec         0.0    0.0
4989  4989  slac            0.0    0.0
4990  4989  slac            0.0    0.0
```

```
Switch:1>show khi performance slabinfo
 Slot:1
--------------------------------------------------------------------------------
Name                    Active  Num     Objsize Objper  Pageper Active  Num
                        Objs    Objs            slab    slab    Slabs   Slabs
--------------------------------------------------------------------------------
merc_sock               0       0       384     21      2       0       0
cfq_queue               72      72      112     36      1       2       2
bsg_cmd                 0       0       288     14      1       0       0
mqueue_inode_cache      15      15      544     15      2       1       1
nfs_direct_cache        0       0       80      51      1       0       0
nfs_inode_cache         0       0       600     13      2       0       0
fat_inode_cache         0       0       416     19      2       0       0
fat_cache               0       0       24      170     1       0       0
ext2_inode_cache        136     41      480     17      2       8       8
configfs_dir_cache      0       0       56      73      1       0       0
posix_timers_cache      0       0       104     39      1       0       0
rpc_inode_cache         17      17      480     17      2       1       1
UNIX                    57      57      416     19      2       3       3
UDP-Lite                0       0       512     16      2       0       0
UDP                     32      32      512     16      2       2       2
tw_sock_TCP             32      32      128     32      1       1       1
TCP                     28      28      1120    14      4       2       2
eventpoll_pwq           204     204     40      102     1       2       2
sgpool-128              12      12      2560    12      8       1       1
sgpool-64               12      12      1280    12      4       1       1
sgpool-32               12      12      640     12      2       1       1
scsi_data_buffer        170     170     24      170     1       1       1
blkdev_queue            48      48      1288    12      4       4       4
blkdev_requests         60      44      200     20      1       3       3
biovec-256              10      10      3072    10      8       1       1
biovec-128              0       0       1536    21      8       0       0
biovec-64               0       0       768     21      4       0       0
sock_inode_cache        304     304     416     19      2       16      16
skbuff_fclone_cache     460     290     352     23      2       20      20
file_lock_cache         72      72      112     36      1       2       2
net_namespace           24      24      320     12      1       2       2
shmem_inode_cache       1170    1144    448     18      2       65      65
proc_inode_cache        777     768     376     21      2       37      37
sigqueue                56      56      144     28      1       2       2
radix_tree_node         1222    1070    296     13      1       94      94
bdev_cache              34      34      480     17      2       2       2
sysfs_dir_cache         7055    7010    48      85      1       83      83
filp                    1700    1520    160     25      1       68      68
inode_cache             3243    3038    352     23      2       141     141
dentry                  6210    5398    136     30      1       207     207
buffer_head             280     277     72      56      1       5       5
vm_area_struct          3358    3250    88      46      1       73      73
mm_struct               126     115     448     18      2       7       7
files_cache             72      71      224     18      1       4       4
signal_cache            119     116     480     17      2       7       7
sighand_cache           108     103     1312    12      4       9       9
task_struct             260     250     1248    13      4       20      20
anon_vma                1280    1278    16      256     1       5       5
idr_layer_cache         208     208     152     26      1       8       8
kmalloc-8192            8       8       8192    4       8       2       2
kmalloc-4096            104     99      4096    8       8       13      13
kmalloc-2048            128     115     2048    16      8       8       8
kmalloc-1024            256     256     1024    16      4       16      16
kmalloc-512             288     240     512     16      2       18      18
```

```
kmalloc-256            352     351     256     16      1       22      22
kmalloc-128            896     895     128     32      1       28      28
kmalloc-64             5120    5120    64      64      1       80      80
kmalloc-32             896     883     32      128     1       7       7
kmalloc-16             1536    1535    16      256     1       6       6
kmalloc-8              2560    2558    8       512     1       5       5
kmalloc-192            273     273     192     21      1       13      13
kmalloc-96             966     900     96      42      1       23      23
```

Variable definitions

Use the data in the following table to use the `show khi performance` command.

Table 1: Variable definitions

Variable	Value
{slot[-slot][,...]}	Specifies the slot number. Valid slot is 1.

Displaying KHI control processor information

Use the following commands to display key health information about the packets generated by the type of packets and protocols received on a port.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display statistics for control packets that go to the control processor:

   ```
   show khi cpp port-statistics [{slot/port[/sub-port][-slot/port[/sub-port]][,...]}]
   ```

Example

```
Switch:1>show khi cpp port-statistics 3/1-3/7
================================================================================
         KHI CPP Details - Port Statistics
================================================================================
Ports    Packet Type                          Rx Packets  Tx Packets
--------------------------------------------------------------------------------
-
3/1      LLC_TDP(134)                            498         498
3/1      LLC_ISIS(137)                           420         421
3/2      LLC_TDP(134)                            498         498
3/4      Ether2_ARP_Request(10)                    0           1
3/4      Ether2_IPv4_PIM_MC(24)                    0         101
3/4      Ether2_IPv4_OSPF_MC(32)                 318         320
3/4      Ether2_IPv4_OSPF_UC(34)                   5           0
3/4      LLC_TDP(134)                            496         496
3/5      Ether2_ARP_Request(10)                    4           4
3/5      Ether2_ARP_Other(11)                      0           4
3/5      Ether2_IPv4_PIM_MC(24)                    0         103
3/5      Ether2_IPv4_OSPF_MC(32)                   0         235
3/5      LLC_TDP(134)                            374         374
```

```
3/7       Ether2_ARP_Request(10)                    0           1
3/7       Ether2_ARP_Other(11)                      1           0
3/7       Ether2_IPv4_PIM_MC(24)                  153         151
3/7       Ether2_IPv4_PIM_UC(26)                    4           0
```

Variable definitions

Use the data in the following table to use the `show khi cpp` command.

Table 2: Variable definitions

Variable	Value
slot/port[-slot/port][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (1/1).

Clearing KHI information

KHI information can be cleared for a specific slot or across the whole device. Use the command to clear the port statistics.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Clear CPP statistics:

   ```
   clear khi cpp <port-statistics>
   ```

Chapter 5: Key Health Indicators using EDM

The Key Health Indicators (KHI) feature of the switch provides a subset of health information that allows for quick assessment of the overall operational state of the device.

Note:

The KHI feature is not intended to provide a comprehensive debugging solution. Instead, KHI identifies key information that could lead Avaya support personnel towards discovery of a specific failure. After the technician assesses the KHI information, further debugging is required to determine the specific reason for the fault.

Avaya recommends that you capture KHI information during normal operations to provide a baseline for Avaya support personnel when detecting fault situations.

Clearing KHI statistics

About this task

Clear KHI statistics.

Procedure

1. In the Device Physical View tab, select the Device.
2. In the navigation tree, expand the following folders: **Configuration** > **Edit**.
3. Click **Chassis**.
4. Click the **CPP Stats Control** tab.
5. Select the statistics you want to clear.
6. Click **Apply**.

CPP Stats Control field descriptions

Use the data in the following table to use the **CPP Stats Control** tab.

Name	Description
PortStatsClear	Clears port statistics.

Displaying KHI port information

About this task

Use the following commands to display key health information about the types of control packets and protocols received on a port and sent to the control processor.

Procedure

1. In the Device Physical View, select a port.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Port**.
4. Click the **CPP Stats** tab.

CPP Stats field descriptions

Use the data in the following table to use the **CPP Stats** tab.

Name	Description
Port	Identifies the slot and port.
Packet	Shows the packet type.
PacketName	Shows the name of the packet.
RxPackets	Indicates the number of received packets on the port for the packet type.
TxPackets	Indicates the number of transmitted packets on the port for the packet type.

Chapter 6: Link state change control using ACLI

Detect and control link flapping to bring more stability to your network.

Controlling link state changes

Configure link flap detection to control state changes on a physical port.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Configure the interval for link state changes:

   ```
   link-flap-detect interval <2-600>
   ```

3. Configure the number of changes allowed during the interval:

   ```
   link-flap-detect frequency <1-9999>
   ```

4. Enable automatic port disabling:

   ```
   link-flap-detect auto-port-down
   ```

5. Enable sending a trap:

   ```
   link-flap-detect send-trap
   ```

Example

1. Enable automatic disabling of the port:

   ```
   Switch(config)# link-flap-detect auto-port-down
   ```

2. Configure the link-flap-detect interval:

   ```
   Switch(config)# link-flap-detect interval 20
   ```

3. Enable sending traps:

   ```
   Switch(config)# link-flap-detect send-trap
   ```

Variable definitions

Use the data in the following table to use the `link-flap-detect` command.

Table 3: Variable definitions

Variable	Value
<auto-port-down>	Automatically disables the port if state changes exceed the link-flap threshold. By default, auto-port-down is enabled. Use the no operator to remove this configuration. To set this option to the default value, use the default operator with the command.
frequency <1-9999>	Configures the number of changes that are permitted during the time specified by the interval command. The default is 20. To set this option to the default value, use the default operator with the command.
interval <2-600>	Configures the link-flap-detect interval in seconds. The default value is 60. To set this option to the default value, use the default operator with the command.
send-trap	Activates traps transmission. The default setting is activated. Use the no operator to remove this configuration. To set this option to the default value, use the default operator with the command.

Displaying link state changes

Displays link flap detection state changes on a physical port.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Display link state changes:

   ```
   show link-flap-detect
   ```

Example

```
Switch:1>enable
Switch:1#show link-flap-detect

 Auto Port Down : enable
 Send Trap      : enable
 Interval       : 60
 Frequency      : 20
```

Chapter 7: Link state change control using EDM

Detect and control link flapping to bring more stability to your network.

Controlling link state changes

About this task

Configure link flap detection to control link state changes on a physical port.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Diagnostics**.
2. Click **General**.
3. Click the **Link Flap** tab.
4. Configure the parameters as required.
5. Click **Apply**.

Link Flap field descriptions

Use the data in the following table to use the **Link Flap** tab.

Name	Description
AutoPortDownEnable	Enables or disables Link Flap Detect. If you enable Link Flap Detect, the system monitors the number of times a port goes down during a designated interval. If the number of drops exceeds a specified limit, the system forces the port out-of-service. The default is enabled.
SendTrap	Specifies that a trap is sent if the port is forced out-of-service.
Frequency	Specifies the number of times the port can go down. The default is 20.
Interval	Specifies the interval (in seconds) between port failures. The default is 60.

Chapter 8: RMON configuration using ACLI

This section contains procedures to configure RMON using ACLI.

Configuring RMON

Enable RMON1 and RMON2 globally, and configure RMON1 alarms, events, history, RAM in bytes to allocate for RMON1, statistics, where RMON1 traps are sent, and whether port utilization is calculated in half or full duplex. By default, RMON1 and RMON2 are disabled globally.

For RMON1, you enable RMON globally, and then you can use RMON1 alarm, history, events, and statistics for the MAC layer in the network. You cannot use RMON1 alarms, history, events, or statistics for application and network layer protocols.

For RMON2, you enable RMON globally, and then you enable RMON on the host interfaces you want to monitor.

Procedure

1. Enter Global Configuration mode:

   ```
   enable

   configure terminal
   ```

2. Enable RMON1 and RMON2 globally:

   ```
   rmon
   ```

3. Configure an RMON1 alarm:

   ```
   rmon alarm <1-65535> WORD <1-1536> <1-3600> {absolute|delta}
   [falling-threshold <-2147483647-2147483647> event <1-65535>] [owner
   WORD<1-127>] [rising-threshold <-2147483647-2147483647> event
   <1-65535>]
   ```

4. Configure an RMON1 event:

   ```
   rmon event <1-65535> [community WORD<1-127>] [description
   WORD<0-127>] [log] [owner WORD<1-127>] [trap] [trap_dest
   [{A.B.C.D}]] [trap_src [{A.B.C.D}]]
   ```

5. Configure RMON1 history:

```
rmon history <1-65535> {slot/port [/sub-port][-slot/port[/sub-port]
[,...]}[buckets <1-65535>][interval <1-3600>][owner WORD<1-127>]
```

6. Configure the amount of RAM in bytes to allocate for RMON1:

   ```
   rmon memsize <250000-4000000>
   ```

7. Configure RMON1 statistics:

   ```
   rmon stats <1-65535> {slot/port [/sub-port][-slot/port[/sub-port]
   [,...]} [owner <1-127>]
   ```

8. Configure whether the RMON1 traps are sent to the owner, or all trap recipients:

   ```
   rmon stats [toOwner][toAll]
   ```

9. Configure whether the system calculates port utilization in half or full duplex:

   ```
   rmon util-method [half|full]
   ```

Example

Configure RMON globally, an RMON1 alarm, and RMON1 event:

```
Switch:1>enable
Switch:1#configure terminal
Switch:1(config)#rmon
Switch:1(config)#rmon alarm 4 rcCliNumAccessViolations.0 10 absolute rising-threshold 2
event 60000
Switch:1(config)#rmon event 60534 community public description "Rising Event" log trap
```

Variable definitions

Use the data in this table to use the `rmon` command.

Table 4: Variable definitions

Variable	Value
alarm *<1-65535> WORD <1-1536> <1-3600>* {absolute|delta} [falling-threshold *<-2147483647-2147483647>* event *<1-65535>*] [owner *WORD<1-127>*] [rising-threshold *<–2147483647-2147483647>* event *<1-65535>*]	Creates an alarm interface. • *<1-65535>*— Specifies the interface index number from 1 to 65535. Each entry defines a diagnostics sample at a particular interval for an object on the device. The default is 1. • *WORD <1-1536>*— Specifies the variable name or OID. The entry is case sensitive and can have a string length of 1 to 1536. • {absolute | delta} — Specifies the sample type. • rising-threshold *<-2147483648-2147483647>* [<event: 1-65535>] — Specifies the rising threshold from -2147483648 to 2147483647, which is a threshold for the sampled statistic. After 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, the system generates a single event. The

Table continues…

Variable	Value
	system also generates a single event if the first sample after this entry that becomes valid is greater than or equal to the rising alarm, or the rising or falling alarm. After the system generates a rising event, the system does not generate another such event until the sampled value falls below this threshold and reaches the alarm falling threshold. You cannot modify this object if the associated alarm status is equal to valid. *<1-65535>*— Specifies the rising event index, which the system uses after the system crosses a rising threshold. The event entry identified by a particular value of this index is the same as identified by the same value of the event index object. If no corresponding entry exists in the event table, no association exists. In particular, if this value is zero, the system does not generate an associated event, as zero is not a valid event index. You cannot modify this object if the associated alarm status is equal to valid. The default is 60534. • falling-threshold <-2147483648-2147483647> [<event: 1-65535>] — Specifies the falling threshold from -2147483648 to 2147483647, which specifies a threshold for the sampled statistic. If 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, the system generates a single event. The system also generates a single event if the first sample after this entry that becomes valid is less than or equal to this threshold and the associated alarm startup alarm is equal to falling alarm or rising or falling alarm. After the system generates a falling event, the system does not generate another such event until the sampled value rises above this threshold, and reaches the alarm rising threshold. You cannot modify this object if the associated alarm status is equal to valid. *<1-65535>* – Specifies the index of the event entry that the system uses after a falling threshold is crossed. The event entry identified by a particular value of this index is the same as identified by the same value of the event index object. If no corresponding entry in the event table exists, no association exists. In particular, if this value is zero, the system does not generate an event, as zero is not a valid event index. You cannot modify this object if the associated alarm status is equal to valid. The default is 60535. • owner *WORD<1-127>* — Specifies the name of the owner, with a string length 1 to 127. Use the default operator to reset the RMON alarms to their default configuration: `default rmon alarm <65535>`

Table continues…

Variable	Value
	Use the no operator to disable RMON alarms: `no rmon alarm [<1-65535>]`
event *<1-65535>* [community *WORD<1-127>*] [description *WORD<0-127>*] [log] [owner *WORD<1-127>*] [trap] [trap_dest [{A.B.C.D}]] [trap_src [{A.B.C.D}]]	Create an event. • *<1-65535>*— Specifies the event index number. Each entry defines one event that the system generates after the appropriate conditions occur. The default is 1. • log — Displays information about configured traps. • trap — Specifies trap source and destination IP addresses. • description *WORD<0-127>*— Specifies the event description, with a string length of 0 to 127. • owner *WORD<1-127>* — Specifies the name of the owner, with a string length of 1 to 127. • trap_src *{A.B.C.D}* — Specifies the trap source IP address. • trap_dest *{A.B.C.D}* — Specifies the trap destination IP address. • community *WORD<1-127>* — Specifies the SNMP community where you can send SNMP traps, with a string length 1 to 127. Use the no operator to delete a RMON event: `no rmon event [<1-65535>] [log]`
history *<1-65535> {slot/port [/sub-port][-slot/port[/sub-port][,...]}*[buckets *<1–65535>*][interval *<1–3600>*][owner *WORD<1–127>*]	Configures RMON history. • *<1-65535>* — Specifies the history index number that uniquely identifies an entry in the history control table. Each entry defines a set of samples at a particular interval for an interface on the default. The default value is 1. • *{slot/port [/sub-port][-slot/port[/sub-port][,...]}* — Specifies the single port interface. Identifies the source for which the system collects and places historical data in a media-specific table on behalf of this history control entry. The source is an interface on this device. The statistics in this group reflect all packets on the local network segment that attaches to the identified interface. • buckets *<1–65535>*— Specifies the requested number of discrete time intervals where the system saves data in the part of the media-specific table associated with this history control entry. The default value is 50. • interval *<1–3600>*— Specifies the time interval in seconds over which the system samples the data for each bucket in the part of the media-specific table associated with this history control entry. Because the counters in a bucket can overflow at their maximum value with no indication, you must take into account the possibility of overflow in all the associated counters. Consider the minimum time in which a counter can

Table continues…

Variable	Value
	overflow on a particular media type, and then set the history control interval to a value less than this interval, which is typically most important for the octets counter in a media-specific table. The default value is 1800. • owner *WORD<1–127>*— Specifies the name of the owner.
rmon memsize *<250000–4000000>*	Configures the amount of RAM in bytes to allocate for RMON. • *<250000–4000000>*— Specifies the memory size in bytes. The default is 250 Kilobytes.
stats *<1-65535> {slot/port [/sub-port][-slot/port[/sub-port][,...]}* owner *WORD<1–127>*	Configures RMON statistics. • *<1-65535>*— Specifies the control Ether statistics entry index number. • *{slot/port [/sub-port][-slot/port[/sub-port][,...]}*— Specifies the single port interface. • owner *WORD<1–127>* — Specifies the name of the owner. Use the no operator to delete a RMON Ether stats control interface: `no rmon stats[<1-65535>]`
trap-option [toOwner][toAll]	Configures whether RMON traps are sent to the owner of the RMON alarm, which is the manager who created the alarm entry, or to all trap recipients in the system trap receiver table. The default value is toOwner.
util-method [half|full]	Configures whether port utilization is calculated in half or full duplex to calculate port usage. • half—Configures the string to half duplex. • full—Configures the string to full duplex. After you select half for half duplex, RMON uses InOctets and the speed of the port to calculate port usage (this is the standard RMON RFC 1271 convention). After you select full for full duplex, RMON uses InOctets and OutOctets, and 2X the speed of the port to calculate port usage. If you select full, but the port operates in half-duplex mode, the calculation defaults to the RFC1271 convention. The default is half.

Enabling Remote Monitoring on an interface

Use the following procedure to enable Remote Monitoring (RMON) on an interface.

Before you begin

- Enable RMON globally.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Enable RMON on a particular VLAN:

   ```
   vlan rmon <1-4059>
   ```

3. Enter GigabitEthernet Interface Configuration mode:

   ```
   enable
   configure terminal
   interface GigabitEthernet {slot/port[/sub-port][-slot/port[/sub-port]][,...]}
   ```

   Note:

   If your platform supports channelization for 40 Gbps ports and the port is channelized, you must also specify the sub-port in the format slot/port/sub-port.

4. Enable RMON on a particular port:

   ```
   rmon
   ```

Example

Enable RMON on VLAN 2:

```
Switch:1>enable
Switch:1#configure terminal
Switch1:1(config)#vlan rmon 2
```

Enable RMON on port 3/8:

```
Switch:1>enable
Switch:1#configure terminal
Switch1:1(config)#interface gigabitethernet 3/8
Switch1:1(config-if)#rmon
```

Variable definitions

Use the data in the following table to use the `show rmon` command.

Table 5: Variable definitions

Variable	Value
address-map	Displays the RMON2 address map. This RMON2 parameter expands RMON capacity to display information on network, transport, and application layers.

Table continues…

Variable	Value
alarm	Displays the RMON1 alarm table. This RMON1 parameter displays and is limited to link layer information, including MAC information.
application-host-stats *WORD<1–64>*	Displays RMON2 application host statistics from one of the following protocols: TCP, UDP, FTP, Telnet HTTP, rLogin, SSHv2, TFTP, SNMP, HTTPS. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
ctl-table	Displays the RMON2 control tables. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
event	Displays the RMON1 event table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.
history	Displays the RMON1 history table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.
log	Displays the RMON1 log table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.
network-host-stats	Displays RMON2 network-host statistics. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
protocol-dist-stats	Displays RMON2 protocol distribution statistics. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
stats	Displays the RMON1 statistics table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.

Displaying RMON information

View RMON1 and RMON2 information on the switch. You can display information on RMON1 alarms, events, history, logs, and statistics. You can also display RMON2 information on application host statistics, control tables, network host statistics, and protocol distribution statistics.

Procedure

1. View RMON1 information:

   ```
   show rmon {alarm|event|history|log|stats}
   ```

2. View RMON2 information:

   ```
   show rmon {address-map|application-host-stats WORD<1-64>|application
   protocols|ctl-table|protocol-dist-stats|network-host-stats}
   ```

Example

View RMON event, log, and statistics information:

```
Switch:(config)#show rmon event

================================================================================
                                  Rmon Event
```

```
================================================================================

INDEX DESCRIPTION     TYPE         COMMUNITY OWNER      LAST_TIME_SENT
--------------------------------------------------------------------------------
60534 Rising Event    log-and-trap public    47.17.142.155 none
60535 Falling Event   log-and-trap public    47.17.142.155 8 day(s), 19:14:32
```

```
Switch:(config)#show rmon log

================================================================================
                                    Rmon Log
================================================================================

INDEX    TIME                 DESCRIPTION
--------------------------------------------------------------------------------
60535. 1 8 day(s), 19:14:45   1.3.6.1.4.1.2272.1.19.14.0 (absValue = 0, Falling
                              Threshold = 2, interval = 10)[alarmIndex.1][trap]
                               "Falling Event"
60535. 2 8 day(s), 19:14:45   1.3.6.1.4.1.2272.1.19.14.0 (absValue = 0, Falling
                              Threshold = 1, interval = 10)[alarmIndex.2][trap]
                               "Falling Event"
```

```
Switch:(config)#show rmon stats

================================================================================
                                 Rmon Ether Stats
================================================================================

INDEX PORT   OWNER
--------------------------------------------------------------------------------
1     cpp    monitor
```

Variable definitions

Use the data in the following table to use the `show rmon` command.

Table 6: Variable definitions

Variable	Value
address-map	Displays the RMON2 address map. This RMON2 parameter expands RMON capacity to display information on network, transport, and application layers.
alarm	Displays the RMON1 alarm table. This RMON1 parameter displays and is limited to link layer information, including MAC information.
application-host-stats *WORD<1–64>*	Displays RMON2 application host statistics from one of the following protocols: TCP, UDP, FTP, Telnet HTTP, rLogin, SSHv2, TFTP, SNMP, HTTPS. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
ctl-table	Displays the RMON2 control tables. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
event	Displays the RMON1 event table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.

Table continues…

Variable	Value
history	Displays the RMON1 history table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.
log	Displays the RMON1 log table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.
network-host-stats	Displays RMON2 network-host statistics. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
protocol-dist-stats	Displays RMON2 protocol distribution statistics. This RMON2 parameter expands RMON capacity to display network, transport, and application layers.
stats	Displays the RMON1 statistics table. This RMON1 parameter displays and is limited to link layer information, including as MAC information.

Chapter 9: RMON configuration using EDM

Remote monitoring (RMON) is a management information base (MIB) or a group of management objects that you use to obtain or configure values using the Simple Network Management Protocol (SNMP).

Enabling RMON globally

About this task

You must globally enable RMON before you can use an RMON function. If you attempt to enable an RMON function before the global flag is disabled, EDM informs you that the flag is disabled and prompts you to enable the flag.

If you want to use nondefault RMON parameter values, you can configure them before you enable RMON, or as you configure the RMON functions.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Options**.
3. Click the **Options** tab.
4. Select the **Enable** check box.
5. In the **UtilizationMethod** option, select a utilization method.
6. In the **TrapOption** option, select a trap option.
7. In the **MemSize** box, type a memory size.
8. Click **Apply**.

Options field descriptions

Use the data in the following table to use the **Options** tab.

Name	Description
Enable	Enables RMON. If you select the **Enable** check box, the RMON agent starts immediately if the amount of memory specified by MemSize is currently available in the device. To disable RMON, clear the **Enable** check box and click **Apply** to save the new setting to NVRAM, and then restart the device. The default is disabled.
UtilizationMethod	Controls whether RMON uses a half-duplex or full-duplex formula to calculate port usage. After you select halfDuplex, RMON uses InOctets and the speed of the port to calculate port usage (this is the standard RMON RFC1271 convention). After you select fullDuplex, RMON uses InOctets and OutOctets and 2X the speed of the port to calculate port usage. If you select fullDuplex, but the port operates in half-duplex mode, the calculation defaults to the RFC1271 convention. The default is halfDuplex.
TrapOption	Indicates whether the system sends RMON traps to the owner of the RMON alarm (the manager who created the alarm entry) or to all trap recipients in the system trap receiver table. The default value is toOwner.
MemSize	Specifies the RAM size, in bytes, available for RMON to use. The default value is 250 Kilobytes.

Enabling RMON on a port or VLAN

Use the following procedure to enable RMON on an interface.

Before you begin

- Enable RMON globally.

Procedure

1. Enable RMON on a VLAN:
   a. In the navigation pane, expand the following folders: **Configuration** > **VLAN**.
   b. Click **VLANs**.
   c. Click the **Advanced** tab.
   d. In the row for the VLAN, double-click the **RmonEnable** field, and then select **enable**.
   e. Click **Apply**.
2. Enable RMON on a port:
   a. In the Device Physical View, select a port.
   b. In the navigation pane, expand the following folders: **Configuration** > **Edit** > **Port**.
   c. Click **General**.
   d. Click the **Interface** tab.
   e. For the **RmonEnable** field, select **enable**.

f. Click **Apply**.

Enabling RMON1 history

About this task

Use RMON1 to establish a history for a port and configure the bucket interval. For example, to gather RMON statistics over the weekend, you must have enough buckets to cover two days. Configure the history to gather one bucket every hour, and cover a 48-hour period. After you configure the history characteristics, you cannot modify them; you must delete the history and create another one.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Control**.
3. In the **History** tab, click **Insert**.
4. In the **Port** box, click the ellipsis (**...**) button.
5. Select a port.
6. Click **OK**.
7. In the **Buckets Requested** box, type the number of discrete time intervals to save data.
8. In the **Interval** box, type the interval in seconds.
9. In the **Owner** box, type the owner information.
10. Click **Insert**.

History field descriptions

Use the data in the following table to use the **History** tab.

Name	Description
Index	Specifies an index that uniquely identifies an entry in the historyControl table. Each entry defines a set of samples at a particular interval for an interface on the device. Index value ranges from 1–65535. The default value is 1.
Port	Identifies the source for which the system collects and places historical data in a media-specific table on behalf of this historyControlEntry. The source is an interface on this device. To identify a particular interface, the object identifies the instance of the ifIndex object, defined in (4,6), for the desired interface. For example, if an entry receives data from

Table continues…

Name	Description
	interface 1, the object is ifIndex 1. The statistics in this group reflect all packets on the local network segment attached to the identified interface. You cannot modify this object if the associated historyControlStatus object is equal to valid(1).
BucketsRequested	Specifies the requested number of discrete time intervals over which the system save data in the part of the media-specific table associated with this historyControlEntry. After this object is created or modified, the probe configures historyControlBucketsGranted as closely to this object as possible for the particular probe implementation and available resources. Values range from 1–65535. The default value is 50.
BucketsGranted	Specifies the number of discrete sampling intervals over which the system save data in the part of the media-specific table associated with this historyControlEntry. After the associated BucketsRequested object is created or modified, the probe sets this object as closely to the requested value as possible for the particular probe implementation and available resources. The probe must not lower this value except as a result of a modification to the associated BucketsRequested object. Occasionally, the actual number of buckets associated with this entry is less than the value of this object. In this case, at the end of each sampling interval, the system adds a new bucket to the media-specific table. After the number of buckets reaches the value of this object and the system is going to add a new bucket to the media-specific table, the agent deletes the oldest bucket associated with this entry so the system can added the new bucket. After the value of this object changes to a value less than the current value, entries are deleted from the media-specific table associated with this entry. The agent deletes the oldest of these entries so that their number remains less than or equal to the new value of this object. After the value of this object changes to a value greater than the current value, the system allows the number of associated media-specific entries to grow.
Interval	Specifies the interval in seconds over which the system samples data for each bucket in the part of the media-specific table associated with this historyControlEntry. You can set this interval between 1–3600 seconds (1 hour). Because the counters in a bucket can overflow at their maximum value with no indication, you must take into account the possibility of overflow in all of the associated counters. Consider the minimum time in which a counter can overflow on a particular media type, and then set the historyControlInterval object to a value less than this interval, which is typically most important for the octets counter in a media-specific table. For example, on an Ethernet network, the etherHistoryOctets counter can overflow in approximately 1 hour at the maximum utilization. You cannot modify this object if the associated historyControlStatus object is equal to valid. The default value is 1800.
Owner	Specifies the entity that configured this entry and uses the assigned resources.

Disabling RMON1 history

About this task

Disable RMON1 history on a port if you do not want to record a statistical sample from that port.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Control**.
3. In the **History** tab, select the row that contains the port ID to delete.
4. Click **Delete**.

Viewing RMON1 history statistics

View RMON1 history statistics when you want to see a statistical sample from the switch. You can create a graph of the statistics in a bar, pie, chart, or line format.

Procedure

1. In the Device Physical View, select a port.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**
3. Click **Port**.
4. Click the **RMON History** tab.
5. Select the statistics you want to graph.
6. Click the button for the type of graph you require (bar, pie, chart, or line).

RMON History field descriptions

Use the data in the following table to use the **RMON History** tab.

Table 7: Variable definitions

Parameter	Description
SampleIndex	Identifies the particular sample this entry represents among all samples associated with the same history control entry. This index starts at one and increases by one as each new sample is taken.
Utilization	Specifies the best estimate of the mean physical layer network utilization on this interface during the sampling interval, in hundredths of a percent.

Table continues…

Parameter	Description
Octets	Specifies the total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets)
Pkts	Specifies the number of packets (including bad packets) received during this sampling interval.
BroadcastPkts	Specifies the number of good packets received during this sampling interval that were directed to the broadcast address.
MulticastPkts	Specifies the number of good packets received during this sampling interval that the system directs to a multicast address. This number does not include packets addressed to the broadcast address.
DropEvents	Specifies the total number of events in which the probe dropped packets due to lack of resources during this sampling interval. This number is not necessarily the number of packets dropped; it is only the number of times the system detects this condition.
CRCAlignErrors	The number of packets the system receives during this sampling interval that had a length (excluding framing bits but including FCS octets) from 64–1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
UndersizePkts	Specifies the number of packets the system receives during this sampling interval that were less than 64 octets (excluding framing bits but including FCS octets), and were otherwise well formed.
OversizePkts	Specifies the number of packets the system receives during this sampling interval that were longer than 1518 octets (excluding framing bits but including FCS octets), but were otherwise well formed.
Fragments	Specifies the total number of packets received during this sampling interval that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error). It is entirely normal for Fragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.
Collisions	Specifies the best estimate of the total number of collisions on this Ethernet segment during this sampling interval. The value returned depends on the location of the RMON probe. Section 8.2.1.3 (10BASE-5) and section 10.3.1.3 (10BASE-2) of IEEE standard 802.3 states that a station must detect a collision in the receive mode if three or more stations transmit simultaneously. A repeater port must detect a collision when two or more stations transmit simultaneously. Thus, a probe placed on a repeater port can record more collisions than a probe connected to a station on the same segment. Probe location plays a small role when 10BASE-T. 14.2.1.4 (10BASE-T) of IEEE standard 802.3 defines a collision as the simultaneous presence of signals on the DO and RD circuits (transmitting and receiving at the same time). A 10BASE-T station can detect only collisions when it transmits. Thus,

Table continues…

Parameter	Description
	probes placed on a station and a repeater can report the same number of collisions. An RMON probe inside a repeater can ideally report collisions between the repeater and one or more other hosts (transmit collisions as defined by IEEE 802.3k) plus receiver collisions observed on any coax segments to which the repeater is connected.

Creating an RMON1 alarm

After you enable RMON1 globally, you also create a default rising and falling event. The default for the events is log-and-trap, which means that you receive notification through a trap as well as through a log file.

Before you begin

- You must globally enable RMON.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Alarms** tab.
4. Click **Insert**.
5. In the **Variable** option, select a variable for the alarm.

   If you select some variables, the system will prompt you for a port (or other object) on which you want to set an alarm.
6. In the **SampleType** option, select a sample type.
7. In the **Interval** box, type a sample interval in seconds.
8. In the **Index** box, type an index number.
9. In the **RisingThreshold** box, type a rising threshold value.
10. In the **RisingEventIndex** box, type a rising threshold event index.
11. In the **FallingThreshold** box, type a falling threshold value.
12. In the **FallingEventIndex** box, type a falling threshold event index.
13. In the **Owner** box, type the owner of the alarm.
14. Click **Insert**.

Alarms field descriptions

Use the data in the following table to use the **Alarms** tab.

Name	Description
Index	Uniquely identifies an entry in the alarm table. Each entry defines a diagnostic sample at a particular interval for an object on the device. The default is 1.
Interval	Specifies the interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds. deltaValue sampling—Configures the interval short enough that the sampled variable is unlikely to increase or decrease by more than 2^31–1 during a single sampling interval. The default is 10.
Variable	Specifies the object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER (INTEGER, Counter, Gauge, or TimeTicks) can be sampled. Alarm variables exist in three formats, depending on the type: • A chassis, power supply, or fan-related alarm ends in x where the x index is hard-coded. No further information is required. • A card, spanning tree group (STG), or EtherStat alarm ends with a dot (.). You must enter a card number, STG ID, IP address, or EtherStat information. • A port alarm ends with no dot or index and requires that you use the port shortcut menu. An example of a port alarm is ifInOctets (interface incoming octet count). Because the system articulates SNMP access control entirely in terms of the contents of MIB views, no access control mechanism exists to restrict the value of this object to identify only those objects that exist in a particular MIB view. Because no acceptable means of restricting the read access that is obtained through the alarm mechanism exists, the probe must grant only write access to this object in those views that have read access to all objects on the probe. After you configure a variable, if the supplied variable name is not available in the selected MIB view, the system returns a badValue error. After the variable name of an established alarmEntry is no longer available in the selected MIB view, the probe changes the status of this alarmEntry to invalid. You cannot modify this object if the associated alarmStatus object is equal to valid.
SampleType	Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds. If the value of this object is absoluteValue, the value of the system compares the selected variable directly with the thresholds at the end of the sampling interval. If the value of this object is deltaValue, the system subtracts the value of the selected variable at the last sample from the current value, and the system compares the difference with the thresholds. You cannot modify this object if the associated alarmStatus object is equal to valid. The default is deltaValue.

Table continues…

Name	Description
Value	Specifies the value of the statistic during the last sampling period. For example, if the sample type is deltaValue, this value is the difference between the samples at the beginning and end of the period. If the sample type is absoluteValue, this value is the sampled value at the end of the period. This system compares the value with the rising and falling thresholds. The value during the current sampling period is not made available until the period is completed and remains available until the next period is complete.
StartUpAlarm	Specifies the alarm that is sent after this entry is first set to valid. If the first sample after this entry becomes valid is greater than or equal to the risingThreshold and alarmStartupAlarm is equal to the risingAlarm or the risingOrFallingAlarm, then the system generates a single rising alarm. If the first sample after this entry becomes valid is less than or equal to the fallingThreshold and alarmStartupAlarm is equal to the fallingAlarm or the risingOrFallingAlarm, then the system generates a single falling alarm. You cannot modify this object if the associated alarmStatus object is equal to valid.
RisingThreshold	Specifies a threshold for the sampled statistic. After 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, the system generates a single event. The system also generates a single event if the first sample after this entry becomes valid is greater than or equal to this threshold and the associated alarmStartupAlarm is equal to risingAlarm or risingOrFallingAlarm. After a rising event is generated, another such event is not generated until the sampled value falls below this threshold and reaches the alarmFallingThreshold. You cannot modify this object if the associated alarmStatus object is equal to valid.
RisingEventIndex	Specifies the index of the eventEntry that is used after a rising threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of the eventIndex object. If no corresponding entry exists in the eventTable, no association exists. In particular, if this value is zero, the system generates no associated event, as zero is not a valid event index. You cannot modify this object if the associated alarmStatus object is equal to valid. The default is 60534.
FallingThreshold	Specifies a threshold for the sampled statistic. If 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, the system generates a single event. The system also generates a single event if the first sample after this entry becomes valid is less than or equal to this threshold and the associated alarmStartupAlarm is equal to fallingAlarm or risingOrFallingAlarm. After the system generates a falling event, the system does not generate another similar event until the sampled value rises above this threshold and reaches the alarmRisingThreshold. You cannot modify this object if the associated alarmStatus object is equal to valid.
FallingEventIndex	Specifies the index of the eventEntry that the system uses after 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 the eventIndex object. If there is no corresponding entry in the eventTable, no association exists. In particular, if this value is zero, the system generates no associated event, as zero is not a

Table continues…

Name	Description
	valid event index. You cannot modify this object if the associated alarmStatus object is equal to valid. The default is 60535.
Owner	Specifies the entity that configured this entry and is therefore using the resources assigned to it.
Status	Specifies the status of this alarm entry.

Creating an RMON1 port history alarm

Create an RMON1 port history alarm to track the number of alarms fired from a particular port.

Procedure

1. Ensure that you globally enable RMON.

   Enabling RMON globally turns on logging and trapping.
2. Select the port that has an alarm configured.
3. Right-click the port.
4. Choose **Enable Rmon Stats and Enable Rmon History**.

Viewing RMON1 alarms

View the RMON1 alarm information to see alarm activity.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Alarm** tab.

Deleting an RMON1 alarm

Delete an RMON1 alarm if you no longer want it to appear in the log.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.

2. Click **Alarms**.
3. Select the alarm you must delete.
4. Click **Delete**.

Creating a default RMON1 event

Create a default rising and falling RMON1 event to specify if alarm information is sent to a trap, a log, or both.

Before you begin

- You must globally enable RMON.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Events** tab.
4. Click **Insert**.
5. In the **Description** box, type a description for the event.
6. In the **Owner** box, type the owner of the event.
7. In the **Insert Events** dialog box, click **Insert**.

Events field descriptions

Use the data in the following table to use the **Events** tab.

Name	Description
Index	Uniquely identifies an entry in the event table. Each entry defines one event that the system generates after the appropriate conditions occur. The default is 1.
Description	Specifies a comment that describes this event entry.
Type	Specifies the type of notification that the probe makes about this event. In the case of a log, the system makes an entry in the log table for each event. In the case of SNMP traps, the system sends an SNMP trap to one or more management stations.
Community	Specifies the SNMP community where you can send SNMP traps.
LastTimeSent	Specifies the value of sysUpTime at the time this event entry last generated an event. If this entry has not generated events, this value is zero.

Table continues…

Name	Description
Owner	Specifies the entity that configured this entry and is therefore using the assigned resources. If this object contains a string starting with monitor and has associated entries in the log table, all connected management stations retrieve those log entries, as they have significance to all management stations connected to this device.

Creating a nondefault RMON1 event

Create a custom rising and falling RMON1 event to specify if alarm information is sent to a trap, a log, or both.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Events** tab.
4. Click **Insert**.
5. In the **Description** box, type an event name.
6. In the **Type** option, select an event type.

   The default configuration is log-and-trap. To save memory, configure the event type to log. To reduce traffic from the system, configure the event type to snmp-log.

   If you select snmp-trap or log, you must configure trap receivers.
7. In the **Community** box, type an SNMP community.
8. In the **Owner** box, type the owner of this event.
9. Click **Insert**.

Events field descriptions

Use the data in the following table to use the **Events** tab.

Name	Description
Index	Uniquely identifies an entry in the event table. Each entry defines one event that the system generates after the appropriate conditions occur. The default is 1.
Description	Specifies a comment that describes this event entry.

Table continues…

Name	Description
Type	Specifies the type of notification that the probe makes about this event. In the case of a log, the system makes an entry in the log table for each event. In the case of SNMP traps, the system sends an SNMP trap to one or more management stations.
Community	Specifies the SNMP community where you can send SNMP traps.
LastTimeSent	Specifies the value of sysUpTime at the time this event entry last generated an event. If this entry has not generated events, this value is zero.
Owner	Specifies the entity that configured this entry and is therefore using the assigned resources. If this object contains a string starting with monitor and has associated entries in the log table, all connected management stations retrieve those log entries, as they have significance to all management stations connected to this device.

Viewing RMON1 events

View RMON1 events to see how many events occurred.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Events** tab.

Events field descriptions

Use the data in the following table to use the **Events** tab.

Name	Description
Index	Uniquely identifies an entry in the event table. Each entry defines one event that the system generates after the appropriate conditions occur. The default is 1.
Description	Specifies a comment that describes this event entry.
Type	Specifies the type of notification that the probe makes about this event. In the case of a log, the system makes an entry in the log table for each event. In the case of SNMP traps, the system sends an SNMP trap to one or more management stations.
Community	Specifies the SNMP community where you can send SNMP traps.
LastTimeSent	Specifies the value of sysUpTime at the time this event entry last generated an event. If this entry has not generated events, this value is zero.

Table continues…

Name	Description
Owner	Specifies the entity that configured this entry and is therefore using the assigned resources. If this object contains a string starting with monitor and has associated entries in the log table, all connected management stations retrieve those log entries, as they have significance to all management stations connected to this device.

Viewing the RMON log

About this task

View the trap log to see which activity occurred.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Log** tab.

Log field descriptions

Use the data in the following table to use the **Log** tab.

Name	Description
Time	Specifies the creation time for this log entry.
Description	Specifies an implementation dependent description of the event that activated this log entry.

Deleting an event

Delete an event after you no longer require the alarm information.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Alarms**.
3. Click the **Events** tab.
4. Select the event you must delete.

5. Click **Delete**.

Viewing the protocol directory

View the protocol directory to see the list of protocols that RMON2 can monitor. You cannot change the list of protocols.

About this task

The protocol directory MIB is enabled by default for the predefined protocols.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Protocol Directory**.
3. Click the **Protocol Directories** tab.

Protocol Directories field descriptions

Use the data in the following table to use the **Protocol Directories** tab.

Name	Description
Index	Shows a unique identifier for the entry in the table.
Protocol	Shows the protocols RMON2 can monitor: • Internet Protocol (IP) • Secure Shell version 2 (SSHv2) • Transmission Control Protocol (TCP) • User Datagram Protcol (UDP) • File Transfer Protocol (FTP) • Hypertext Transfer Protocol (HTTP) • Telnet • Remote login (rlogin) • Trivial File Transfer Protocol (TFTP) • Simple Networking Management Protocol (SNMP)

Table continues…

Name	Description
AddressMapConfig	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The values can be one of the following: • notSupported • supportedOff • supportedOn If the value is supportedOn, the probe adds entries to the Address Map tab that maps the network layer address to the MAC layer address.
HostConfig	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The values can be one of the following: • notSupported • supportedOff • supportedOn If the value is supportedOn, the probe adds entries to the Host Control tab to collect statistics for network layer and application layer hosts.
MatrixConfig	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The values can be one of the following: • notSupported • supportedOff • supportedOn
Owner	Shows the entity that configured this entry.

Viewing the data source for protocol distribution statistics

View the Distribution Control tab to see the network segment data source on which the protocol distribution statistics are measured. The management IP mentioned as a data source represents the IP that the SNMP agent uses to access the switch.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Protocol Distribution**.
3. Click the **Distribution Control** tab.

Distribution Control field descriptions

Use the data in the following table to use the **Distribution Control** tab.

Name	Description
Index	Shows a unique identifier for the entry in the table.
DataSource	Specifies the source of data for this protocol distribution.
DroppedFrames	Shows the total number of frames that the probe receives and drops but does not include in the StatsDropEvents value. This event can occur if the probe is out of resources and sheds the load from this collection. This value does not include packets that were not counted because they had MAC-layer errors.
CreateTime	Shows the value of the sysUpTime when the entry was last activated.
Owner	Shows the entity that configured this entry.

Viewing protocol distribution statistics

View protocol distribution statistics to see traffic statistics that each protocol generates by local area network (LAN) segment.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Protocol Distribution**.
3. Click the **Distribution Stats** tab.

Distribution Stats field descriptions

Use the data in the following table to use the **Distribution Stats** tab.

Name	Description
LocalIndex	Identifies the protocol distribution an entry is part of, as well as the particular protocol that it represents.

Table continues…

Name	Description
Pkts	Shows the number of packets without errors received for this protocol type. This value is the number of link-layer packets so a single, fragmented network-layer packet can increment the counter several times.
Octets	Shows the number of octets in packets received for this protocol type since it was added to the table. This value does not include octets in packets that contained errors. This value counts octets in the entire packet that contained the protocol, not just the particular protocol frames.

Viewing the host interfaces enabled for monitoring

View the entries in the address map control tab to see which host interfaces are enabled for monitoring on the switch. Each entry in this table enables the discovery of addresses on a new interface.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Address Map**.
3. Click the **Address Map Control** tab.

Address Map Control field descriptions

Use the data in the following table to use the **Address Map Control** tab.

Name	Description
Index	Shows a unique identifier for the entry in the table.
DataSource	Shows the source of data for the entry.
DroppedFrames	Shows the total number of frames that the probe receives and drops but does not include in the StatsDropEvents value. This event can occur if the probe is out of resources and sheds the load from this collection. This value does not include packets that were not counted because they had MAC-layer errors.
Owner	Shows the entity that configured this entry.

Viewing address mappings

View the mappings of network layer address to physical address to interface.

About this task

The probe adds entries on this tab based on the source MAC and network addresses in packets without MAC-level errors.

The probe populates this table for all protocols on the **Protocol Directories** tab with a value of **AddressMapConfig** equal to **supportedOn**.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Address Map**.
3. Click the **Address Map** tab.

Address Map field descriptions

Use the data in the following table to use the **Address Map** tab.

Name	Description
LocalIndex	Shows a unique identifier for the entry in the table.
HostAddress	Shows the network address for this entry. The format of the value depends on the protocol portion of the local index.
Source	Shows the interface or port on which the network address was most recently seen.
PhysicalAddress	Shows the physical address on which the network address was most recently seen.
LastChange	Shows the value of the sysUpTime when the entry was created or last changed. If this value changes frequently, it can indicate duplicate address problems.

Viewing the data source for host statistics

View the Host Control tab to see the data source for both network layer and application layer host statistics.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Network Layer Host**.
3. Click the **Host Control** tab.

Host Control field descriptions

Use the data in the following table to use the **Host Control** tab.

Name	Description
Index	Shows a unique identifier for the entry in the table.
DataSource	Shows the source of data for the associated host table. The statistics in this group reflect all packets on the local network segment that attaches to the identified interface.
NHDropFrames	Shows the total number of frames that the probe receives and drops but does not include in the StatsDropEvents value. This event can occur if the probe is out of resources and sheds the load from this collection. This value does not include packets that were not counted because they had MAC-layer errors.
AHDropFrames	Shows the total number of frames that the probe receives and drops but does not include in the StatsDropEvents value. This event can occur if the probe is out of resources and sheds the load from this collection. This value does not include packets that were not counted because they had MAC-layer errors.
Owner	Shows the entity that configured this entry.

Viewing network host statistics

View network host statistics to see Layer 3 traffic statistics for each host. The network layer host MIB monitors traffic packets in and out of hosts based on the network layer address.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Network Layer Host**.

3. Click the **Network Host Stats** tab.

Network Host Stats field descriptions

Use the data in the following table to use the **Network Host Stats** tab.

Name	Description
LocalIndex	Shows a unique identifier for the entry in the table.
HostAddress	Shows the host address for this entry.
InPkts	Shows the number of packets without errors transmitted to this address. This value is the number of link-layer packets so a single, fragmented network-layer packet can increment the counter several times.
OutPkts	Shows the number of packets without errors transmitted by this address. This value is the number of link-layer packets so a single, fragmented network-layer packet can increment the counter several times.
InOctets	Shows the number of octets transmitted to this address, excluding octets in packets that contained errors. This value counts octets in the entire packet that contained the protocol, not just the particular protocol frames.
OutOctets	Shows the number of octets transmitted by this address, excluding octets in packets that contained errors. This value counts octets in the entire packet that contained the protocol, not just the particular protocol frames.
CreateTime	Shows the value of the sysUpTime when the entry was last activated.

Viewing application host statistics

View application host statistics to see traffic statistics by application protocol for each host.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Application Layer Host**.
3. Click the **Application Host Stats** tab.

Application Host Stats field descriptions

Use the data in the following table to use the **Application Host Stats** tab.

Name	Description
Index	Shows a unique identifier for the entry in the table.
LocalIndex	Identifies the network layer protocol of the address.
HostAddress	Identifies the network layer address of this entry.
LocalIndex	Identifies the protocol that is counted by this entry.
InPkts	Shows the number of packets for this protocol type, without errors, transmitted to this address. This value is the number of link-layer packets so a single, fragmented network-layer packet can increment the counter several times.
OutPkts	Shows the number of packets for this protocol type, without errors, transmitted by this address. This value is the number of link-layer packets so a single, fragmented network-layer packet can increment the counter several times.
InOctets	Shows the number of octets transmitted to this address, excluding octets in packets that contained errors. This value counts octets in the entire packet that contained the protocol, not just the particular protocol frames.
OutOctets	Shows the number of octets transmitted by this address, excluding octets in packets that contained errors. This value counts octets in the entire packet that contained the protocol, not just the particular protocol frames.
CreateTime	Shows the value of the sysUpTime when the entry was last activated.

Chapter 10: Viewing statistics using ACLI

Use remote monitoring (RMON) statistics on Ethernet ports to remotely monitor network performance.

Viewing RMON statistics

View RMON statistics to manage network performance.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. View RMON statistics:

   ```
   show rmon stats
   ```

Example

```
Switch:1#show rmon stats

================================================================================
                                Rmon Ether Stats
================================================================================

INDEX PORT   OWNER
--------------------------------------------------------------------------------
1     cpp    monitor
```

Job aid

Use the data in the following table to use the `show rmon stats` command output.

Table 8: show rmon stats command output

Parameter	Description
Index	Uniquely identifies an entry in the Ethernet Statistics table.

Table continues…

Parameter	Description
Port	Identifies the source of the data that this etherStats entry analyzes.
Owner	Specifies the entity that configured this entry and is therefore using the assign resources.

Chapter 11: Viewing statistics using EDM

Use remote monitoring (RMON) statistics on Ethernet ports to remotely monitor network performance.

Enabling RMON statistics

About this task

Enable Ethernet statistics collection for RMON.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Control**.
3. Click the **Ethernet Statistics** tab.
4. Click **Insert**.
5. Next to the **Port** box, click the ellipsis **(...)** button.
6. Select a port.
7. Click **OK**.
8. In the **Owner** box, type the name of the owner entity.
9. Click **OK**.
10. Click **Insert**.

Ethernet Statistics field descriptions

Use the data in the following table to use the **Ethernet Statistics** tab.

Name	Description
Index	Uniquely identifies an entry in the Ethernet Statistics table. The default is 1.
Port	Identifies the source of the data that this etherStats entry is configured to analyze.
Owner	Specifies the entity that configured this entry and therefore uses the assigned resources.

Disabling RMON statistics

About this task

Disable RMON statistics on a port after you do not need to gather statistics on that port.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Serviceability** > **RMON**.
2. Click **Control**.
3. Click the **Ethernet Statistics** tab.
4. Select the row that contains the port ID for which you must disable statistics.
5. Click **Delete**.

Chapter 12: Log and trap fundamentals

Use the information in this section to help you understand Simple Network Management Protocol (SNMP) traps and log files, available as part of the switch System Messaging Platform.

Overview of traps and logs

System log messaging

On a UNIX-based management platform, you can use system log (syslog) messaging to manage event messages. The switch syslog software communicates with a server software component named syslogd on the management workstation.

The UNIX daemon syslogd is a software component that receives and locally logs, displays, prints, and forwards messages that originate from sources internal and external to the workstation. For example, syslogd on a UNIX workstation concurrently handles messages received from applications that run on the workstation, as well as messages received from the switch that run in a network accessible to the workstation.

The remote UNIX management workstation performs the following actions:

- Receives system log messages from the switch .
- Examines the severity code in each message.
- Uses the severity code to determine appropriate system handling for each message.

Log consolidation

Virtual Services Platform generates a system log file and can forward that file to a syslog server for remote viewing, storage and analyzing.

The system log captures messages for the following components:

- Extensible Authentication Protocol (EAP)
- Remote Authentication Dial-in User Service (RADIUS)
- Remote Monitoring (RMON)
- Web
- hardware (HW)
- MultiLink Trunking (MLT)
- filter
- Quality of Service (QoS)

- Command line interface (CLI) log
- software (SW)
- Central Processing Unit (CPU)
- Internet Protocol (IP)
- Virtual Local Area Network (VLAN)
- policy
- Simple Network Management Protocol (SNMP) log

The switch can send information in the system log file, including ACLI command log and the SNMP operation log, to a syslog server.

View logs for CLILOG module to track all ACLI commands executed and for fault management purposes. The ACLI commands are logged to the system log file as CLILOG module.

View logs for SNMPLOG module to track SNMP logs. The SNMP operation log is logged to the system log file as SNMPLOG module.

The platform logs CLILOG and SNMPLOG as INFO. Normally, if you configure the logging level to WARNING, the system skips all INFO messages. However, if you enable CLILOG and SNMPLOG the system logs ACLI Log and SNMP Log information regardless of the logging level you set. This is not the case for other INFO messages.

System log client over IPv6 transport

You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration except in the following case. When you configure the system log table in EDM, under the **System Log Table** tab, you must select either IPv4 or IPv6.

Log messages with enhanced secure mode

Enhanced secure mode allows the system to provide role-based access levels, stronger password requirements, and stronger rules on password length, password complexity, password change intervals, password reuse, and password maximum age use. If you enable enhanced secure mode, the system encrypts the entire log file.

With enhanced secure mode enabled, only individuals in the administrator or auditor role can view log files to analyze switch access and configuration activity. However, no access level role can modify the content of the log files, not even the administrator or the auditor access level roles. The administrator has access to the **`remove`** and **`delete`** commands.

If you enable enhanced secure mode, you cannot access the following commands for log files at any role-based access level:

- **`more`**
- **`edit`**
- **`rename`**
- **`copy`**

If someone attempts to access a log file with the preceding commands, an information and warning message displays on the screen.

The following table summarizes log file command access based on role-based access levels.

Table 9: Log commands accessible for various users

Access level role	Commands
Administrator	The **remove** and **delete** commands.
No user at any access level.	The following commands: • **more** • **edit** • **rename** • **copy**
Administrator	All configuration commands can only be accessed by the individual in the administrator role, other than the preceding commands.
Administrator and auditor	All show commands for log files.
All users (Administrator, auditor, security, privilege, operator)	All show commands for log configurations.

With enhanced secure mode enabled, authorized users can use SFTP to transfer files to a remote server with the content encrypted.

SNMP traps

The SNMP trap is an industry-standard method used to manage events. You can set SNMP traps for specific types of log message (for example, warning or fatal), from specific applications, and send them to a trap server for further processing. For example, you can configure the switch to send SNMP traps to a server after a port is unplugged or if a power supply fails.

This document only describes SNMP commands related to traps. For more information about how to configure SNMP community strings and related topics, see *Configuring Security on Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-601.

Simple Network Management Protocol

The Simple Network Management Protocol (SNMP) provides facilities to manage and monitor network resources. SNMP consists of:

- Agents—An agent is software that runs on a device that maintains information about device configuration and current state in a database.
- Managers—An SNMP manager is an application that contacts an SNMP agent to query or modify the agent database.
- The SNMP protocol—SNMP is the application-layer protocol SNMP agents and managers use to send and receive data.
- Management Information Bases (MIB)—The MIB is a text file that specifies the managed objects by an object identifier (OID).

Important:

The switch does not reply to SNMP requests sent to the Virtual Router Redundancy Protocol (VRRP) virtual interface address; it does, however, reply to SNMP requests sent to the physical IP address.

An SNMP manager and agent communicate through the SNMP protocol. A manager sends queries and an agent responds; however, an agent initiates traps. Several types of packets transmit between SNMP managers and agents:

- Get request—This message requests the values of one or more objects.
- Get next request—This message requests the value of the next object.
- Set request—This message requests to modify the value of one or more objects.
- Get response—An SNMP agent sends this message in response to a get request, get next request, or set request message.
- Trap—SNMP trap is a notification triggered by events at the agent.

Log message format

The log messages for the switch have a standardized format. All system messages are tagged with the following information, except that alarm type and alarm status apply to alarm messages only:

- Avaya proprietary (AP) format—Provides encrypted information for debugging purposes
- CPU slot number—Indicates the CP slot where the command is logged.
- timestamp—Records the date and time at which the event occurred. The format is MM/DD/YY hh:mm:ss.uuu, where uuu is milliseconds. Example: [11/01/10 11:41:21.376].
- event code—Precisely identifies the event reported.
- alarm code—Specifies the alarm code.
- alarm type—identifies the alarm type (Dynamic or Persistent) for alarm messages
- alarm status—identifies the alarm status (set or clear) for alarm messages
- VRF name—Identifies the Virtual Routing and Forwarding (VRF) instance, if applicable.
- module name—Identifies the software module or hardware from which the log is generated.
- severity level—Identifies the severity of the message.
- sequence number—Identifies a specific CLI command.
- context—Specifies the type of the session used to connect to the switch. If the session is a remote session, the remote IP address is identified.
- user name—Specifies the user name used to login to the switch.
- ACLI command—Specifies the commands typed during the ACLI session. The system logs anything type during the ACLI session as soon as the user enters the Enter key.

The following messages are examples of an informational message for CLILOG:

```
CP1  [07/18/14 13:23:11.253] 0x002c0600 00000000 GlobalRouter CLILOG INFO    13   TELNET:
135.55.40.200 rwa show log file name-of-file log.40300001.1806

CP1  [07/18/14 13:24:19.739] 0x002c0600 00000000 GlobalRouter CLILOG INFO    15 TELNET:
135.55.40.200 rwa term more en

 CP1  [07/18/14 13:24:22.577] 0x002c0600 00000000 GlobalRouter CLILOG INFO    16 TELNET:
135.55.40.200 rwa show log

CP1  [01/12/70 15:13:59.056] 0x002c0600 00000000 GlobalRouter CLILOG INFO     5 TELNET:
47.17.170.108 rwa syslog host 4

CP1  [01/12/70 15:13:35.520] 0x002c0600 00000000 GlobalRouter CLILOG INFO     4 TELNET:
47.17.170.108 rwa syslog host enable

CP1  [01/12/70 15:13:14.576] 0x002c0600 00000000 GlobalRouter CLILOG INFO     3 TELNET:
47.17.170.108 rwa show syslog

CP1  [01/12/70 15:12:44.640] 0x002c0600 00000000 GlobalRouter CLILOG INFO     2 TELNET:
47.17.170.108 rwa show logging file tail
```

The following messages are examples of an informational message for SNMPLOG:

```
CP1  [05/07/14 10:24:05.468] 0x002c4600 00000000 GlobalRouter SNMPLOG INFO     1
ver=v2c  public  rcVlanPortMembers.2 =

CP1  [05/07/14 10:29:58.133] 0x002c4600 00000000 GlobalRouter SNMPLOG INFO     2
ver=v2c  public  rcVlanPortMembers.2 =

CP1  [05/07/14 10:30:20.466] 0x002c4600 00000000 GlobalRouter SNMPLOG INFO    3  ver=v2c
public  rcVlanPortMembers.1 =
```

The following messages are examples of an informational message for system logs:

```
CP1  [07/24/14 18:04:08.304] 0x00000670 00000000 GlobalRouter SW INFO Basic license
supports all features on this device
CP1  [07/24/14 18:04:10.651] 0x00034594 00000000 GlobalRouter SW INFO System boot
CP1  [07/24/14 18:04:10.651] 0x00034595 00000000 GlobalRouter SW INFO VSP-8200 System
Software Release 0.0.0.0_B553
CP1  [07/24/14 18:04:10.779] 0x00010774 00000000 GlobalRouter HW INFO Detected 8 284XSQ
chassis
CP1  [07/24/14 18:04:10.779] 0x0001081c 00400010.2 DYNAMIC SET GlobalRouter HW INFO Slot
2 is initializing.
CP1  [07/24/14 18:04:10.780] 0x0001081c 00400010.1 DYNAMIC SET GlobalRouter HW INFO Slot
1 is initializing.
CP1  [07/24/14 18:04:10.810] 0x00010729 00000000 GlobalRouter HW INFO Detected 8284XSQ
Power Supply in slot PS 1. Adding 800 watts to available power
CP1  [07/24/14 18:04:10.811] 0x00010830 00000000 GlobalRouter HW INFO Detected 8242XSQ
module (Serial#: SDNIV84Q2013) in slot 2
```

The system encrypts AP information before writing it to the log file. The encrypted information is for debugging purposes. Only an Avaya Customer Service engineer can decrypt the information. ACLI commands display the logs without the encrypted information. Avaya recommends that you do not edit the log file.

The following table describes the system message severity levels.

Table 10: Severity levels

Severity level	Definition
EMERGENCY	A panic condition that occurs when the system becomes unusable. Usually a severity level of emergency is usually a condition where multiple applications or server are affected. You must correct a severity level of alert immediately.
ALERT	Any condition requiring immediate attention and correction. You must correct a severity level of alert immediately, but usually indicates failure of a secondary system, such as an Internet Service Provider connection.
CRITICAL	Any critical conditions, such as a hard drive error.
ERROR	A nonfatal condition occurred. You can be required to take appropriate action. For example, the system generates an error message if it is unable to lock onto the semaphore required to initialize the IP addresses used to transfer the log file to a remote host.
WARNING	A nonfatal condition occurred. No immediate action is needed. An indication that an error can occur if action is not taken within a given amount of time.
NOTIFICATION	Significant event of a normal and normal nature. An indiciation that unusual, but not error, conditions have occurred. No immediate action is required.
INFO	Information only. No action is required.
DEBUG	Message containing information useful for debugging.
FATAL	A fatal condition occurred. The system cannot recover without restarting. For example, a fatal message is generated after the configuration database is corrupted.

Based on the severity code in each message, the platform dispatches each message to one or more of the following destinations:

- workstation display
- local log file
- one or more remote hosts

You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration except in the following case. When you configure the system log table in EDM, under the **System Log Table** tab, you must select either IPv4 or IPv6.

Internally, the switch has four severity levels for log messages: INFO, WARNING, ERROR, and FATAL. The system log supports eight different severity levels:

- Debug
- Info
- Notice
- Warning
- Critical

- Error
- Alert
- Emergency

The following table shows the default mapping of internal severity levels to syslog severity levels.

Table 11: Default and system log severity level mapping

UNIX system error codes	System log severity level	Internal severity level
0	Emergency	Fatal
1	Alert	—
2	Critical	—
3	Error	Error
4	Warning	Warning
5	Notice	—
6	Info	Info
7	Debug	—

Log files

The log file captures hardware and software log messages, and alarm messages. The switch logs to internal flash.

The system saves internal log messages in a circular list in memory, which overwrite older log messages as the log fills. Unlike the log messages in a log file, the internal log messages in memory do not contain encrypted information, which can limit the information available during troubleshooting. Free up the disk space on the flash if the system generates the disk space 75% full alarm. After the disk space utilization returns below 75%, the system clears the alarm, and then starts logging to a file again.

Log file naming conventions

The following list provides the naming conventions for the log file:

- The log file is named as log.xxxxxxxx.sss format. The prefix of the log file name is log. The six characters after the log file prefix contain the last three bytes of the chassis base MAC address. The next two characters are 01. The last three characters (sss) denote the sequence number of the log file.
- The sequence number of the log file is incremented for each new log file created after the existing log file reaches the maximum configured size.
- At initial system start up when no log file exists, a new log file with the sequence number 000 is created. After a restart, the system finds the newest log file from internal flash based on file timestamps. If the newest log file is on the flash that is used for logging, the system continues to use the newest log file. And once the maximum configured size is reached, system

continues to create a new log file with incremental sequence number on the internal flash for logging.

Log file transfer

The system logs contain important information for debugging and maintaining the switch. After the current log file reaches the configured maximum size, the system creates a new log file for logging. The system transfers old log files to a remote host. You can configure up to 10 remote hosts, which creates long-term backup storage of your system log files.

Of the 10 configured remote hosts, 1 is the primary host and the other 9 are redundant. Upon initiating a transfer, system messaging attempts to use host 1 first. If host 1 is not reachable, system messaging tries hosts 2 to 10.

If log file transfer is unsuccessful, the system keeps the old log files on internal flash. The system attempts to transfer old log files after the new log file reaches the configured maximum size. The system also attempts to transfer old log files periodically (once in one hundred log writes) if the disk space on the flash is more than 75% full.

You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration.

With enhanced secure mode enabled, authorized users can use SFTP to transfer files to a remote server with the content encrypted.

You can specify the following information to configure the transfer criteria:

- The maximum size of the log file.
- The IP address of the remote host.
- The name prefix of the log file to store on the remote host.

  The system appends a suffix of .xxxxxxxx.sss to the file name. The first six characters of the suffix contain the last three bytes of the chassis base MAC address. The next two characters are 01. The last three characters (sss) denote the sequence number of the log file. For example, if you configure the name prefix as mylog, a possible file name is mylog.90000001.001.
- The user name and password, if using File Transfer Protocol (FTP) for file transfer. Use the following commands to configure the user name and password:

  ```
  boot config host user WORD<0-16>

  boot config host password WORD<0-16>
  ```

Be aware of the following restrictions to transfer log files to a remote host:

- The remote host IP address must be reachable.
- If you transfer a log file from a host to the system, (for example, to display it with a show command), rename the log file. Failure to rename the log file can cause the system to use the recently transferred file as the current log, if the sequence number in the extension is higher than the current log file. For example, if bf860005.002 is the current log file and you transfer bf860005.007 to the system, the system logs future messages to the bf860005.007 file. You

can avoid this if you rename the log file to something other than the format used by system messaging.

- If your TFTP server is a UNIX-based machine, files written to the server must already exist. For example, you must create dummy files with the same names as your system logs. This action is commonly performed by using the touch command (for example, **`touch bf860005.001`**).

Three parameters exist to configure the log file:

- the minimum acceptable free space available for logging
- the maximum size of the log file
- the percentage of free disk space the system can use for logging

Although these three parameters exist, you can only configure the maximum size of the log file. The switch does not support the minimum size and percentage of free disk space parameters. The internal flash must be less than 75% full for the system to log a file. If the internal flash is more than 75% full, logging to a file stops to prevent exhausting disk space.

Log file transfer using a wildcard filename

Log files from VOSS Release 4.1 and earlier were created without access permissions. However, file transfers using SFTP require file permissions.

The command `attribute WORD<1-99> [+/-] R` allows you to change the permissions of a file. To change permissions for log files created in VOSS 4.1 and earlier, use the **`attribute`** command with the wildcard filename `log.*`. Using the command in the wildcard form `attribute log.* [+/-]R` changes permissions for log files with names that begin with the characters “log.”.

Important:

You cannot use a wildcard pattern other than `log.*` for this command.

Chapter 13: Log configuration using ACLI

Use log files and messages to perform diagnostic and fault management functions.

Configuring a UNIX system log and syslog host

Configure the syslog to control a facility in UNIX machines that logs SNMP messages and assigns each message a severity level based on importance.

About this task

You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration using ACLI.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Enable the system log:

   ```
   syslog enable
   ```

3. Specify the IP header in syslog packets:

   ```
   syslog ip-header-type <circuitless-ip|default>
   ```

4. Configure the maximum number of syslog hosts:

   ```
   syslog max-hosts <1-10>
   ```

5. Create the syslog host:

   ```
   syslog host <1-10>
   ```

6. Configure the IP address for the syslog host:

   ```
   syslog host <1-10> address WORD <0-46>
   ```

7. Enable the syslog host:

   ```
   syslog host <1-10> enable
   ```

Configure optional syslog host parameters by using the variables in the following variable definition tables.

8. View the configuration to ensure it is correct:

   ```
   show syslog [host <1-10>]
   ```

Example

```
Switch:1(config)# syslog enable

Switch:1(config)# syslog host 1 address 47.17.143.52

Switch:1(config)# syslog host 1 enable
```

```
Switch:1(config)#show syslog host 1

                Id : 1
            IpAddr : 47.17.143.52
           UdpPort : 515
          Facility : local7
          Severity : info|warning|error|fatal
   MapInfoSeverity : info
MapWarningSeverity : warning
  MapErrorSeverity : error
    MapMfgSeverity : notice
  MapFatalSeverity : emergency
            Enable : true
```

```
Switch:1(config)#show syslog

Enable    : true
Max Hosts : 5
OperState : active
                header : default
Total number of configured hosts : 1
Total number of enabled hosts : 1
Configured host : 1
Enabled host : 1
```

Variable definitions

Use the data in the following table to use the **syslog** command.

Variable	Value
enable	Enables the sending of syslog messages on the device. The default is disabled. Use the no operator before this parameter, no syslog enable to disable the sending of syslog messages on the device. The default is enabled.
ip-header-type <circuitless-ip|default>	Specifies the IP header in syslog packets to circuitless-ip or default. • If the value is default, the IP address of the VLAN is used for syslog packets that are transmitted in-band using input/output (I/O) ports.

Table continues…

Variable	Value
	• If the value is circuitless-ip, then for all syslog messages (in-band or out-of-band), the circuitless IP address is used in the IP header. If you configure multiple circuitless IPs, the first circuitless IP configured is used.
max-hosts <1-10>	Specifies the maximum number of syslog hosts supported, from 1–10. The default is 5.

Use the data in the following table to use the **`syslog host`** command.

Variable	Value
1–10	Creates and configures a host instance. Use the no operator before this parameter, no syslog host to delete a host instance.
address WORD <*0–46*>	Configures a host location for the syslog host. WORD <*0–46*> is the IPv4 or IPv6 address of the UNIX system syslog host in the format A.B.C.D or x:x:x:x:x:x:x:x. You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration using ACLI..
enable	Enables the syslog host. Use the no operator before this parameter, no syslog host enable to disable syslog host. The default is disabled.
facility {local0|local1|local2|local3|local4|local5|local6|local7}	Specifies the UNIX facility in messages to the syslog host. {local0|local1|local2|local3|local4|local5|local6|local7} is the UNIX system syslog host facility. The default is local7.
maperror {emergency|alert|critical|error|warning|notice|info|debug}	Specifies the syslog severity to use for error messages. The default is error.
mapfatal {emergency|alert|critical|error|warning|notice|info|debug}	Specifies the syslog severity to use for fatal messages. The default is emergency.
mapinfo {emergency|alert|critical|error|warning|notice|info|debug}	Specifies the syslog severity level to use for information messages. The default is info.
mapwarning {emergency|alert|critical|error|warning|notice|info|debug}	Specifies the syslog severity to use for warning messages. The default is warning.
severity <info|warning|error|fatal>	Specifies the severity levels for which to send syslog messages. The default is info.
udp-port <514-530>	Specifies the User Datagram Protocol port number on which to send syslog messages to the syslog host. This value is the UNIX system syslog host port number from 514–530. The default is 514.

Configuring logging

Configure logging to determine the types of messages to log and where to store the messages.

About this task

Note:

The platform logs CLILOG and SNMPLOG as INFO. Normally, if you configure the logging level to WARNING, the system skips all INFO messages. However, if you enable CLILOG and SNMPLOG the system logs ACLI Log and SNMP Log information regardless of the logging level you set. This is not the case for other INFO messages.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Define which messages to log:

   ```
   logging level <0-4>
   ```

3. Write the log file from memory to a file:

   ```
   logging write WORD<1-1536>
   ```

4. Show logging on the screen:

   ```
   logging screen
   ```

Example

```
Switch:1 logging level 0
Switch:1 logging write log2
Switch:1 logging screen
```

Variable definitions

Use the data in the following table to use the **logging** command.

Table 12: Variable definitions

Variable	Value
level <0-4>	Shows and configures the logging level. The level is one of the following values: • 0: Information — all messages are recorded • 1: Warning — only warning and more serious messages are recorded

Table continues…

Variable	Value
	• 2: Error — only error and more serious messages are recorded • 3: Manufacturing — this parameter is not available for customer use • 4: Fatal — only fatal messages are recorded
screen	Configures the log display on the screen to on. Use the no form of the command to stop the log display on the screen: `no logging screen`
transferFile *<1–10>* address *{A.B.C.D}* filename-prefix *WORD<0–200*	Transfers the syslog file to a remote FTP/TFTP server. `<1-10>` specifies the file ID. The `address {A.B.C.D}` option specifies the IP address. The `filename-prefix WORD<0-200>` option sets the filename prefix for the log file at the remote host.
write WORD<1-1536>	Writes the log file with the designated string. *WORD<1-1536>* is the string or command that you append to the log file. If the string contains spaces, you must enclose the string in quotation marks (").

Configuring the remote host address for log transfer

Configure the remote host address for log transfer. The system transfers the current log file to a remote host after the log file size reaches the maximum size.

Before you begin

- The IP address you configure for the remote host must be reachable at the time of configuration.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Configure the remote host address for log transfer:

   ```
   logging transferFile {1-10} address {A.B.C.D} [filename WORD<0-255>]
   ```

Example

```
Switch:1(config)# logging transferFile 1 address 172.16.120.10
```

Variable definitions

Use the data in the following table to use the **`logging transferFile`** command.

Table 13: Variable definitions

Variable	Value
1–10	Specifies the file ID to transfer.
address {A.B.C.D}	Specifies the IP address of the host to which to transfer the log file. The remote host must be reachable or the configuration fails.
filename WORD<0-255>	Specifies the name of the file on the remote host. If you do not configure a name, the current log file name is the default.

Configuring system logging

System logs are a valuable diagnostic tool. You can send log messages to flash files for later retrieval.

About this task

You can change log file parameters at anytime without restarting the system. Changes made to these parameters take effect immediately.

Avaya recommends that you configure logging to a flash file at all times.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Enable system logging to a PC card file:

   ```
   boot config flags logging
   ```

3. Configure the logfile parameters:

   ```
   boot config logfile <64-500> <500-16384> <10-90>
   ```

Example

```
Switch:1> enable
Switch:1# configure terminal
Switch:1(config)# boot config logfile 64 600 10
```

Variable definitions

Use the data in the following table to use the **boot config** command.

Table 14: Variable definitions

Variable	Value
flags logging	Enables or disables logging to a file a flash file. The log file is named using the format log.xxxxxxxx.sss. The first six characters after the prefix of the file name log contain the last three bytes of the chassis base MAC address. The next two characters specify the slot number. The last three characters denote the sequence number of the log file.
logfile <64-500> <500-16384> <10-90>	Configures the logfile parameters • *<64-500>* specifies the minimum free memory space on the external storage device from 64–500 KB. The switch does not support this parameter. • *<500-16384>* specifies the maximum size of the log file from 500–16384 KB. • *<10-90>* specifies the maximum percentage, from 10–90%, of space on the external storage device the logfile can use. The switch does not support this parameter.

Configuring system message control

Configure system message control to suppress duplicate error messages on the console, and to determine the action to take if they occur.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Configure system message control action:

   ```
   sys msg-control action <both|send-trap|suppress-msg>
   ```

3. Configure the maximum number of messages:

   ```
   sys msg-control max-msg-num <2-500>
   ```

4. Configure the interval:

   ```
   sys msg-control control-interval <1-30>
   ```

5. Enable message control:

   ```
   sys msg-control
   ```

Example

```
Switch:1(config)# sys msg-control action suppress-msg
```

```
Switch:1(config)# sys msg-control max-msg-num 10
Switch:1(config)# sys msg-control control-interval 15
Switch:1(config)# sys msg-control
```

Variable definitions

Use the data in the following table to use the **sys msg-control** command.

Table 15: Variable definitions

Variable	Value
action <both|send-trap|suppress-msg>	Configures the message control action. You can either suppress the message or send a trap notification, or both. The default is suppress.
control-interval <1-30>	Configures the message control interval in minutes. The valid options are 1–30. The default is 5.
max-msg-num <2-500>	Configures the number of occurrences of a message after which the control action occurs. To configure the maximum number of occurrences, enter a value from 2–500. The default is 5.

Extending system message control

Use the force message control option to extend the message control feature functionality to the software and hardware log messages.

About this task

To enable the message control feature, you must specify an action, control interval, and maximum message number. After you enable the feature, the log messages, which get repeated and cross the maximum message number in the control interval, trigger the force message feature. You can either suppress the message or send a trap notification, or both.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Configure the force message control option:

   ```
   sys force-msg WORD<4-4>
   ```

Example

```
Switch:1> enable
```

```
Switch:1# configure terminal
```

Add a force message control pattern. If you use a wildcard pattern (****), all messages undergo message control.

```
Switch:1(config)# sys force-msg ****
```

Variable definitions

Use the data in the following table to use the **sys force-msg** command.

Table 16: Variable definitions

Variable	Value
WORD<4-4>	Adds a forced message control pattern, where *WORD<4-4>* is a string of 4 characters. You can add a four-byte pattern into the force-msg table. The software and the hardware log messages that use the first four bytes that match one of the patterns in the force-msg table undergo the configured message control action. You can specify up to 32 different patterns in the force-msg table, including a wildcard pattern (****) as well. If you specify the wildcard pattern, all messages undergo message control.

Viewing logs

View log files by file name, category, or severity to identify possible problems.

About this task

View ACLI command and SNMP trap logs, which are logged as normal log messages and logged to the system log file.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Show log information:

   ```
   show logging file [alarm] [event-code WORD<0-10>] [module WORD<0-100>] [name-of-file WORD<1-99>] [save-to-file WORD<1-99>] [severity WORD<0-25>] [tail] [vrf WORD<0-32>]
   ```

Example

Display log file information:

```
Switch:1>enable
Switch:1#configure terminal
```

```
Switch:1(config)#show logging file
CP1  [02/06/15 22:38:20.678:UTC] 0x00270428 00000000 GlobalRouter SW INFO Lifecy
cle: Start
CP1  [02/06/15 22:38:21.770:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s sockserv started, pid:4794
CP1  [02/06/15 22:38:21.771:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s oom95 started, pid:4795
CP1  [02/06/15 22:38:21.771:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s oom90 started, pid:4796
CP1  [02/06/15 22:38:21.772:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s imgsync.x started, pid:4797
CP1  [02/06/15 22:38:22.231:UTC] 0x0026452f 00000000 GlobalRouter SW INFO No pat
ch set.
CP1  [02/06/15 22:38:22.773:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s logServer started, pid:4840
CP1  [02/06/15 22:38:22.774:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s trcServer started, pid:4841
CP1  [02/06/15 22:38:22.774:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s oobServer started, pid:4842
CP1  [02/06/15 22:38:22.775:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s cbcp-main.x started, pid:4843
CP1  [02/06/15 22:38:22.776:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s rssServer started, pid:4844
CP1  [02/06/15 22:38:22.777:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s dbgServer started, pid:4845
CP1  [02/06/15 22:38:22.777:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s dbgShell started, pid:4846
CP1  [02/06/15 22:38:22.778:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s coreManager.x started, pid:4847
CP1  [02/06/15 22:38:22.779:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s ssio started, pid:4848
CP1  [02/06/15 22:38:22.780:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s hckServer started, pid:4849
CP1  [02/06/15 22:38:22.780:UTC] 0x0027042b 00000000 GlobalRouter SW INFO Proces
s remCmdAgent.x started, pid:4850
CP1  [02/06/15 22:38:24.717:UTC] 0x000006cc 00000000 GlobalRouter SW INFO rcStar
t:  FIPS Power Up Self Test SUCCESSFUL - 0
CP1  [02/06/15 22:38:24.718:UTC] 0x000006c2 00000000 GlobalRouter SW INFO rcStar
t:  Security Stack Init SUCCESSFUL - 0
CP1  [02/06/15 22:38:24.718:UTC] 0x000006c3 00000000 GlobalRouter SW INFO rcStar
t:  IPSEC Init SUCCESSFUL
CP1  [02/06/15 22:38:24.718:UTC] 0x000006bf 00000000 GlobalRouter SW INFO rcStar
t: Security Stack Log init SUCCESSFUL - 0
CP1  [02/06/15 22:38:26.111:UTC] 0x000005c0 00000000 GlobalRouter SW INFO Licens
eLoad = ZERO, loading premier license for developer debugging
IO1  [02/06/15 22:38:26.960:UTC] 0x0011054a 00000000 GlobalRouter COP-SW INFO De
tected Master CP in slot 1

--More-- (q = quit)

Switch:1(config)#show logging file module SNMP
CP1  [02/06/15 22:39:58.530:UTC] 0x00004595 00000000 GlobalRouter SNMP INFO Boot
ed with file
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=1 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=2 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=3 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:40:45.839:UTC] 0x000045e5 00400005 DYNAMIC SET GlobalRouter SN
MP INFO Sending Cold-Start Trap
```

Variable definitions

Use the data in the following table to use the **show logging file** command.

Table 17: Variable definitions

Variable	Value
alarm	Displays alarm log entries.
event-code *WORD<0–10>*	Specifies a number that precisely identifies the event reported.
module *WORD<0-100>*	Filters and lists the logs according to module. Specifies a string length of 0–100 characters. Categories include SNMP, EAP, RADIUS, RMON, WEB, HW, MLT, FILTER, QOS, CLILOG, SW, CPU, IP, VLAN, IPMC, and SNMPLOG. To specify multiple filters, separate each category by the vertical bar (|), for example, |FILTER|QOS.
name-of-file *WORD<1-99>*	Displays the valid logs from this file. For example, /intflash/logcopy.txt. You cannot use this command on the current log file, which is the file into which the messages are currently logged. Specify a string length of 1 to 99 characters. If you enable enhanced secure mode, the system encrypts the entire log file. After you use the **show log file name-of-file WORD<1–99>** command, the system takes the encrypted log file name as input, then decrypts it, and prints the output to the screen. You can then redirect the decrypted output to a file that you can store onto the flash. If enhanced secure mode is disabled, the system only encrypts the proprietary portion of the log file.
save-to-file *WORD<1-99>*	Redirects the output to the specified file and removes all encrypted information. You cannot use the tail option with the save-to-file option. Specify a string length of 1–99 characters.
severity *WORD<0-25>*	Filters and lists the logs according to severity. Choices include INFO, ERROR, WARNING, and FATAL. To specify multiple filters, separate each severity by the vertical bar (|), for example, ERROR|WARNING|FATAL.
tail	Shows the last results first.
vrf *WORD<0–32>*	Specifies the name of a VRF instance to show log messages that only pertain to that VRF.

Configuring ACLI logging

Use ACLI logging to track all ACLI commands executed and for fault management purposes. The ACLI commands are logged to the system log file as CLILOG module.

About this task

Note:

The platform logs CLILOG and SNMPLOG as INFO. Normally, if you configure the logging level to WARNING, the system skips all INFO messages. However, if you enable CLILOG and SNMPLOG the system logs ACLI Log and SNMP Log information regardless of the logging level you set. This is not the case for other INFO messages.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Enable ACLI logging:

   ```
   clilog enable
   ```

3. **(Optional)** Disable ACLI logging:

   ```
   no clilog enable
   ```

4. Ensure that the configuration is correct:

   ```
   show clilog
   ```

5. View the ACLI log:

   ```
   show logging file module clilog
   ```

Example

Enable ACLI logging, and view the ACLI log:

```
Switch:1>enable
Switch:1#configure terminal
Switch:1(config)#clilog enable
Switch:1(config)#show logging file module clilog
CP1  [02/13/13 17:27:25.956] 0x002c0600 00000000 GlobalRouter CLILOG INFO     1 CONSOLE
rwa show snmp-server host
CP1  [02/13/13 17:28:10.100] 0x002c0600 00000000 GlobalRouter CLILOG INFO     2 CONSOLE
rwa show snmp-server notif
CP1  [02/13/13 17:28:45.732] 0x002c0600 00000000 GlobalRouter CLILOG INFO     3 CONSOLE
rwa snmp-server force-trap
CP1  [02/13/13 17:29:30.628] 0x002c0600 00000000 GlobalRouter CLILOG INFO     4 CONSOLE
rwa show logging file modug
CP1  [02/14/13 19:39:11.648] 0x002c0600 00000000 GlobalRouter CLILOG INFO     5 CONSOLE
rwa ena
CP1  [02/14/13 19:39:13.420] 0x002c0600 00000000 GlobalRouter CLILOG INFO     6 CONSOLE
rwa conf t
CP1  [02/14/13 19:49:21.044] 0x002c0600 00000000 GlobalRouter CLILOG INFO     7 CONSOLE
rwa filter acl 2 enable
CP1  [02/14/13 19:50:08.540] 0x002c0600 00000000 GlobalRouter CLILOG INFO     8 CONSOLE
rwa filter acl 2 type inpo1
CP1  [02/14/13 19:50:38.444] 0x002c0600 00000000 GlobalRouter CLILOG INFO     9 CONSOLE
rwa filter acl 2 type inpoe
CP1  [02/14/13 19:50:52.968] 0x002c0600 00000000 GlobalRouter CLILOG INFO    10 CONSOLE
rwa filter acl enable 2
CP1  [02/14/13 19:51:08.908] 0x002c0600 00000000 GlobalRouter CLILOG INFO    11 CONSOLE
rwa filter acl 2 enable
```

```
CP1  [02/15/13 06:50:25.972] 0x002c0600 00000000 GlobalRouter CLILOG INFO    14 CONSOLE
rwa ena
CP1  [02/15/13 06:50:30.288] 0x002c0600 00000000 GlobalRouter CLILOG INFO    15 CONSOLE
rwa conf t
CP1  [02/15/13 06:50:39.412] 0x002c0600 00000000 GlobalRouter CLILOG INFO    16 CONSOLE
rwa show vlan basic
CP1  [02/15/13 06:51:09.488] 0x002c0600 00000000 GlobalRouter CLILOG INFO    17 CONSOLE
rwa show isis spbm
CP1  [02/15/13 06:56:00.992] 0x002c0600 00000000 GlobalRouter CLILOG INFO    19 CONSOLE
rwa spbm 23 b-vid 2 primar1
CP1  [02/15/13 06:56:59.092] 0x002c0600 00000000 GlobalRouter CLILOG INFO    20 CONSOLE
rwa show isis
CP1  [02/15/13 07:10:54.928] 0x002c0600 00000000 GlobalRouter CLILOG INFO    21 CONSOLE
rwa show isis interface
CP1  [02/15/13 07:12:33.404] 0x002c0600 00000000 GlobalRouter CLILOG INFO    22 CONSOLE
rwa show isis spbm
CP1  [02/15/13 07:45:28.596] 0x002c0600 00000000 GlobalRouter CLILOG INFO    23 CONSOLE
rwa ena
CP1  [02/15/13 07:45:30.236] 0x002c0600 00000000 GlobalRouter CLILOG INFO    24 CONSOLE
rwa conf t
CP1  [02/15/13 07:46:29.456] 0x002c0600 00000000 GlobalRouter CLILOG INFO    25 CONSOLE
rwa interface gigabitEther0
CP1  [02/15/13 07:47:28.476] 0x002c0600 00000000 GlobalRouter CLILOG INFO    26 CONSOLE
rwa encapsulation dot1q

--More-- (q = quit)
```

Variable definitions

Use the data in the following table to use the **clilog** commands.

Table 18: Variable definitions

Variable	Value
enable	Activates ACLI logging. To disable, use the `no clilog enable` command.

Chapter 14: Log configuration using EDM

Use log files and messages to perform diagnostic and fault management functions. This section provides procedures to configure and use the logging system in Enterprise Device Manager (EDM).

Configuring the system log

About this task

Configure the system log to track all user activity on the device. The system log can send messages of up to ten syslog hosts.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Diagnostics**.
2. Click **System Log**.
3. In the **System Log** tab, select **Enable**.
4. Configure the maximum number of syslog hosts.
5. Configure the IP header type for the syslog packet.
6. Click **Apply**.

System Log field descriptions

Use the data in the following table to use the **System Log** tab.

Name	Description
Enable	Enables or disables the syslog feature. If you select this variable, this feature sends a message to a server on a network that is configured to receive and store diagnostic messages from this device. You can configure the type of messages sent. The default is enabled.
MaxHosts	Specifies the maximum number of remote hosts considered active and can receive messages from the syslog service. The range is 0–10 and the default is 5.

Table continues…

Name	Description
OperState	Specifies the operational state of the syslog service. The default is active.
Header	Specifies the IP header in syslog packets to circuitlessIP or default. • If the value is default, the IP address of the VLAN is used for syslog packets that are transmitted in-band using input/output (I/O) ports. • If the value is circuitlessIP, the circuitless IP address is used in the IP header for all syslog messages (in-band or out-of-band). If you configure multiple circuitless IPs, the first circuitless IP configured is used. The default value is default.

Configuring the system log table

About this task

Use the system log table to customize the mappings between the severity levels and the type of alarms.

You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses with no difference in functionality or configuration except in the following case. When you configure the system log table, under the **System Log Table** tab, you must select **ipv4** or **ipv6**, in the **AddressType** box. The **Address** box supports both IPv4 and IPv6 addresses.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Diagnostics**.
2. Click **System Log**.
3. Click the **System Log Table** tab.
4. Click **Insert**.
5. Configure the parameters as required.
6. Click **Insert**.
7. To modify mappings, double-click a parameter to view a list of options.
8. Click **Apply**.

System Log Table field descriptions

Use the data in the following table to use the **System Log Table** tab.

Name	Description
Id	Specifies the ID for the syslog host. The range is 1–10.
AddressType	Specifies if the address is an IPv4 or IPv6 address.
Address	Specifies the IP address of the syslog host. You can log system log messages to external system log hosts with both IPv4 and IPv6 addresses.
UdpPort	Specifies the UDP port to use to send messages to the syslog host (514–530). The default is 514.
Enable	Enables or disables the sending of messages to the syslog host. The default is disabled.
HostFacility	Specifies the syslog host facility used to identify messages (local0 to local7). The default is local7.
Severity	Specifies the message severity for which syslog messages are sent. The default is info|warning|error|fatal.
MapInfoSeverity	Specifies the syslog severity to use for INFO messages. The default is info.
MapWarningSeverity	Specifies the syslog severity to use for WARNING messages. The default is warning.
MapErrorSeverity	Specifies the syslog severity to use for ERROR messages. The default is error.
MapFatalSeverity	Specifies the syslog severity to use for FATAL messages. The default is emergency.
MapMfgSeverity	Specifies the syslog severity to use for Accelar manufacturing messages. The default is notice.

Chapter 15: SNMP trap configuration using ACLI

Use Simple Network Management Protocol (SNMP) traps and notifications to gather information about device activities, alarms, and other information on management stations.

For more information about how to configure SNMP community strings and related topics, see *Configuring Security on Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-601.

Configuring an SNMP host

Configure an SNMP host so that the system can forward SNMP traps to a host for monitoring. You can use SNMPv1, SNMPv2c, or SNMPv3. You configure the target table parameters (security name and model) as part of the host configuration.

Procedure

1. Enter Global Configuration mode:

   ```
   enable

   configure terminal
   ```

2. Configure an SNMPv1 host:

   ```
   snmp-server host WORD<1-256> [port <1-65535>] v1 WORD<1-32> [filter
   WORD<1-32>]
   ```

3. Configure an SNMPv2c host:

   ```
   snmp-server host WORD<1-256> [port <1-65535>] v2c WORD<1-32> [inform
   [timeout <1-2147483647>] [retries <0-255>] [mms <0-2147483647>]]
   [filter WORD<1-32>]
   ```

4. Configure an SNMPv3 host:

   ```
   snmp-server host WORD<1-256> [port <1-65535>] v3 {noAuthNoPriv|
   authNoPriv|AuthPriv} WORD<1-32> [inform [timeout <1-2147483647>]
   [retries <0-255>]] [filter WORD<1-32>]
   ```

5. Ensure that the configuration is correct:

```
show snmp-server host
```

Example

Configure the target table entry. Configure an SNMPv3 host.

```
Switch:1>enable
Switch:1#configure terminal
Switch:1(config)#snmp-server host 198.202.188.207 port 162 v2c ReadView inform timeout
1500 retries 3 mms 484
Switch:1(config)#snmp-server host 198.202.188.207 port 163 v3 authPriv Lab3 inform
timeout 1500 retries 3
```

Variable definitions

Use the data in the following table to use the **`snmp-server host`** command.

Variable	Value
inform [timeout <1-2147483647>] [retries <0-255>] [mms <0-2147483647>]	Sends SNMP notifications as inform (rather than trap). To use all three options in one command, you must use them in the following order: 1. timeout <1-2147483647> specifies the timeout value in seconds with a range of 0–214748364. 2. retries <0-255> specifies the retry count value with a range of 0–255. 3. mms <0-2147483647> specifies the maximum message size as an integer with a range of 0–2147483647.
filter WORD<1-32>	Specifies the filter profile to use.
noAuthNoPriv|authNoPriv|AuthPriv	Specifies the security level.
port <1-65535>	Specifies the host server port number.
WORD<1-32>	Specifies the security name, which identifies the principal that generates SNMP messages.
WORD<1-256>	Specifies either an IPv4 or IPv6 address.

Configuring an SNMP notify filter table

Configure the notify table to select management targets to receive notifications, as well as the type of notification to send to each management target.

Before you begin

- For more information about the notify filter table, see RFC3413.

Procedure

1. Enter Global Configuration mode:

```
enable
configure terminal
```

2. Create a new notify filter table:

   ```
   snmp-server notify-filter WORD<1-32> WORD<1-32>
   ```

3. Ensure that the configuration is correct:

   ```
   show snmp-server notify-filter
   ```

Example

```
Switch(config)# snmp-server notify-filter profile3 99.3.6.1.6.3.1.1.4.1
```

```
Switch(config)#show snmp-server notify-filter

================================================================================
                          Notify Filter Configuration
================================================================================
Profile Name                    Subtree                          Mask
--------------------------------------------------------------------------------
profile1                        +99.3.6.1.6.3.1.1.4.1             0x7f
profile2                        +99.3.6.1.6.3.1.1.4.1             0x7f
profile3                        +99.3.6.1.6.3.1.1.4.1             0x7f
```

Variable definitions

Use the data in the following table to use the `snmp-server notify-filter` command.

Table 19: Variable definitions

Variable	Value
WORD<1-32> WORD<1-32>	Creates a notify filter table. The first instance of *WORD<1-32>* specifies the name of the filter profile with a string length of 1–32. The second instance of *WORD<1-32>* identifies the filter subtree OID with a string length of 1–32. If the subtree OID parameter uses a plus sign (+) prefix (or no prefix), this indicates include. If the subtree OID uses the minus sign (–) prefix, it indicates exclude. You do not calculate the mask because it is automatically calculated. You can use the wildcard character, the asterisk (*), to specify the mask within the OID. You do not need to specify the OID in the dotted decimal format; you can alternatively specify that the MIB parameter names and the OIDs are automatically calculated.

Configuring SNMP interfaces

Configure an interface to send SNMP traps. If the switch has multiple interfaces, configure the IP interface from which the SNMP traps originate.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Configure the destination and source IP addresses for SNMP traps:

   ```
   snmp-server sender-ip {A.B.C.D} {A.B.C.D}
   ```

3. If required, send the source address (sender IP) as the sender network in the notification message:

   ```
   snmp-server force-trap-sender enable
   ```

4. If required, force the SNMP and IP sender flag to use the same value:

   ```
   snmp-server force-iphdr-sender enable
   ```

Example

```
Switch(config)# snmp-server sender-ip 172.16.120.2 172.16.120.5
Switch(config)# no snmp-server force-iphdr-sender enable
```

Variable definitions

Use the data in the following table to use the `snmp-server` command.

Table 20: Variable definitions

Variable	Value
agent-conformance enable	Enables the agent conformance mode. Conforms to MIB standards if disabled. If you activate this option, feature configuration is stricter and error handling less informative. Avaya recommends that you do not activate this option; it is not a normally supported mode of operation.
authentication-trap enable	Activates the generation of authentication traps.
force-iphdr-sender enable	Automatically configures the SNMP and IP sender to the same value. The default is disabled.
force-trap-sender enable	Sends the configured source address (sender IP) as the sender network in the notification message.

Table continues…

Variable	Value
sender-ip <A.B.C.D> <A.B.C.D>	Configures the SNMP trap receiver and source IP addresses. Specify the IP address of the destination SNMP server that receives the SNMP trap notification in the first IP address. Specify the source IP address of the SNMP trap notification packet that is transmitted in the second IP address. If this address is 0.0.0.0, the system uses the IP address of the local interface that is closest (from an IP routing table perspective) to the destination SNMP server.

Enabling SNMP trap logging

Use SNMP trap logging to send a copy of all traps to the syslog server.

Before you begin

- You must configure and enable the syslog server.

About this task

Note:

The platform logs CLILOG and SNMPLOG as INFO. Normally, if you configure the logging level to WARNING, the system skips all INFO messages. However, if you enable CLILOG and SNMPLOG the system logs ACLI Log and SNMP Log information regardless of the logging level you set. This is not the case for other INFO messages.

Procedure

1. Enter Global Configuration mode:

   ```
   enable
   configure terminal
   ```

2. Enable SNMP trap logging:

   ```
   snmplog enable
   ```

3. **(Optional)** Disable SNMP trap logging:

   ```
   no snmplog enable
   ```

4. View the contents of the SNMP log:

   ```
   show logging file module snmplog
   ```

Example

Enable SNMP trap logging and view the contents of the SNMP log:

```
Switch:1>enable
Switch:1#configure terminal
Switch:1(config)#snmplog enable
Switch:1(config-app)#show logging file module snmp
```

```
CP1  [02/06/15 22:39:58.530:UTC] 0x00004595 00000000 GlobalRouter SNMP INFO Boot
ed with file
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=1 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=2 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:39:59.547:UTC] 0x00004603 00400003.67108870 DYNAMIC CLEAR Glob
alRouter SNMP INFO 2k card up(CardNum=3 AdminStatus=1 OperStatus=1)
CP1  [02/06/15 22:40:45.839:UTC] 0x000045e5 00400005 DYNAMIC SET GlobalRouter SN
MP INFO Sending Cold-Start Trap
```

Variable definitions

Use the data in the following table to use the **`snmplog`** command.

Table 21: Variable definitions

Variable	Value
enable	Enables the logging of traps. Use the command `no snmplog enable` to disable the logging of traps.

Chapter 16: SNMP trap configuration using EDM

Use Simple Network Management Protocol (SNMP) traps and notifications to gather information about device activities, alarms, and other information on management stations. This section provides procedures to configure and use SNMP traps in Enterprise Device Manager (EDM).

For information about how to configure SNMP community strings and related topics, see *Configuring Security on Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-601.

Configuring an SNMP host target address

Configure a target table to specify the list of transport addresses to use in the generation of SNMP messages.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Edit** > **SnmpV3**.
2. Click **Target Table**.
3. In the **Target Table** tab, click **Insert**.
4. In the **Name** box, type a unique identifier.
5. In the **TDomain** box, select the transport type of the address. Select either **ipv4Tdomain** or **ipv6Tdomain**.
6. In the **TAddress** box, type the transport address and User Datagram Protocol (UDP) port.
7. In the **Timeout** box, type the maximum round trip time.
8. In the **RetryCount** box, type the number of retries to be attempted.
9. In the **TagList** box, type the list of tag values.
10. In the **Params** box, type the SnmpAdminString.
11. In the **TMask** box, type the mask.
12. In the **MMS** box, type the maximum message size.
13. Click **Insert**.

Target Table field descriptions

Use the data in the following table to use the **Target Table** tab.

Name	Description
Name	Specifies a unique identifier for this table. The name is a community string.
TDomain	Specifies the transport type of the address. **ipv4Tdomain** specifies the transport type of address is an IPv4 address. **ipv6Tdomain** specifies the transport type of address is IPv6. The default is ipv4Tdomain.
TAddress	Specifies the transport address in xx.xx.xx.xx:port format, for example: 10:10:10:10:162, where 162 is the trap listening port on the system 10.10.10.10.
Timeout	Specifies the maximum round trip time required to communicate with the transport address. The value is in 1/100 seconds from 0–2147483647. The default is 1500. After the system sends a message to this address, if a response (if one is expected) is not received within this time period, you can assume that the response is not delivered.
RetryCount	Specifies the maximum number of retries if a response is not received for a generated message. The count can be in the range of 0–255. The default is 3.
TagList	Contains a list of tag values used to select target addresses for a particular operation. A tag refers to a class of targets to which the messages can be sent.
Params	Contains SNMP parameters used to generate messages to send to this transport address. For example, to receive SNMPv2C traps, use TparamV2.
TMask	Specifies the mask. The value can be empty or in six-byte hex string format. Tmask is an optional parameter that permits an entry in the TargetAddrTable to specify multiple addresses.
MMS	Specifies the maximum message size. The size can be zero, or 484–2147483647. The default is 484. Although the maximum MMS is 2147483647, the device supports the maximum SNMP packet size of 8192.

Configuring target table parameters

About this task

Configure the target table to configure the security parameters for SNMP. Configure the target table to configure parameters such as SNMP version and security levels.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **SnmpV3**.
2. Click **Target Table**.
3. Click the **Target Params Table** tab.
4. Click **Insert**.
5. In the **Name** box, type a target table name.
6. From the **MPModel** options, select an SNMP version.
7. From the **Security Model** options, select the security model.
8. In the **SecurityName** box, type `readview` or `writeview`.
9. From the **SecurityLevel** options, select the security level for the table.
10. Click **Insert**.

Target Params Table field descriptions

Use the data in the following table to use the **Target Params Table** tab.

Name	Description
Name	Identifies the target table.
MPModel	Specifies the message processing model to use to generate messages: SNMPv1, SNMPv2c, or SNMPv3/USM.
SecurityModel	Specifies the security model to use to generate messages: SNMPv1, SNMPv2c, or USM. You can receive an inconsistentValue error if you try to configure this variable to a value for a security model that the implementation does not support.
SecurityName	Identifies the principal on whose behalf SNMP messages are generated.
SecurityLevel	Specifies the security level used to generate SNMP messages: noAuthNoPriv, authNoPriv, or authPriv.

Configuring SNMP notify filter profiles

About this task

Configure the SNMP table of filter profiles to determine whether particular management targets receive particular notifications.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **SnmpV3**.
2. Click **Notify Table**.
3. Click the **Notify Filter Table** tab.
4. Click **Insert**.
5. In the **NotifyFilterProfileName** box, type a name for the notify filter profile.
6. In the **Subtree** box, type subtree location information in x.x.x.x.x.x.x.x.x. format.
7. In the **Mask** box, type the mask location in hex string format.
8. From the **Type** options, select **included** or **excluded**.
9. Click **Insert**.

Notify Filter Table field descriptions

Use the data in the following table to use the **Notify Filter Table** tab.

Name	Description
NotifyFilterProfileName	Specifies the name of the filter profile used to generate notifications.
Subtree	Specifies the MIB subtree that, if you combine it with the mask, defines a family of subtrees, which are included in or excluded from the filter profile. For more information, see RFC2573.
Mask	Specifies the bit mask (in hexadecimal format) that, in combination with Subtree, defines a family of subtrees, which are included in or excluded from the filter profile.
Type	Indicates whether the family of filter subtrees are included in or excluded from a filter. The default is included.

Configuring SNMP notify filter profile table parameters

Before you begin

- The notify filter profile exists.

About this task

Configure the profile table to associate a notification filter profile with a particular set of target parameters.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **SnmpV3**.
2. Click **Notify Table**.
3. Click the **Notify Filter Profile Table** tab.
4. Click **Insert**.
5. In the **TargetParamsName** box, type a name for the target parameters.
6. In the **NotifyFilterProfileName** box, type a name for the notify filter profile.
7. Click **Insert**.

Notify Filter Profile Table field descriptions

Use the data in the following table to use the **Notify Filter Profile Table** tab.

Name	Description
TargetParamsName	Specifies the unique identifier associated with this entry.
NotifyFilterProfileName	Specifies the name of the filter profile to use to generate notifications.

Enabling authentication traps

About this task

Enable the SNMP agent process to generate authentication-failure traps.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Diagnostics**.
2. Click **General**.
3. Click the **Error** tab.
4. Select **AuthenticationTraps**.
5. Click **Apply**.

Error field descriptions

Use the data in the following table to use the **Error** tab.

Name	Description
AuthenticationTraps	Enables or disables the sending of traps after an error occurs. The default is disabled.
LastErrorCode	Specifies the last reported error code.
LastErrorSeverity	Specifies the last reported error severity: 0= Informative Information 1= Warning Condition 2= Error Condition 3= Manufacturing Information 4= Fatal Condition

Chapter 17: RMON alarm variables

This reference section describes remote monitoring (RMON) alarm variables.

RMON alarm variables are divided into three categories.

- Security
- Errors
- Traffic

Each category can have subcategories.

RMON alarm variables

Table 22: RMON alarm variables

Category	Subcategory	Variable	Definition
Security		rcCliNumAccessViolations.0	The number of CLI access violations detected by the system.
		rcWebNumAccessBlocks.0	The number of accesses the Web server blocked.
		snmpInBadCommunityNames.0	The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation not allowed by the SNMP community named in the message.
Errors	Interface	ifInDiscards	The number of inbound packets discarded even though no errors were detected to prevent the packets being deliverable to a higher-layer protocol. One possible reason for discarding a packet is to free buffer space.
		ifInErrors	For packet-oriented interfaces, the number of inbound packets that contained errors preventing

Table continues…

Category	Subcategory	Variable	Definition
			them from being deliverable to a higher-layer protocol. For character-oriented or fixed-length interfaces, the number of inbound transmission units that contained errors, preventing them from being deliverable to a higher-layer protocol.
		ifOutDiscards	The number of outbound packets discarded even though no errors were detected to prevent the packets being transmitted. One possible reason for discarding such a packet is to free buffer space.
		ifOutErrors	For packet-oriented interfaces, the number of outbound packets that were not transmitted because of errors. For character-oriented or fixed-length interfaces, the number of outbound transmission units that were not transmitted because of errors.
	Ethernet	dot3StatsAlignmentErrors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object increments when the alignmentError status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions exist are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
		dot3StatsFCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check. The count represented by an instance of this object increments when the frameCheckError status

Table continues…

Category	Subcategory	Variable	Definition
			is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
		dot3StatsSingleCollisionFrames	A count of successfully transmitted frames on a particular interface where transmission is inhibited by exactly one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts object, the ifOutMulticastPkts object, or the ifOutBroadcastPkts object, and is not counted by the corresponding instance of the dot3StatsMultipleCollisionFrames object.
		dot3StatsMultipleCollisionFrames	A count of successfully transmitted frames on a particular interface where transmission is inhibited by more than one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts object, and is not counted by the corresponding instance of the dot3StatsSingleCollisionFrames object.
		dot3StatsSQETestErrors	A count of times that the SQE TEST ERROR message is generated by the PLS sublayer for a particular interface. The SQE TEST ERROR message is defined in section 7.2.2.2.4 of ANSI/IEEE 802.3-1985 and its

Table continues…

Category	Subcategory	Variable	Definition
			generation is described in section 7.2.4.6 of the same document.
		dot3StatsDeferredTransmissions	A count of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy. The count represented by an instance of this object does not include frames involved in collisions.
		dot3StatsLateCollisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet; 512 bit-times corresponds to 51.2 microseconds on a 10 Mb/s system. A (late) collision included in a count represented by an instance of this object is also considered as a (generic) collision for purposes of other collision-related statistics.
		dot3StatsExcessiveCollisions	A count of frames where the transmission on a particular interface fails due to excessive collisions.
		dot3StatsInternalMacTransmitErrors	A count of frames where the transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object can represent a count of transmission errors on a

Table continues…

Category	Subcategory	Variable	Definition
			particular interface that are not otherwise counted.
		dot3StatsCarrierSenseErrors	The number of times the carrier sense condition was lost or never asserted when the switch attempted to transmit a frame on a particular interface. The count represented by an instance of this object increments at most once for each transmission attempt, even if the carrier sense condition fluctuates during a transmission attempt.
		dot3StatsFrameTooLongs	A count of frames received on a particular interface that exceeds the maximum permitted frame size. The count represented by an instance of this object increments when the frameTooLong status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
		dot3StatsInternalMacReceiveErrors	A count of frames where the transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is counted by an instance of this object ony if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object. The precise meaning of the count represented by an instance of this object is implementation-specific. In particular, an instance of this

Table continues…

Category	Subcategory	Variable	Definition
			object can represent a count of transmission errors on a particular interface that are not otherwise counted.
	IP	ipInHdrErrors.0	The number of input datagrams discarded due to errors in the datagram IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, and errors discovered in processing IP options.
		ipInDiscards.0	The number of discarded input IP datagrams where no problems were encountered to prevent continued processing. An example of why they were discarded can be lack of buffer space. This counter does not include any datagrams discarded while awaiting reassembly.
		ipOutDiscards.0	The number of output IP datagrams where no problems were encountered to prevent transmission to the destination, but that were discarded (for example, for lack of buffer space). This counter includes datagrams counted in ipForwDatagrams if packets meet this (discretionary) discard criterion.
		ipFragFails.0	The number of IP datagrams discarded because they needed to be fragmented at this entity but were not, for example, because the Don't Fragment flag was set.
		ipReasmFails.0	The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, and so forth). This is not necessarily a count of discarded IP fragments because some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by

Table continues…

Category	Subcategory	Variable	Definition
			combining them as they are received.
		icmpInParmProbs.0	The number of ICMP In parameter problem messages received.
		icmpOutParmProbs.0	The number of ICMP Out parameter problem messages received.
	MLT	rcStatMltEtherAlignmentErrors	The number of frames received on an MLT that are not an integral number of octets in length, but do not pass the FCS check.
		rcStatMltEtherFCSErrors	The number of frames received on an MLT that are an integral number of octets in length, but do not pass the FCS check.
		rcStatMltEtherSingleCollFrames	The number of successfully transmitted frames on a particular MLT where transmission is inhibited by exactly one collision.
		rcStatMltEtherMultipleCollFrames	The number of successfully transmitted frames on a particular MLT where transmission is inhibited by more than one collision.
		rcStatMltEtherSQETestError	A count of times that the SQE TEST ERROR message is generated by the PLS sublayer for a particular MLT.
		rcStatMltEtherDeferredTransmiss	A count of frames where the first transmission attempt on a particular MLT is delayed because the medium is busy. The count represented by an instance of this object.
		rcStatMltEtherLateCollisions	The number of times that a late collision is detected on a particular MLT later than 512 bit-times into the transmission of a packet; 512-bit-times corresponds to 51.2-microseconds on a 10 Mb/s system.
		rcStatMltEtherExcessiveCollis	The number of times that excessive collisions are detected

Table continues…

Category	Subcategory	Variable	Definition
			on a particular MLT later than 512 bit-times into the transmission of a packet; 512 bit-times corresponds to 51.2 microseconds on a 10-Mb/s system.
		rcStatMltEtherMacTransmitError	A count of frames where the transmission on a particular MLT fails due to an internal MAC sublayer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the LateCollisions object, the ExcessiveCollisions object, or the CarrierSenseErrors object.
		rcStatMltEtherCarrierSenseError	The number of times the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular MLT. The count represented by an instance of this object increments at most once for each transmission attempt, even if the carrier sense condition fluctuates during a transmission attempt.
		rcStatMltEtherFrameTooLong	A count of frames received on a particular MLT that exceeds the maximum permitted frame size. The count represented by an instance of this object increments when the frameTooLong status is returned by the MAC service to the LLC (or other MAC user).
		rcStatMltEtherMacReceiveError	A count of frames for which reception on a particular MLT fails due to an internal MAC sublayer receive error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the FrameTooLongs object, the AlignmentErrors object, or the FCSErrors object.

Table continues…

Category	Subcategory	Variable	Definition
	Other	rcTblArNoSpace	The number of entries not added to the address translation table due to lack of space.
		snmpInAsnParseErrs.0	The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when it decodes received SNMP messages.
		rcStgPortInBadBpdus	The number of bad BPDUs received by this port.
		dot1dTpPortInDiscards	Count of valid frames received that were discarded (that is, filtered) by the forwarding process.
Traffic	Interface	ifInOctets	The total number of octets received on the interface, including framing characters.
		ifInMulticastPkts	The number of packets, delivered by this sublayer to a higher sublayer, that are addressed to a multicast address at this sublayer. For a MAC layer protocol, this number includes both Group and Functional addresses.
		ifInBroadcastPkts	The number of packets, delivered by this sublayer to a higher (sub) layer, that are addressed to a broadcast address at this sublayer.
		ifInUnkownProtos	For packet-oriented interfaces, the number of packets received through the interface that are discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces that support protocol multiplexing, the number of transmission units received through the interface that are discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter is always 0.

Table continues…

Category	Subcategory	Variable	Definition
		ifOutOctets	The total number of octets transmitted from the interface, including framing characters.
		ifOutMulticastPkts	The total number of packets that higher-level protocols requested be transmitted, and that are addressed to a multicast address at this sublayer, including those that are discarded or not sent. For a MAC layer protocol, this includes both Group and Functional addresses.
		ifoutBroadcastPkts	The total number of packets that higher level protocols requested transmitted, and that were addressed to a broadcast address at this sublayer, including those discarded or not sent.
		ifLastChange	The value of sysUpTime at the time the interface entered its current operational state. If the current state was entered prior to the last reinitialization of the local network management subsystem, this object contains a value of zero.
	RmonEther Stats	etherStatsOctets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). Use this object as a reasonable estimate of Ethernet utilization. For greater precision, sample the etherStatsPkts and etherStatsOctets objects before and after a common interval.
		etherStatsPkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
		etherStatsBroadcastPkts	The total number of good packets received that are directed to the broadcast address. This number does not include multicast packets.

Table continues…

Category	Subcategory	Variable	Definition
		etherStatsMulticastPkts	The total number of good packets received that are directed to a multicast address. This number does not include packets directed to the broadcast address.
		etherStatsCRCAlignErrors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of 64 to 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
		etherStatsUndersizePkts	The total number of packets received that are less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
		etherStatsOversizePkts	The total number of packets received that are longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
		etherStatsFragments	The total number of packets received that are less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error). It is entirely normal for etherStatsFragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.
		etherStatsCollisions	The best estimate of the total number of collisions on this Ethernet segment.

Table continues…

Category	Subcategory	Variable	Definition
	IP	ipInReceives.0	All incoming IP packets.
		ipInAddrErrors.0	The number of bad IP destination addresses.
		ipForwDatagrams.0	IP packets forwarded.
		ipInUnknownProtos.0	Number of unsupported IP protocols.
		ipInDelivers.0	The number of IP In packets delivered.
		ipOutRequests.0	The total number of IP datagrams that local IP user protocols supplied to IP in request for transmission.
		ipOutNoRoutes.0	The number of IP datagrams discarded because no route was found to transmit to the destination.
		ipFragOKs.0	The number of IP datagrams successfully fragmented.
		ipFragCreates.0	The number of IP datagram fragments generated as a result of fragmentation.
		ipReasmReqds.0	The number of requests to reassemble fragments.
		ipReasmOKs.0	The number of fragments reassembled successfully.
	ICMP	IcmpInSrcQuenchs.0	The number of ICMP Source Quench messages received.
		icmpInRedirects.0	The number of ICMP redirect messages.
		icmpInEchos.0	The number of ICMP Echo requests messages received.
		icmpInEchosReps.0	The number of ICMP Echo reply messages received.
		icmpInTimeStamps.0	The number of ICMP timestamp request messages received.
		icmpInTimeStampsReps.0	The number of ICMP timestamp reply messages received.
		icmpInAddrMasks.0	The number of ICMP mask request messages reviewed.
		icmpInAddrMasksReps.0	The number of ICMP mask reply messages reviewed.

Table continues…

Category	Subcategory	Variable	Definition
		icmpInDestUnreachs.0	The number of ICMP destinations unreachable messages received.
		icmpInTimeExcds.0	The number of ICMP Time Exceeded messages received.
		icmpOutSrcQuenchs.0	The number of ICMP Source Quench messages sent.
		icmpOutRedirects.0	The number of ICMP redirect messages sent.
		icmpOutEchos.0	The number of ICMP Echo request messages sent.
		icmpOutEchosReps.0	The number of ICMP Echo reply messages sent.
		icmpOutTimeStamps.0	The number of ICMP Timestamp request messages sent.
		icmpOutTimeStampsReps.0	The number of ICMP Timestamp reply messages sent.
		icmpOutAddrMasks.0	The number of ICMP Address mask messages sent.
		icmpOutAddrMasksReps.0	The number of ICMP Address mask reply messages sent.
		icmpOutDestUnreachs.0	The number of ICMP destination unreachable messages sent.
		icmpOutTimeExcds.0	The number of ICMP time exceeded messages sent.
	Snmp	snmpInPkts.0	The total number of messages delivered to the SNMP entity from the transport service.
		snmpOutPkts.0	The total number of SNMP messages passed from the SNMP protocol entity to the transport service.
		snmpInBadVersions.0	The total number of SNMP messages delivered to the SNMP protocol entity that were intended for an unsupported SNMP version.
		snmpInBadCommunityUses.0	The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation that was not allowed by the SNMP community named in the message.

Table continues…

Category	Subcategory	Variable	Definition
		snmpInTooBigs.0	The total number of SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is tooBig.
		snmpInNoSuchNames.0	The total number of SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is noSuchName.
		snmpInBadValues. 0	The total number of SNMP PDUs received that were generated by the SNMP protocol entity and for which the value of the error-status field is badValue.
		snmpInReadOnlys.0	The total number of valid SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is readOnly. It is a protocol error to generate an SNMP PDU that contains the value readOnly in the error-status field; as such, this object is provided as a means of detecting incorrect implementations of the SNMP.
		snmpInGenErrs.0	The total number of SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is genErr.
		snmpInTotalReqVars.0	The total number of MIB objects retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
		snmpInTotalSetVars.0	The total number of MIB objects altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.
		snmpInGetRequests.0	The total number of SNMP Get-Request PDUs accepted and processed by the SNMP protocol entity.
		snmpInGetNexts.0	The total number of SNMP Get-Next PDUs accepted and

Table continues…

Category	Subcategory	Variable	Definition
			processed by the SNMP protocol entity.
		snmpInSetRequests.0	The total number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol entity.
		snmpInGetResponses.0	The total number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol entity.
		snmpInTraps.0	The total number of SNMP Trap PDUs accepted and processed by the SNMP protocol entity.
		snmpOutTooBigs.0	The total number of SNMP PDUs generated by the SNMP protocol entity and for which the value of the error-status field is tooBig.
		snmpOutNoSuchNames.0	The total number of SNMP PDUs generated by the SNMP protocol entity and for which the value of the error-status field is noSuchName.
		snmpOutBadValues.0	The total number of SNMP PDUs sent that were generated by the SNMP protocol entity and for which the value of the error-status field is badValue.
		snmpOutGenErrs.0	The total number of SNMP PDUs generated by the SNMP protocol entity and for which the value of the error-status field is genErr.
		snmpOutGetRequests.0	The total number of SNMP Get-Request PDUs generated by the SNMP protocol entity.
		snmpOutGetNexts.0	The total number of SNMP Get-Next PDUs generated by the SNMP protocol entity.
		snmpOutSetRequests.0	The total number of SNMP Set-Request PDUs generated by the SNMP protocol entity.
		snmpOutGetResponses.0	The total number of SNMP Get-Response PDUs generated by the SNMP protocol entity.

Table continues…

Category	Subcategory	Variable	Definition
		snmpOutTraps.0	The total number of SNMP Trap PDUs generated by the SNMP protocol entity.
	Bridge	rcStgTimeSinceTopologyChange	The time (in hundredths of a second) since the last topology change was detected by the bridge entity.
		rcStgTopChanges	The total number of topology changes detected by this bridge since the management entity was last reset or initialized.
		rcStgMaxAge	The maximum age of Spanning Tree Protocol information learned from the network on any port before it is discarded, in hundredths of a second. This is the actual value that this bridge is currently using.
		rcStgPortForwardTransitions	The number of times this port transitioned from the Learning state to the Forwarding state.
		rcStgPortInConfigBpdus	The number of Config BPDUs received by this port.
		rcStgPortInTcnBpdus	The number of Topology Change Notification BPDUs received by this port.
		rcStgPortOutConfigBpdus	The number of Config BPDUs transmitted by this port.
		rcStgPortOutTcnBpdus	The number of Topology Change Notification BPDUs transmitted by this port.
		dot1dTpPortInFrames	The number of frames received by this port from its segment. A frame received on the interface corresponding to this port is counted by this object only if it is for a protocol being processed by the local bridging function, including bridge management frames.
		dot1dTpPortOutFrames	The number of frames transmitted by this port to its segment. A frame transmitted on the interface corresponding to this port is

Table continues…

Category	Subcategory	Variable	Definition
			counted by this object if and only if it is for a protocol processed by the local bridging function, including bridge management frames.
		dot1dTpLearnedEntryDiscards.0	The total number of Forwarding Database entries learned but discarded due to a lack of space to store them in the Forwarding Database. If this counter increases, it indicates that the forwarding database is regularly becoming full (a condition that has negative performance effects on the subnetwork). If this counter has a significant value but does not increase, it indicates that the problem occurred but is not persistent.
	Utilization	rcSysBufferUtil.0	Buffer utilization as a percentage of the total amount of buffer space in the system. A high value indicates congestion.
		rcSysNVRamUsed.0	DRAM in use in kilobytes.
		rcSysLastChange.0	Last management-initiated configuration change since sysUpTime.
		rcSysLastVlanChange.0	Last management-initiated VLAN configuration change since sysUpTime.
	MLT	rcStatMltIfExtnIfInMulticastPkts	The total number of multicast packets delivered to this MLT interface.
		rcStatMltIfExtnIfInBroadcastPkts	The total number of broadcast packets delivered to this MLT Interface.
		rcStatMltIfExtnIfOutMulticastPkts	The total number of MLT interface multicast packets delivered to this MLT interface.
		rcStatMltIfExtnIfOutBroadcastPkts	The total number of MLT interface broadcast packets delivered to this MLT interface.
		rcStatMltIfExtnIfHCInOctets	The total number of octets received on this MLT interface

Table continues…

Category	Subcategory	Variable	Definition
			including framing characters detected by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCInUcastPkts	The number of packets delivered by this MLT interface to a higher MLT that were not addressed to a multicast or broadcast address as detected by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCInMulticastPkt	The total number of multicast packets delivered to this MLT interface detected by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCInBroadcastPkt	The total number of broadcast packets delivered to this MLT interface detected by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCOutOctets	The total number of octets transmitted from the MLT interface, including framing characters.
		rcStatMltIfExtnIfHCOutUcastPkts	The number of packets transmitted by this MLT interface to a higher MLT that were not addressed to a multicast or broadcast address as detected by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCOutMulticast	The total number of packets that higher-level protocols requested be transmitted, and that were addressed to a multicast address at this sublayer, including those that were discarded or not sent registered by the high-count (64-bit) register.
		rcStatMltIfExtnIfHCOutBroadcast	The total number of packets that higher-level protocols requested be transmitted, and that were addressed to a broadcast address at this sublayer, including those that were discarded or not sent registered by the high-count (64-bit) register.

Glossary

Application Programming Interface (API)	Defines how to access a software-based service. An API is a published specification that describes how other software programs can access the functions of an automated service.
Autonomous System Number (ASN)	A two-byte number that is used to identify a specific AS.
Avaya command line interface (ACLI)	A textual user interface. When you use ACLI, you respond to a prompt by typing a command. After you enter the command, you receive a system response.
bit error rate (BER)	The ratio of the number of bit errors to the total number of bits transmitted in a specific time interval.
Bridge Protocol Data Unit (BPDU)	A data frame used to exchange information among the bridges in local or wide area networks for network topology maintenance.
Enterprise Device Manager (EDM)	A Web-based embedded management system to support single-element management. EDM provides complete configuration management functionality for the supported devices and is supplied to the customer as embedded software in the device.
Frame Check Sequence (FCS)	Frames are used to send upper-layer data and ultimately the user application data from a source to a destination.
Generalized Regular Expression Parser (grep)	A Unix command used to search files for lines that match a certain regular expression (RE).
Institute of Electrical and Electronics Engineers (IEEE)	An international professional society that issues standards and is a member of the American National Standards Institute, the International Standards Institute, and the International Standards Organization.
Internet Control Message Protocol (ICMP)	A collection of error conditions and control messages exchanged by IP modules in both hosts and gateways.
Internet Protocol multicast (IPMC)	The technology foundation for audio and video streaming, push applications, software distribution, multipoint conferencing, and proxy and caching solutions.

link-state advertisement (LSA)	Packets that contain state information about directly connected links (interfaces) and adjacencies. Each Open Shortest Path First (OSPF) router generates the packets.
Logical Link Control (LLC)	A protocol used in LANs to transmit protocol data units between two end stations. This LLC layer addresses and arbitrates data exchange between two endpoints.
mask	A bit string that the device uses along with an IP address to indicate the number of leading bits in the address that correspond with the network part.
media	A substance that transmits data between ports; usually fiber optic cables or category 5 unshielded twisted pair (UTP) copper wires.
Media Access Control (MAC)	Arbitrates access to and from a shared medium.
MultiLink Trunking (MLT)	A method of link aggregation that uses multiple Ethernet trunks aggregated to provide a single logical trunk. A multilink trunk provides the combined bandwidth of multiple links and the physical layer protection against the failure of a single link.
port	A physical interface that transmits and receives data.
quality of service (QoS)	QoS features reserve resources in a congested network, allowing you to configure a higher priority for certain devices. For example, you can configure a higher priority for IP deskphones, which need a fixed bit rate and split the remaining bandwidth between data connections if calls in the network are more important than the file transfers.
Random Access Memory (RAM)	Memory into which you can write and read data. A solid state memory device used for transient memory stores. You can enter and retrieve information from storage position.
Remote Network Monitoring (RMON)	Creates and displays alarms for user-defined events, gathers cumulative statistics for Ethernet interfaces, and tracks statistical history for Ethernet interfaces.
reverse path checking (RPC)	Prevents packet forwarding for incoming IP packets with incorrect or forged (spoofed) IP addresses.
Routing Information Protocol (RIP)	A distance vector protocol in the IP suite, used by IP network-layer protocol, that enables routers in the same AS to exchange routing information by means of periodic updates. You often use RIP as a very simple interior gateway protocol (IGP) within small networks.
shortest path first (SPF)	A class of routing protocols that use Djikstra's algorithm to compute the shortest path through a network, according to specified metrics, for efficient transmission of packet data.

Simple Network Management Protocol (SNMP)	SNMP administratively monitors network performance through agents and management stations.
spanning tree	A simple, fully-connected active topology formed from the arbitrary physical topology of connected bridged Local Area Network components by relaying frames through selected bridge ports. The protocol parameters and states that are used and exchanged to facilitate the calculation of the active topology and to control the bridge relay function.
Spanning Tree Group (STG)	A collection of ports in one spanning-tree instance.
Trivial File Transfer Protocol (TFTP)	A protocol that governs transferring files between nodes without protection against packet loss.
User Datagram Protocol (UDP)	In TCP/IP, a packet-level protocol built directly on the Internet Protocol layer. TCP/IP host systems use UDP for application-to-application programs.
user-based security model (USM)	A security model that uses a defined set of user identities for authorized users on a particular Simple Network Management Protocol (SNMP) engine.
virtual router	An abstract object managed by the Virtual Router Redundancy Protocol (VRRP) that acts as a default router for hosts on a shared LAN.
virtual router forwarding (VRF)	Provides traffic isolation between customers operating over the same node. Each virtual router emulates the behavior of a dedicated hardware router by providing separate routing functionality, and the network treats each VRF as a separate physical router.
Virtual Router Redundancy Protocol (VRRP)	A protocol used in static routing configurations, typically at the edge of the network. This protocol operates on multiple routers on an IP subnet and elects a primary gateway router. When the primary router fails, a backup router is quickly available to take its place.