Performance Management on Avaya Virtual Services Platform 4000 Series

Release 5.1.2
NN46251-701
Issue 09.01
January 2017

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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

This document describes conceptual and procedural information about the switch management tools and features that are available to monitor and manage the Avaya Virtual Services Platform 4000 Series. Operations include the following:

- Remote Monitoring (RMON)
- Simple Network Management protocol (SNMP)
- Chassis performance
- Port performance

For information on performance management in Avaya Virtual Services Platform 7200 Series and 8000 Series switches, see *Monitoring Performance on Avaya Virtual Services Platform 7200 Series and 8000 Series*, NN47227-701.

Related resources

Documentation

See the *Documentation Roadmap for Avaya Virtual Services Platform 4000 Series*, NN46251-100 for a list of the documentation for this product.

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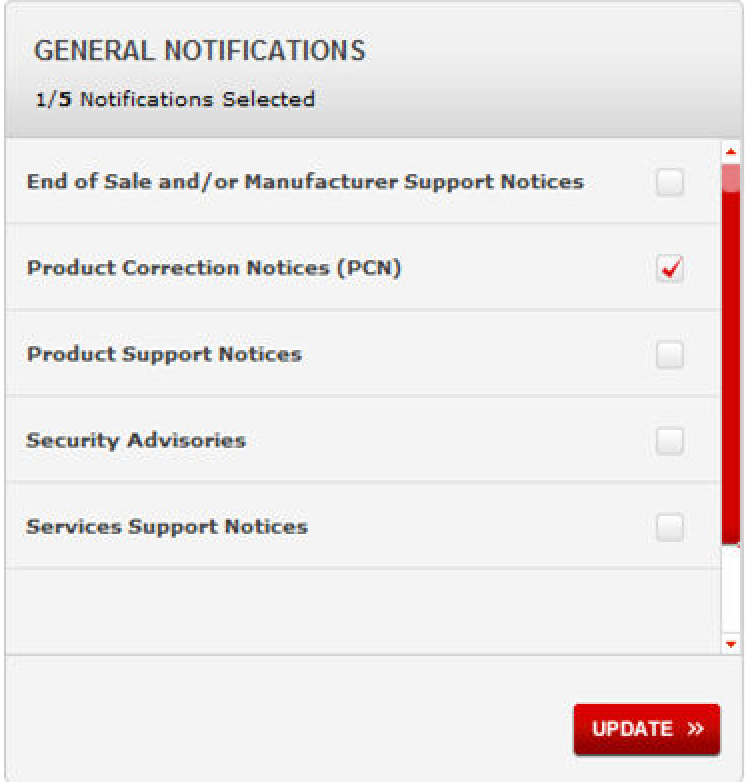

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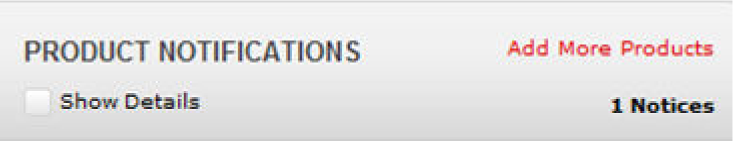

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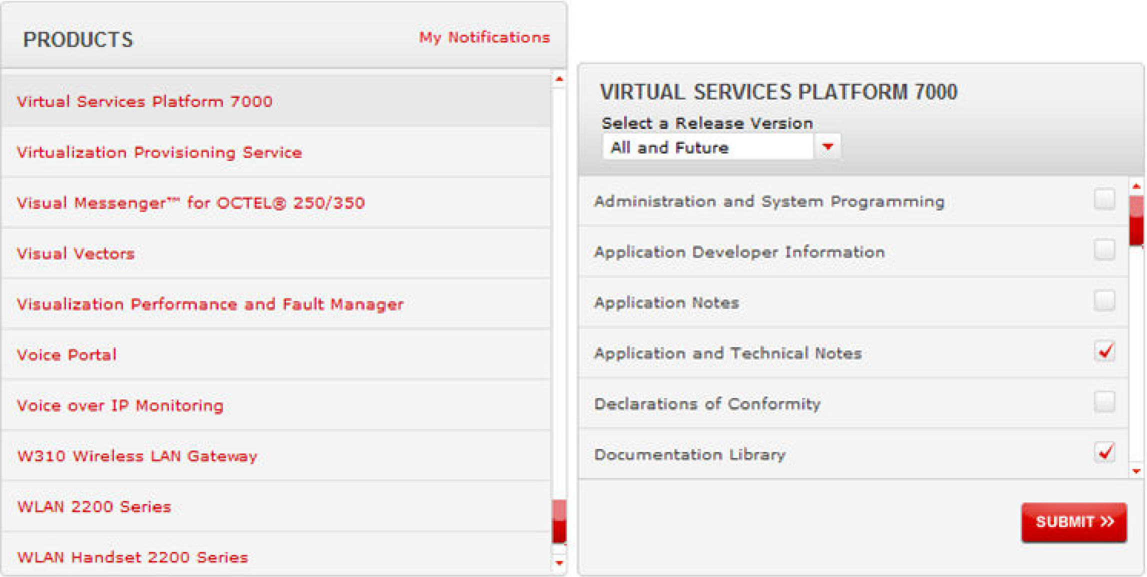
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Chapter 2: New in this document

The following section details what is new in *Performance Management of Avaya Virtual Services Platform 4000 Series*, NN46251-701.

Features

See the following sections for information about feature changes.

Release 5.1.2

The following features are included in Release 5.1.2:

IPsec updates

This release updates IPsec information. CLI commands and EDM paths are updated, IPsec now supports both IPv4 and IPv6, and the system now gives you the ability to enable or disable IPsec for a Circuitless IP on a loopback interface.

For more information, see

- Displaying IPsec statistics on page 67.
- Displaying IPsec statistics on page 74.
- Displaying IPsec interface statistics on page 128.
- Displaying switch level statistics for IPsec-enabled interfaces on page 130.

Release 5.1.1

The following features are included in Release 5.1.1:

RMON1

This release supports RMON1 in addition to RMON2, which was already supported in a previous release. For more information, see Remote Monitoring on page 16.

Chapter 3: Performance management fundamentals

Performance management includes the management tools and features that are available to monitor and manage your routing switch. This section provides overviews for Simple Network Management Protocol (SNMP), Remote Monitoring (RMON), and Digital Diagnostic Monitoring (DDM).

Switch management tools

Use Avaya Command Line Interface or Enterprise Device Manager to access, manage, and monitor the Avaya Virtual Services Platform 4000 Series.

Avaya Command Line Interface

To access the Avaya Command Line Interface (ACLI) initially, you need a direct connection to the system from a terminal or PC. After you enable Telnet, you can access the ACLI from a Telnet session on the network.

ACLI contains commands to configure system operations and management access. ACLI has five major command modes with different privileges.

For more information about ACLI, see *Using ACLI and EDM on VSP Operating System Software*, NN47227-103.

Enterprise Device Manager

Enterprise Device Manager (EDM) is a Web-based graphical user interface (GUI) tool that operates with a Web browser. Use it to access, manage, and monitor a single Virtual Services Platform 4000 system on your network from various locations within the network.

For more information about EDM, see *Using ACLI and EDM on VSP Operating System Software*, NN47227-103.

Dynamic network applications

The remote access services supported on Virtual Services Platform 4000, for example the File Transfer Protocol (FTP), Trivial FTP (TFTP), rlogin, and Telnet, use daemons. These remote access daemons are not enabled by default to enhance security.

After you disable a daemon flag, all existing connections abruptly terminate, and the daemon remains idle (accepts no connection requests).

Use the following dynamic network applications to manage remote access services:

- Access policies
- Port lock
- ACLI access
- SNMP community strings
- Web management interface access

For more information about how to enable remote access services, see *Quick Start for Avaya Virtual Services Platform 4000 Series*, NN46251-102.

For more information about how to access policies, lock a port, access the ACLI, and configure SNMP community strings, see *Security for Avaya Virtual Services Platform 4000 Series*, NN46251-601.

For more information about how to access the Web management interface, see .

Digital diagnostic monitoring

Use Digital Diagnostic Monitoring (DDM) to monitor laser operating characteristics such as temperature, voltage, current, and power. This feature works at any time during active laser operation without affecting data traffic.

There are three optical transceivers that support DDM:

- Small Form Factor Pluggable (SFP) transceivers
- 10 Gigabit Small Form Factor Pluggable plus (SFP+)
- Quad Small Form Factor Pluggable plus (QSFP+)

Important:

The Avaya VSP 4000 does not support QSFP+ transceivers because the VSP 4000 devices do not have any QSFP+ ports.

Digital Diagnostic Interface (DDI) is an interface that supports DDM. These devices provide real-time monitoring of individual DDI SFPs, SFP+s and QSFP+s on a variety of Avaya products. The DDM software provides warnings or alarms after the temperature, voltage, laser bias current, transmitter power or receiver power fall outside of vendor-specified thresholds during initialization.

For information about SFPs, SFP+s and QSFPs see *Installing Transceivers and Optical components on VSP Operating System Software*, NN47227-301.

Remote Monitoring

This section provides information on Remote Monitoring (RMON).

RMON has two versions:

- RMON1
- 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 alarm to monitor anything that has a MIB OID associated with it and a valid instance.

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 and/or a trap.
- 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:

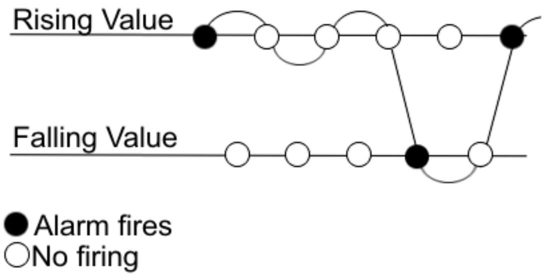

Figure 1: How alarms fire

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:

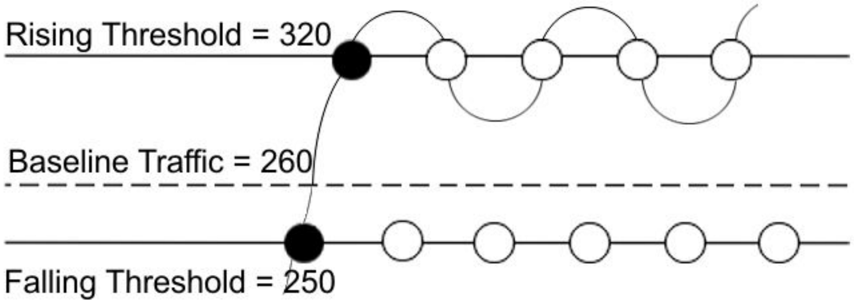

Figure 2: Alarm example, threshold less than 260

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.

Note:

If you create an alarm that monitors a variable that does not exists, you will receive an error message and the creation will fail. Also, if the variable you are monitoring is no longer valid at the time of sampling, the switch removes the alarm automatically. For example, if you create an alarm that monitors some information about a VLAN, and that VLAN is later removed, then the switch silently removes the associated alarm at the next sampling interval.

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 to monitor anything that has a MIB OID associated with it and a valid instance.

An event specifies whether a trap, a log, or both a trap and a log generates to view alarm activity.

You must create an event before associating it with an alarm, otherwise an error occurs. Also, you cannot delete an event as long as there are alarms associated with it. If you try to do so, an error message displays.

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.

RMON1 scaling limits

The following tables shows the scaling limits for RMON1 elements.

Note:

When the log table reaches the maximum 500 log limit, the oldest third of the logs per event is removed to make room for new events. For all other elements, a message displays when you reach the maximum limit and no other element can be added.

Alarms	100
Events	100
History (entries in the history control table with 2000 buckets shared between them)	20
Logs	500
Statistics (entries in stats table)	100

RMON 2

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.

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:

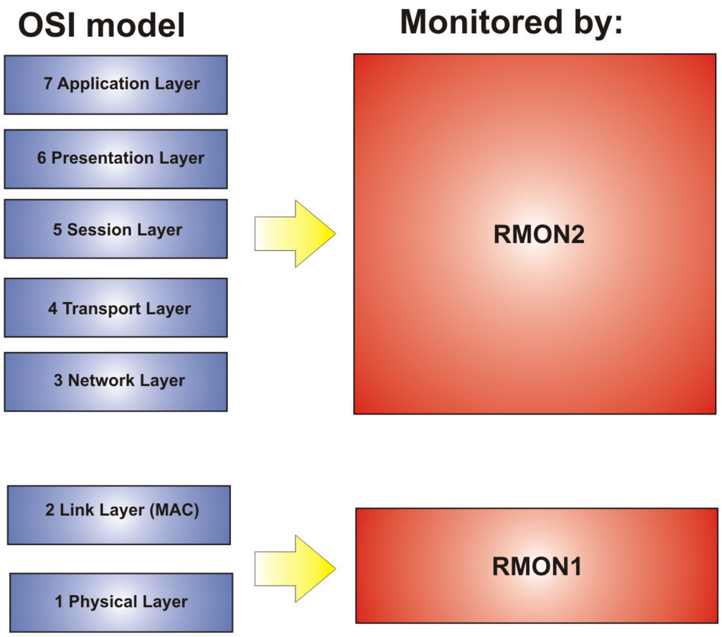

Figure 3: OSI model and RMON

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). The switch 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, enable monitoring for individual devices. 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 enable 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 Protocol (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 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.

Chapter 4: Chassis performance management using EDM

Use Enterprise Device Manager (EDM) to configure chassis parameters and to graph chassis statistics on an Avaya Virtual Services Platform 4000 Series.

Viewing system performance

About this task

For information about how to use Key Health Indicators functionality to view system performance, see *Fault Management of Avaya Virtual Services Platform 4000 Series*, NN46251-702.

Viewing the trap sender table

About this task

Use the Trap Sender Table tab to view source and receiving addresses.

Procedure

1. On the Device physical view, select a chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Edit**.
3. Click **Chassis**.
4. Click the **Trap Sender Table** tab.

Trap Sender Table field descriptions

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

Name	Description
RecvAddress	IP address for the trap receiver. This is a read-only parameter that contains the IP address configured in the TAddress field in the TargetTable.
SrcAddress	Source IP address to use when sending traps. This IP address will be inserted into the source IP address field in the UDP trap packet.

Chapter 5: Port performance management using ACLI

This section contains procedures to configure port performance management in the ACLI.

Viewing DDI module information

Before you begin

- You must log on to at least Privileged EXEC mode in the ACLI.

About this task

Perform this procedure to view basic SFP and SFP+ manufacturing information and characteristics, and the current configuration.

This command displays information for both DDI and non-DDI SFPs and SFP+s.

Procedure

1. View basic SFP and SFP+ manufacturing information and characteristics:

   `show pluggable-optical-modules basic [{slot/port[-slot/port][,...]}]`

2. View configuration information:

   `show pluggable-optical-modules config`

3. View detailed SFP and SFP+ manufacturing information and characteristics:

   `show pluggable-optical-modules detail [{slot/port[-slot/port][,...]}]`

Example

```
VSP-4850GTS#show pluggable-optical-modules config

================================================================================
                 Pluggable Optical Module Global Configuration
================================================================================
                           ddm-monitor : disabled
                  ddm-monitor-interval : 5
                        ddm-traps-send : enabled
                    ddm-alarm-portdown : disabled
```

Variable definitions

Use the data in the following table to use the `show pluggable-optical-modules basic` and `show pluggable-optical-modules detail` commands.

Table 1: Variable definitions

Variable	Value
{slot/port[-slot/port][,...]}	Specify a port or a range of ports in the format of slot/port. If you do not specify a port list, the system displays the complete detailed output for each port.

Viewing DDI temperature information

Before you begin

- You must log on to at least Privileged EXEC mode in the ACLI.

About this task

Perform this procedure to view SFP and SFP+ temperatures.

This command displays information for both DDI and non-DDI SFPs and SFP+s.

Procedure

View SFP and SFP+ temperatures:

```
show pluggable-optical-modules temperature [{slot/port[-slot/port]
[,...]}]
```

Example

```
VSP-4850GTS#show pluggable-optical-modules temperature

=============================================================================
 Pluggable Optical Module Temperature(C)
=============================================================================
PORT        LOW_ALARM LOW_WARN   ACTUAL     HIGH_WARN HIGH_ALARM THRESHOLD
NUM         THRESHOLD THRESHOLD  VALUE      THRESHOLD THRESHOLD         STATUS
-----------------------------------------------------------------------------
1/49           0.0              5.0         28.9296      73.0              78.0
Normal
1/50           0.0              5.0         36.3007      73.0             78.0
Normal

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

Variable definitions

Use the data in the following table to use the `show pluggable-optical-modules temperature` command.

Table 2: Variable definitions

Variable	Value
{slot/port[-slot/port][,...]}	Specify a port or a range of ports in the format of slot/port. If you do not specify a port list, the system displays the complete detailed output for each port.

Viewing DDI voltage information

Before you begin

- You must log on to at least Privileged EXEC mode in the ACLI.

About this task

Perform this procedure to view SFP and SFP+ voltages.

This command displays information for both DDI and non-DDI SFPs and SFP+s.

Procedure

View SFP and SFP+ voltages:

`show pluggable-optical-modules voltage [{slot/port[-slot/port][,...]}]`

Example

```
VSP-4850GTS#show pluggable-optical-modules voltage

================================================================================
                      Pluggable Optical Module Voltage(V)
================================================================================
PORT         LOW_ALARM LOW_WARN    ACTUAL  HIGH_WARN HIGH_ALARM THRESHOLD
NUM          THRESHOLD THRESHOLD   VALUE   THRESHOLD THRESHOLD  STATUS
--------------------------------------------------------------------------------
1/49                   3.0350        3.1000        3.2922        3.5000
3.5650         Normal
1/50                   3.0350        3.1000        3.2950        3.5000
3.5650         Normal
```

Variable definitions

Use the data in the following table to use the `show pluggable-optical-modules voltage` command.

Table 3: 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).

Chapter 6: Port performance management using EDM

This section describes port performance management functions on an Avaya Virtual Services Platform 4000 Series.

Configuring rate limits

About this task

Configure the rate limit of broadcast or multicast packets to determine the total bandwidth limit on the port.

Procedure

1. On the Device Physical View, select a port or multiple ports.
2. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Port**.
3. Click **General**.
4. Click the **Rate Limiting** tab.
5. Configure the parameters as required.
6. Click **Apply**.

Rate Limiting field descriptions

Use the data in the following table to use the **Rate Limiting** tab.

Name	Description
Index	The port number.
TrafficType	The type of traffic being rate limited, either broadcast or multicast traffic. The default is broadcast.
AllowedRatePps	This variable is the allowed traffic rate limit for the port in packets per second.

Table continues…

Name	Description
	For the Avaya Virtual Services Platform 4000 Series, 1 to 25 sets the limit in a percentage of the total bandwidth on the port from 1–25 percent. On gigabit ports and MDAs, there can be up to a 2 percent difference between the configured and actual rate limiting values. For the Avaya Virtual Services Platform 4000 Series, 1–65535 sets the limit in packets for each second.
Enable	Double-click in the field and select to enable (True) or disable (False) rate limiting. The default is false.

Enabling learning limits on a port

About this task

Limit MAC address learning to limit the number of forwarding database (FDB) entries learned on a particular port to a user-specified value. After the number of learned forwarding database entries reaches the maximum limit, packets with unknown source MAC addresses are flooded to all member ports.

Procedure

1. In the Device Physical View tab, select a port or multiple ports.
2. In the navigation tree, expand the following folders: **Configuraton** > **Edit** > **Port**.
3. Click **General**.
4. Click the **Limit-Learning** tab.
5. Configure the parameters as required.

Limit-Learning field descriptions

Use the data in the following table to use the **Limit-Learning** tab.

Name	Description
PortNum	Shows the slot and port number to configure.
MaxMacCount	Configures the number of entries in the MAC table for the port that causes learning to stop. The default is 1024.
CurrentMacCount	Shows the number of entries currently in the MAC table for the port.

Table continues…

Name	Description
Enable	Enables or disables limit learning for the port. The default is disable.
MacLearning	Shows if MAC learning is enabled or disabled for the port. The default is true.

Viewing DDI information

Before you begin

To view the DDI information, you must first set a VRF context view.

About this task

You can view DDI information (such as module information, temperature, and voltages) for SFPs and SFP+s on the 1 Gb and 10 Gb interface modules.

Procedure

1. In the Physical Device view, select a port.
2.
3. In the navigation tree, expand the following folders: **Configuration** > **Edit** > **Port**.
4. Click **General**.
5. Select the **DDI/SFP** tab.

DDI/SFP field descriptions

Use the data in the following table to use the **DDI/SFP** tab.

Name	Description
DdmStatus	Indicates if DDM is enabled.
Calibration	Indicates if the calibration is internal or external.
PowerMeasure	Indicates Rx power measurement as average or OMA.
ConnectorType	Indicates the type of SFP or SFP+ connector.
VendorName	Indicates the name of the SFP or SFP+ manufacturer.
VendorPartNumber	Indicates the Avaya PEC for the SFP or SFP+
VendorRevNumber	Indicates the manufacturer revision level for the SFP or SFP+.
VendorSN	Indicates the manufacturer serial number for the SFP or SFP+.

Table continues…

Name	Description
VendorDateCode	Indicates the manufacturer date code for the SFP or SFP+.
CLEI	Indicates the Telcordia register assignment Avaya CLEI code.
SupportsDDM	Indicates if the SFP or SFP+ supports DDM.
Aux1Monitoring	Indicates if auxiliary monitoring is implemented for the SFP +.
Aux2Monitoring	Indicates if auxiliary monitoring is implemented for the SFP +.
Wavelength	Indicates the wavelength in nm of the SFP or SFP+.
Temperature	Indicates the current temperature in degrees Celsius of the SFP or SFP+.
TemperatureHighAlarmThreshold	Indicates the high alarm threshold in degrees Celsius.
TemperatureLowAlarmThreshold	Indicates the low alarm threshold in degrees Celsius.
TemperatureHighWarningThreshold	Indicates the high warning threshold in degrees Celsius.
TemperatureLowWarningThreshold	Indicates the high warning threshold in degrees Celsius.
TemperatureStatus	Indicates if any temperature thresholds were exceeded.
Voltage	Indicates the current voltage in volts.
VoltageHighAlarmThreshold	Indicates the high alarm threshold in volts.
VoltageLowAlarmThreshold	Indicates the low alarm threshold in volts.
VoltageHighWarningThreshold	Indicates the high warning threshold in volts.
VoltageLowWarningThreshold	Indicates the high warning threshold in volts.
VoltageStatus	Indicates if any voltage thresholds were exceeded.
Bias	Indicates the laser bias current in mA.
BiasHighAlarmThreshold	Indicates the bias current high alarm threshold in mA.
BiasLowAlarmThreshold	Indicates the bias current low alarm threshold in mA.
BiasHighWarningThreshold	Indicates the bias current high warning threshold in mA.
BiasLowWarningThreshold	Indicates the bias current high warning threshold in mA.
BiasStatus	Indicates if any bias thresholds were exceeded.
TxPower	Indicates the current Tx power in mW.
TxPowerHighAlarmThreshold	Indicates the high alarm threshold in mW for the Tx power.
TxPowerLowAlarmThreshold	Indicates the low alarm threshold in mW for the Tx power.
TxPowerHighWarningThreshold	Indicates the high warning threshold in mW for the Tx power.
TxPowerLowWarningThreshold	Indicates the high warning threshold in mW for the Tx power.
TxPowerStatus	Indicates if any Tx power thresholds were exceeded.
RxPower	Indicates the current Rx power in mW.

Table continues…

Name	Description
RxPowerHighAlarmThreshold	Indicates the high alarm threshold in mW for the Rx power.
RxPowerLowAlarmThreshold	Indicates the low alarm threshold in mW for the Rx power.
RxPowerHighWarningThreshold	Indicates the high warning threshold in mW for the Rx power.
RxPowerLowWarningThreshold	Indicates the high warning threshold in mW for the Rx power.
RxPowerStatus	Indicates if any Rx power thresholds were exceeded.
Aux1	Indicates the current auxiliary 1 reading.
Aux1HighAlarmThreshold	Indicates the high alarm threshold auxiliary 1 reading.
Aux1LowAlarmThreshold	Indicates the low alarm threshold auxiliary 1 reading.
Aux1HighWarningThreshold	Indicates the high warning threshold auxiliary 1 reading.
Aux1LowWarningThreshold	Indicates the high warning threshold auxiliary 1 reading.
Aux1Status	Indicates if any auxiliary 1 thresholds were exceeded.
Aux2	Indicates the current auxiliary 2 reading.
Aux2rHighAlarmThreshold	Indicates the high alarm threshold auxiliary 2 reading.
Aux2LowAlarmThreshold	Indicates the low alarm threshold auxiliary 2 reading.
Aux2HighWarningThreshold	Indicates the high warning threshold auxiliary 2 reading.
Aux2LowWarningThreshold	Indicates the high warning threshold auxiliary 2 reading.
Aux2rStatus	Indicates if any auxiliary 2 thresholds were exceeded.

Chapter 7: Statistics

This chapter provides the procedures for using statistics to help monitor the performance of the switch using Enterprise Device Manager (EDM) and Avaya command line interface (ACLI).

Viewing statistics using ACLI

This section contains procedures to view statistics in the ACLI.

Viewing TCP statistics

View TCP statistics to manage network performance.

Procedure

View TCP statistics:

```
show ip tcp statistics
```

Example

```
VSP-4850GTS#show ip tcp statistics
show ip tcp global statistics:
------------------
ActiveOpens:        0
PassiveOpens:       37
AttemptFails:       0
EstabResets:        34
CurrEstab:          1
InSegs:             6726
OutSegs:            7267
RetransSegs:        10
InErrs:             0
OutRsts:            10
```

Job aid

The following table describes the output for the **`show ip tcp statistics`** command.

Table 4: show ip tcp statistics command output

Field	Description
ActiveOpens	The count of transitions by TCP connections to the SYN-SENT state from the CLOSED state.
PassiveOpens	The count of transitions by TCP connections to the SYN-RCVD state from the LISTEN state.
AttemptFails	The count of transitions by TCP connections to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the count of transitions to the LISTEN state from the SYN-RCVD state.
EstabResets	The count of transitions by TCP connections to the CLOSED state from the ESTABLISHED or CLOSE-WAIT state.
CurrEstab	The count of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.
InSegs	The total count of segments received, including those received in error. This count includes segments received on currently established connections.
OutSegs	The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
RetransSegs	The total count of TCP segments transmitted containing one or more previously transmitted octets.
InErrs	The count of segments received in error.
OutRsts	The count of TCP segments sent containing the RST flag.

Viewing port routing statistics

About this task

View port routing statistics to manage network performance.

Procedure

View port routing statistics:

```
show routing statistics interface [gigabitethernet] [{slot/port[-slot/
port][,...]}]
```

Example

```
VSP-4850GTS#show routing statistics interface gigabitethernet 1/7-1/9
```

```
================================================================================
                               Port Stats Routing
================================================================================
PORT     IN_FRAME   IN_FRAME   IN         OUT_FRAME  OUT_FRAME
NUM      UNICAST    MULTICAST  DISCARD    UNICAST    MULTICAST
--------------------------------------------------------------------------------
1/7      1386       0          0          1344       0
1/8      1302       0          0          1344       0
1/9      0          0          0          0          0
```

Variable definitions

Use the data in the following table to use the **`show routing statistics interface`** command.

Variable	Value
gigabitethernet	Specifies the interface type.
{slot/port[-slot/port][,...]}	Identifies the slot and port in the following formats: a single slot and port (1/1).

Job aid

The following table describes the output for the **`show routing statistics interface`** command.

Table 5: show routing statistics interface field descriptions

Parameter	Description
PORT NUM	Indicates the port number.
IN_FRAME UNICAST	The count of inbound unicast frames.
IN_FRAME MULTICAST	The count of inbound multicast frames.
IN DISCARD	The count of inbound discarded frames.
OUT_FRAME UNICAST	The count of outbound unicast frames.
OUT_FRAME MULTICAST	The count of outbound multicast frames.

Displaying bridging statistics for specific ports

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Display individual bridging statistics for specific ports to manage network performance.

Procedure

View bridging statistics for a specific port:

```
show interfaces GigabitEthernet statistics bridging [{slot/port[-slot/
port][,...]}}
```

Example

```
VSP-4850GTS#show interfaces gigabitEthernet statistics bridging
================================================================================
                               Port Stats Bridge
================================================================================
PORT  IN_FRAME   IN_FRAME   IN_FRAME   OUT_FRAME IN_FRAME  OUT_FRAME IN_DISCARD
NUM   UNICAST    MULTICAST  BROADCAST            xSTP BPDU xSTP BPDU
--------------------------------------------------------------------------------
1/1   179325     0          0          119310    179325    0         0
1/2   187951     26078      42         689486    179324    0         25617
1/3   0          0          0          0         0         0         0
1/4   0          0          0          0         0         0         0
1/5   0          0          0          0         0         0         0
1/6   394        0          0          948942    360       0         0
1/7   4689       0          0          863403    360       0         0
1/8   4369       3206       116        958752    360       0         3995
1/9   0          0          0          0         0         0         0
1/10  0          0          0          0         0         0         0
1/11  0          0          0          0         0         0         0
1/12  0          0          0          0         0         0         0
1/13  179325     0          0          42040     179325    0         0
1/14  187864     0          0          50437     179324    0         0
1/15  0          0          0          0         0         0         0
1/16  0          0          0          0         0         0         0

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

Variable definitions

Use the data in the following table to use the **`show interfaces GigabitEthernet statistics bridging`** command.

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

Job aid

The following table describes parameters for the `show interfaces GigabitEthernet statistics bridging` command.

Table 6: show interfaces gigabitEthernet statistic bridging field descriptions

Parameter	Description
PORT NUMB	Port index of the statistics table.
IN_FRAME UNICAST	The count of inbound Unicast frames.
IN_FRAME MULTICAST	The count of inbound Multicast frames.
IN_FRAME BROADCAST	The count of inbound Broadcast frames.
OUT_FRAME	The count of outbound frames.

Displaying DHCP-relay statistics for specific ports

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Display individual DHCP-relay statistics for specific ports to manage network performance.

Procedure

View DHCP-relay statistics for a specific port or VRF.

```
show interfaces GigabitEthernet statistics dhcp-relay [vrf WORD<1-16>]
[vrfids WORD<0-255>]|{slot/port[-slot/port][,...]}}
```

Example

View DHCP-relay statistics:

```
Switch:1>enable
Switch:1#show interfaces gigabitethernet statistics dhcp-relay

================================================================================
                                Port Stats Dhcp
================================================================================
PORT_NUM VRF NAME         NUMREQUEST NUMREPLY
--------------------------------------------------------------------------------
1/12     GlobalRouter     0          2
1/13     GlobalRouter     3          2
2/3      GlobalRouter     0          2
--------------------------------------------------------------------------------
```

Variable definitions

Use the data in the following table to use the **`show interfaces GigabitEthernet statistics dhcp-relay`** command.

Variable	Value
vrf *WORD<1-16>*	Specifies a VRF instance by VRF name.
vrfids *WORD<0-255>*	Specifies the ID of the VRF.
{slot/port[-slot/port][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (1/1).

Job aid

The following table describes parameters for the **`show interfaces GigabitEthernet statistics dhcp-relay`** command output.

Table 7: show interfaces gigabitethernet statistics dhcp-relay field descriptions

Variable	Value
PORT_NUM	Indicates the port number.
VRF NAME	Identifies the VRF
NUMREQUEST	Indicates the total number of DHCP requests on this interface
NUMREPLY	Indicates the total number of DHCP replies on this interface.

Displaying DHCP-relay statistics for all interfaces

About this task

Display DHCP-relay statistics for all interfaces to manage network performance.

Procedure

1. Show the number of requests and replies for each interface:

   `show ip dhcp-relay counters [vrf` *`WORD<1-16>`*`] [vrfids` *`WORD<0-512>`*`]`

2. Show counters for Option 82:

   `show ip dhcp-relay counters option82 [vrf` *`WORD<1-16>`*`] [vrfids` *`WORD<0-512>`*`]`

Example

```
VSP-4850GTS>show ip dhcp-relay counters option82
================================================================================
                     DHCP Counters Option82 - GlobalRouter
================================================================================
          FOUND DROP  CIRCUIT ADD   REMOVE REMOTE            ADD    REMOVE
INTERFACE OPT82 PKT   ID      CIRC  CIRC   ID                REMOTE REMOTE
--------------------------------------------------------------------------------
Port 1/12  0     0     395      0     0      00:24:7f:9d:0a:00  0      0
Vlan40     0     0     2088     0     0      00:24:7f:9d:0a:01  0      0
```

Variable definitions

Use the data in the following table to use the **`show ip dhcp-relay counters`** command.

Variable	Value
vrf *WORD<1-16>*	Specifies a VRF instance by the VRF name.
vrfids *WORD<0-512>*	Specifies the ID of the VRF.

Job aid

The following table explains the output from the `show ip dhcp-relay counters option82` command.

Table 8: show ip dhcp-relay counters option82 command

Heading	Description
INTERFACE	Shows the name of the interface on which you enabled option 82. Shows the port number if the interface is a brouter port or the VLAN number if the interface is a VLAN.
FOUND OPT82	Shows the number of packets that the interface received that already had option82 in them.
DROP PKT	Shows the number of packets the interface dropped because of option 82–related issues. These reasons could be that the packet was received from an untrusted source or spoofing was detected. To determine the cause of the drop, you must enable trace on level 170.
CIRCUIT ID	Show the value inserted in the packets as the circuit ID. The value is the index of the interface.
ADD CIRC	Shows on how many packets (requests from client to server) the circuit ID was inserted for that interface. If you expect this value to increase but it does not, and the interface does not drop a packet, it is possible the packet does not have enough space to insert the option. You must enable trace on level 170 to determine the cause.
REMOVE CIRC	Shows on how many packets (replies from server to client) the circuit id was removed for that interface.
REMOTE ID	Shows the value inserted in the packets as the remote ID. The value is the MAC address of the interface.
ADD REMOTE	Shows on how many packets (requests from client to server) the remote ID was inserted for that interface. If you expect this value to increase but it does not, and the interface does not drop a packet, it is possible the packet does not have enough space to insert the option. You must enable trace on level 170 to determine the cause.
REMOVE REMOTE	Shows on how many packets (replies from server to client) the remote ID was removed for that interface.

Viewing IPv6 DHCP Relay statistics

Display individual IPv6 DHCP Relay statistics for specific interfaces to manage network performance.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View statistics:

   `show ipv6 dhcp-relay counters`

   Note:

   Use the `sys action reset counters` command to clear DHCP Relay statistics.

Example

```
Switch:1#show ipv6 dhcp-relay counters

================================================================================
                                DHCPv6 Counters
================================================================================
INTERFACE                                 REQUESTS   REPLIES
--------------------------------------------------------------------------------
1111:0:0:0:0:0:0:1111                     1         1
```

Job aid

The following table explains the output of the **`show ipv6 dhcp-relay counters`** command.

Table 9: show ipv6 dhcp-relay counters command output

Heading	Description
REQUESTS	Shows the number of DHCP and BootP requests on this interface.
REPLIES	Shows the number of DHCP and BootP replies on this interface.

Displaying LACP statistics for specific ports

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Display individual LACP statistics for specific ports to manage network performance.

Procedure

View statistics for specific ports:

```
show interfaces GigabitEthernet statistics lacp [{slot/port[-slot/port]
[,...]}]
```

Example

View LACP statistics:

```
Switch:1>enable
Switch:1#show interfaces gigabitethernet statistics lacp

================================================================================
                                Port Stats Lacp
================================================================================
PORT    TX     RX     TX        RX        TX            RX            RX      RX
NUM     LACPDU LACPDU MARKERPDU MARKERPDU MARKERRESPPDU MARKERRESPPDU UNKNOWN
ILLEGAL
--------------------------------------------------------------------------------
1/39     0        0        0          0          0               0    0       0
1/40     0        0        0          0          0               0    0       0
2/37     0        0        0          0          0               0    0       0
2/38     0        0        0          0          0               0    0       0
```

Variable definitions

Use the data in the following table to use the **`show interfaces GigabitEthernet statistics lacp`** command.

Variable	Value
{slot/port[-slot/port][,...]}	Identifies the slot and port in the following format: a single slot and port/ports (1/1).

Job aid

The following table describes parameters for the `show interfaces GigabitEthernet statistics lacp` command.

Table 10: show interfaces GigabitEthernet statistics lacp field descriptions

Parameter	Description
PORT_NUM	Indicates the port number.
TX LACPDU	The count of transmitted LACP data units.
RX LACPDU	The count of received LACP data units.
TX MARKERPDU	The count of transmitted marker protocol data units.
RX MARKERPDU	The count of received marker protocol data units.
TX MARKERRESPPDU	The count of transmitted marker protocol response data units.
RX MARKERRESPPDU	The count of received marker protocol response data units.
RX UNKNOWN	The count of received unknown frames.
RX ILLEGAL	The count of received illegal frames.

Displaying RMON statistics for specific ports

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Display individual RMON statistics for specific ports to manage network performance.

Procedure

View statistics for specific ports:

```
show interfaces GigabitEthernet statistics rmon {slot/port[-slot/port]
[,...]}
```

Example

View RMON statistics:

```
Switch:1>enable
Switch:1#show interfaces gigabitEthernet statistics rmon 1/13

================================================================================
                                Port Stats Rmon
================================================================================
PORT  OCTETS     PKTS    MULTI   BROAD   CRC     UNDER   OVER    FRAG    COLLI
NUM                      CAST    CAST    ALLIGN  SIZE    SIZE    MENT    SION
--------------------------------------------------------------------------------
1/13  1943       21      8       13      0       0       0       0       0
```

Variable definitions

Use the data in the following table to use the **show interfaces GigabitEthernet statistics rmon** command.

Variable	Value
{slot/port[-slot/port][,...]}	Identifies the slot and port in the following format: a single slot and port/ports (1/1).

Job aid

The following table describes parameters for the `show interfaces GigabitEthernet statistics rmon` command output.

Table 11: show interfaces GigabitEthernet statistics rmon field descriptions

Parameter	Description
PORT NUM	Indicates the port number.
OCTETS	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).

Table continues…

Parameter	Description
PKTS	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
MULTICAST	The total number of packets received that were directed to a multicast address. This number does not include packets directed to the broadcast address.
BROADCAST	The total number of packets received that were directed to the broadcast address. This number does not include multicast packets.
CRC ALLIGN	The total number of packets received that had a length (excluding framing bits, but including FCS octets) between 64 and 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).
UNDERSIZE	The total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
OVERSIZE	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
FRAGMENT	The total number of packets received 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).
COLLISION	An estimated value for the total number of collisions on this Ethernet segment.

Displaying detailed statistics for ports

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Display detailed statistics for specific ports to manage network performance.

Procedure

View statistics for specific ports:

```
show interfaces GigabitEthernet statistics verbose {slot/port[-slot/port]
[,...]}
```

Example

View statistics for various ports:

```
Switch:1>enable
Switch:1#show interfaces gigabitethernet statistics verbose

Please widen the terminal for optimal viewing of data.

==========================================================================================
                            Port Stats Interface Extended
==========================================================================================
PORT_NUM IN_UNICST OUT_UNICST IN_MULTICST OUT_MULTICST IN_BRDCST OUT_BRDCST IN_LSM OUT_LSM
------------------------------------------------------------------------------------------
1/1      21160      4631274243 2673939      93652        1577118    190030   0       0
1/2      5127315765 636763065  0            375918       1          155808   0       0
1/3      0          0          0            0            0          0        0       0
1/4      0          0          0            0            0          0        0       0
1/5      0          0          0            0            0          0        0       0
1/6      0          0          0            0            0          0        0       0
1/7      0          0          0            0            0          0        0       0
1/8      0          0          0            0            0          0        0       0
1/9      0          0          0            0            0          0        0       0
1/10     0          0          0            0            0          0        0       0
1/11     0          0          0            0            0          0        0       0
1/12     0          0          0            0            0          0        0       0
1/13     0          0          0            0            0          0        0       0
1/14     0          0          0            0            0          0        0       0
1/15     0          0          0            0            0          0        0       0

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

Variable definitions

Use the data in the following table to use the **`show interfaces GigabitEthernet statistics verbose`** command.

Variable	Value
{slot/port[-slot/port][,...]}	Identifies the slot and port in the following format: a single slot and port/ports (1/1).

Job aid

The following table describes parameters for the `show interfaces GigabitEthernet statistics verbose` command.

Table 12: how interfaces GigabitEthernet statistics verbose field descriptions

Parameter	Description
PORT_NUM	Indicates the port number.
IN_UNICAST	The count of inbound Unicast packets.
OUT_UNICAST	The count of outbound Unicast packets.
IN_MULTICAST	The count of inbound Multicast packets.
OUT_MULTICAST	The count of outbound Multicast packets.

Table continues…

Parameter	Description
IN_BRDCST	The count of inbound broadcast packets.
OUT_BRDCST	The count of outbound broadcast packets.

Displaying IS-IS statistics and counters

Use the following procedure to display the IS-IS statistics and counters.

Procedure

1. Display IS-IS system statistics:

   `show isis statistics`

2. Display IS-IS interface counters:

   `show isis int-counters`

3. Display IS-IS level 1 control packet counters:

   `show isis int-l1-cntl-pkts`

   Note:

   The current release uses level 1 IS-IS. The current release does not support level 2 IS-IS. The ACLI command **`show isis int-l2-contl-pkts`** is not supported in the current release because the IEEE 802.1aq standard currently only defines the use of one hierarchy, Level 1.

4. Clear IS-IS statistics:

   `clear isis stats [error-counters] [packet-counters]`

Example

```
VSP-4850GTS# show isis statistics
================================================================================
                               ISIS System Stats
================================================================================

LEVEL    CORR   AUTH   AREA   MAX SEQ   SEQ NUM  OWN LSP  BAD ID  PART   LSP    DB
             LSPs  FAILS  DROP   EXCEEDED   SKIPS    PURGE    LEN    CHANGES OLOAD
--------------------------------------------------------------------------------
Level-1  0      0      0      0        1        0        0       0       0
```

```
VSP-4850GTS#show isis int-counters
================================================================================
                            ISIS Interface Counters
================================================================================

IFIDX    LEVEL   AUTH     ADJ          INIT      REJ     ID LEN  MAX AREA LAN    DIS
                 FAILS    CHANGES           FAILS       ADJ                       CHANGES
--------------------------------------------------------------------------------
Mlt2     Level 1-2  0        1               0       0           0       0        0
```

```
Port1/21 Level 1-2  0        1               0       0           0       0        0
```

```
VSP-4850GTS#show isis int-l1-cntl-pkts
================================================================================
                        ISIS L1 Control Packet counters
================================================================================
IFIDX         DIRECTION     HELLO        LSP          CSNP         PSNP

--------------------------------------------------------------------------------
Mlt2           Transmitted       13346        231          2            229
Mlt2           Received          13329        230          1            230
Port1/21       Transmitted       13340        227          2            226
Port1/21       Received          13335        226          1            227
```

Variable definitions

Use the data in the following table to use the **`clear isis stats`** command.

Variable	Value
error-counters	Clears IS-IS stats error-counters.
packet-counters	Clears IS-IS stats packet-counters.

Job aid

show isis statistics

The following table describes the fields in the output for the **`show isis statistics`** command.

Parameter	Description
LEVEL	Shows the level of the IS-IS interface (Level 1 in the current release).
CORR LSPs	Shows the number of corrupted LSPs detected.
AUTH FAILS	Shows the number of times authentication has failed on the global level.
AREA DROP	Shows the number of manual addresses dropped from the area.
MAX SEQ EXCEEDED	Shows the number of attempts to exceed the maximum sequence number.
SEQ NUM SKIPS	Shows the number of times the sequence number was skipped.
OWN LSP PURGE	Shows how many times the local LSP was purged.
BAD ID LEN	Shows the number of ID field length mismatches.
PART CHANGES	Shows the number of partition link changes.
LSP DB OLOAD	Show the number of times the Virtual Services Platform 4000 was in the overload state.

show isis int-counters

The following table describes the fields in the output for the **`show isis int-counters`** command.

Parameter	Description
IFIDX	Shows the interface index for the Ethernet or MLT interface.
LEVEL	Shows the level of the IS-IS interface (Level 1 in the current release).
AUTH FAILS	Shows the number of times authentication has failed per interface.
ADJ CHANGES	Shows the number of times the adjacencies have changed.
INIT FAILS	Shows the number of times the adjacency has failed to establish.
REJ ADJ	Shows the number of times the adjacency was rejected by another router.
ID LEN	Shows the ID field length mismatches.
MAX AREA	Shows the maximum area address mismatches.
LAN DIS CHANGES	Shows the number of times the DIS has changed.

show isis int-l1-cntl-pkts

The following table describes the fields in the output for the **`show isis int-l1-cntl-pkts`** command.

Parameter	Description
IFIDX	Shows the interface index for the Ethernet or MLT interface.
DIRECTION	Shows the packet flow (Transmitted or Received).
HELLO	Shows the amount of interface-level Hello packets.
LSP	Shows the amount of LSP packets.
CSNP	Shows the amount of CSNPs.
PSNP	Shows the amount of PSNPs.

Clearing ACL statistics

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

Clear default ACL statistics if you no longer require previous statistics.

Procedure

1. Enter the following command to clear default ACL statistics:

   ```
   clear filter acl statistics default [<1-2048>]
   ```

2. Enter the following command to clear global ACL statistics:

   ```
   clear filter acl statistics global [<1-2048>]
   ```

3. Enter the following command to clear all ACL statistics:

   ```
   clear filter acl statistics all
   ```

4. Enter the following command to clear statistics associated with a particular ACL, ACE, or ACE type:

   ```
   clear filter acl statistics [<1-2048>] [<1-2000>][qos] [security]
   ```

Variable definitions

Use the information in the following table to use the **clear filter acl statistics** command.

Variable	Value
1–2048	Specifies the ACL ID.
1–2000	Specifies the ACE ID.

Viewing ACE statistics

Before you begin

- You must log on to at least the Privileged EXEC mode in ACLI.

About this task

View ACE statistics to ensure that the filter operates correctly.

Procedure

1. View ACE statistics for a specific ACL, ACE, or ACE type:

   ```
   show filter acl statistics <1-2048> [<1-2000>] [qos] [security]
   ```

2. View all ACE statistics:

   ```
   show filter acl statistics all
   ```

3. View default ACE statistics:

   ```
   show filter acl statistics default [<1-2048>]
   ```

4. View global statistics for ACEs:

   ```
   show filter acl statistics global [<1-2048>]
   ```

Example

View ACE statistics:

```
Switch:1>enable
Switch:1#show filter acl statistics all

================================================================================
                          Acl Global Statistics Table
================================================================================
Acl Id  Acl Name    Acl Type  Acl Sec    Acl Sec    Acl QOS    Acl QOS
                              Packets    Bytes      Packets    Bytes
--------------------------------------------------------------------------------
1       ACL-1       inVlan    0          0          0          0
2       ACL-2       inVlan    0          0          0          0

Displayed 2 of 2 entries
```

```
================================================================================
                          Acl Default Statistics Table
================================================================================
Acl Id  Acl Name    Acl Type  Acl Sec    Acl Sec    Acl QOS    Acl QOS
                              Packets    Bytes      Packets    Bytes
--------------------------------------------------------------------------------
1       ACL-1       inVlan    0          0          0          0
2       ACL-2       inVlan    0          0          0          0

Displayed 2 of 2 entries


--More-- (q = quit)

Switch:1#show filter acl statistics default

================================================================================
                          Acl Default Statistics Table
================================================================================
Acl Id  Acl Name    Acl Type  Acl Sec    Acl Sec    Acl QOS    Acl QOS
                              Packets    Bytes      Packets    Bytes
--------------------------------------------------------------------------------
1       ACL-1       inVlan    0          0          0          0
2       ACL-2       inVlan    0          0          0          0

Displayed 2 of 2 entries

Switch:1#show filter acl statistics global 2

===============================================================================
                          Acl Global Statistics Table
===============================================================================
Acl Id  Acl Name    Acl Type  Acl Sec    Acl Sec    Acl QOS    Acl QOS
                              Packets    Bytes      Packets    Bytes
-------------------------------------------------------------------------------
2       ACL-2       inVlan    0          0          0          0

Displayed 1 of 1 entries
```

Variable definitions

Use the data in the following table to use the **show filter acl statistics** command.

Variable	Value
1–2048	Specifies the ACL ID.
1–2000	Specifies the ACE ID.

Job aid

The following table describes output for the `show filter acl statistics default` command.

Table 13: show filter acl statistics default field descriptions

Parameter	Description
Acl ID	Specifies the identifier for the ACL.
Acl Name	Specifies the name for the ACL.
Acl Type	Specifies the ACL type.
Acl Sec Packets	Specifies the ACL secondary packets.
Acl Sec Bytes	Specifies the ACL secondary bytes.
Acl QoS Packets	Specifies the ACL QoS packets.
Acl QoS Bytes	Specifies the ACL QoS bytes.

Viewing MSTP statistics

About this task

Display MSTP statistics to see MSTP related bridge-level statistics.

Procedure

Display the MSTP related bridge-level statistics:

```
show spanning-tree mstp statistics
```

Example

```
VSP-4850GTS#show spanning-tree mstp statistics

================================================================================
                             MSTP Bridge Statistics
================================================================================
Mstp UP Count                       : 1
Mstp Down Count                     : 0
Region Config Change Count          : 12
Time since topology change          : 8 day(s), 02H:54M:33S
Topology change count               : 10
New Root Bridge Count               : 25
```

Job aid

The following table describes the output for the `show spanning-tree mstp statistics` command.

Table 14: show spanning-tree mstp statistics field descriptions

Parameter	Description
MSTP Up Count	The number of times the MSTP Module has been enabled. A Trap is generated on the occurrence of this event.

Table continues…

Parameter	Description
MSTP Down Count	The number of times the MSTP Module has been disabled. A Trap is generated on the occurrence of this event.
Region Config Change Count	The number of times the switch detects a Region Configuration Identifier Change. The switch generates a trap on the occurrence of this event.
Time since topology change	The time (in hundredths of a second) since the TcWhile Timer for any port in this Bridge was non-zero for Common Spanning Tree context.
Topology change count	The count of at least one non zero TcWhile timers on this Bridge for Common Spanning Tree context.
New Root Bridge Count	The number of times this Bridge has detected a Root Bridge change for Common Spanning Tree context. A Trap is generated on the occurrence of this event.

Viewing RSTP statistics

About this task

View Rapid Spanning Tree Protocol statistics to manage network performance.

Procedure

View RSTP stats with the following command:

```
show spanning-tree rstp statistics
```

Job aid

The following table describes output for the `show spanning-tree rstp statistics` command.

Table 15: show spanning-tree rstp statistics field descriptions

Parameter	Description
RSTP Up Count	The number of times RSTP Module has been enabled. A Trap is generated on the occurence of this event.
RSTP Down Count	The number of times RSTP Module has been disabled. A Trap is generated on the occurence of this event.
Count of Root Bridge Changes	The number of times this Bridge has detected a Root Bridge change for Common Spanning Tree context.

Table continues…

Parameter	Description
STP Time since Topology change	The time (in hundredths of a second) since the "TcWhile" Timer for any port in this Bridge was non zero for this spanning tree instance.
Total number of topology changes	The number of times that there have been atleast one non zero "TcWhile" Timer on this Bridge for this spanning tree instance.

Viewing RSTP port statistics

About this task

View RSTP statistics on ports to manage network performance.

Procedure

View RSTP statistics on a port:

```
show spanning-tree rstp port statistics [{slot/port[-slot/port][,...]}]
```

Example

View RSTP statistics:

```
Switch:1#show spanning-tree rstp port statistics

================================================================================
                              RSTP Port Statistics
================================================================================
Port Number                       : 4/1
Number of Fwd Transitions         : 0
Rx RST BPDUs Count                : 0
Rx Config BPDU Count              : 0
Rx TCN BPDU Count                 : 0
Tx RST BPDUs Count                : 0
Tx Config BPDU Count              : 0
Tx TCN BPDU Count                 : 0
Invalid RST BPDUs Rx Count        : 0
Invalid Config BPDU Rx Count      : 0
Invalid TCN BPDU Rx Count         : 0
Protocol Migration Count          : 0
Port Number                       : 4/2
Number of Fwd Transitions         : 0
Rx RST BPDUs Count                : 0
Rx Config BPDU Count              : 0
Rx TCN BPDU Count                 : 0
Tx RST BPDUs Count                : 0
Tx Config BPDU Count              : 0

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

Variable definitions

Use the data in the following table to use the **show spanning-tree rstp port statistics** command.

Variable	Value
{slot/port[-slot/port][,...]}	Identifies the slot and port in the following format: a single slot and port/ports (1/1).

Job aid

The following table describes output for the `show spanning-tree rstp port statistics` command.

Table 16: show spanning-tree rstp port statistics field descriptions

Parameter	Description
RxRstBpduCount	The number of RSTP BPDUs received on this port.
RxConfigBpduCount	The number of configuration BPDUs received on this port.
RxTcnBpduCount	The number of TCN BPDUs received on this port.
TxRstBpduCount	The number of RSTP BPDUs transmitted by this port.
TxConfigBpduCount	The number of Config BPDUs transmitted by this port.
TxTcnBpduCount	The number of TCN BPDUs transmitted by this port.
InvalidRstBpduRxCount	The number of invalid RSTP BPDUs received on this port. A trap is generated on the occurrence of this event.
InvalidConfigBpduRx Count	The number of invalid configuration BPDUs received on this port. A trap is generated on the occurrence of this event.
InvalidTcnBpduRxCount	The number of invalid TCN BPDUs received on this port. A trap is generated on the occurrence of this event.
ProtocolMigrationCount	The number of times this port migrated from one STP protocol version to another. The relevant protocols are STP-Compatible and RSTP. A trap is generated on the occurrence of this event.

Viewing MLT statistics

About this task

View MLT statistics to display MultiLinkTrunking statistics for the switch or for the specified MLT ID.

Procedure

View MLT statistics:

```
show mlt stats [<1-512>]
```

Example

```
VSP-4850GTS#show mlt stats

================================================================================
                                 Mlt Interface
================================================================================
ID IN-OCTETS          OUT-OCTETS         IN-UNICST          OUT-UNICST
--------------------------------------------------------------------------------
1  256676904          183670662          1397               456
2  61737348498        61584347982        1450182            1490619
4  229256124          47472778           0                  0
100 251678170          32332107           0                  0

ID IN-MULTICST        OUT-MULTICST       IN-BROADCST        OUT-BROADCST      MT
--------------------------------------------------------------------------------
1  2419514            2295274            41                 268194            E
2  962303832          960067410          765                237               E
4  2159884            666153             0                  90                E
100 2095269            504965             13                 0                 E

ID IN-LSM             OUT-LSM
--------------------------------------------------------------------------------
1  0                  0
2  957925732          957929399
4  0                  0

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

Variable definitions

Use the data in the following table to help you use the **show mlt stats** command.

Variable	Value
<1-512>	Specifies the MLT ID.

Job aid

The following table describes the output for the `show mlt stats` command.

Table 17: show mlt stats field descriptions

Parameter	Description
ID IN-OCTETS	The total number of inbound octets of data (including those in bad packets).
OUT-OCTETS	The total number of outbound octets of data.
IN-UNICAST	The count of inbound Unicast packets.
OUT-UNICAST	The count of outbound unicast packets.
ID IN-MULTICAST	The count of inbound multicast packets.
OUT-MULTICAST	The count of outbound multicast packets.
IN-BROADCAST	The count of inbound broadcast packets.
OUT-BROADCAST	The count of outbound broadcast packets.
MT	The MLT type: P for POS, E for Ethernet, A for ATM.

Viewing vIST statistics

View virtual IST (vIST) statistics for the switch.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Display the vIST statistics:

   ```
   show virtual-ist stat
   ```

3. To clear the vIST statistics:

   ```
   clear virtual-ist stats
   ```

Example

```
Switch:1#show virtual-ist stat
================================================================================
                             IST Message Statistics
================================================================================
PROTOCOL MESSAGE            COUNT
--------------------------------------------------------------------------------

Ist Down                 :  0
Hello Sent               :  0
Hello Recv               :  0
Learn MAC Address Sent   :  0
Learn MAC Address Recv   :  0
MAC Address AgeOut Sent  :  0
MAC Address AgeOut Recv  :  0
MAC Address Expired Sent :  0
MAC Address Expired Sent :  0
Delete Mac Address Sent  :  0
Delete Mac Address Recv  :  0
Smlt Down Sent           :  0
Smlt Down Recv           :  0
Smlt Up Sent             :  0
Smlt Up Recv             :  0
Send MAC Address Sent    :  0
Send MAC Address Recv    :  0
IGMP Sent                :  0
IGMP Recv                :  0
Port Down Sent           :  0
Port Down Recv           :  0
Request MAC Table Sent   :  0
Request MAC Table Recv   :  0
Unknown Msg Type Recv    :  0
Mlt Table Sync Req Sent  :  0
Mlt Table Sync Req Recv  :  0
Mlt Table Sync Sent      :  0
Mlt Table Sync Recv      :  0
Port Update Sent         :  0
Port Update Recv         :  0
Entry Update Sent        :  0
Entry Update Recv        :  0
Dialect Negotiate Sent   :  0
Dialect Negotiate Recv   :  0
Update Response Sent     :  0
```

```
Update Response Recv     :  0
Transaction Que HiWaterM :  0
Poll Count Hi Water Mark :  0
```

Job aid

The following table describes the output for the `show virtual-ist stat` command.

Table 18: show virtual-ist stat field descriptions

Parameter	Description
Ist Down	The count of how many sessions between the two peering switches went down since last boot.
Hello Sent	The count of transmitted hello messages.
Hello Recv	The count of received hello messages.
Learn MAC Address Sent	The count of transmitted learned MAC address messages.
Learn MAC Address Recv	The count of received learned MAC address messages.
MAC Address AgeOut Sent	The count of transmitted aging out MAC address messages.
MAC Address AgeOut Recv	The count of received aging out MAC address messages.
MAC Address Expired Sent	The count of transmitted MAC address age expired messages.
MAC Address Expired Recv	The count of received MAC address age expired messages.
Delete Mac Address Sent	The count of transmitted MAC address deleted messages.
Delete Mac Address Recv	The count of received MAC address deleted messages.
Smlt Down Sent	The count of transmitted SMLT down messages.
Smlt Down Recv	The count of received SMLT down messages.
Smlt Up Sent	The count of transmitted SMLT up messages.
Smlt Up Recv	The count of received SMLT up messages.
Send MAC Address Sent	The count of transmitted send MAC table messages.
Send MAC Address Recv	The count of received send MAC table messages.
IGMP Sent	The count of transmitted IGMP messages.
IGMP Recv	The count of received IGMP messages.
Port Down Sent	The count of transmitted port down messages.
Port Down Recv	The count of received port down messages.
Request MAC Table Sent	The count of transmitted MAC table request messages.

Table continues…

Parameter	Description
Request MAC Table Recv	The count of received MAC table request messages.
Unknown Msg Type Recv	The count of received unknown message type messages.
Mlt Table Sync Req Sent	The count of transmitted MLT table sync request messages.
Mlt Table Sync Req Recv	The count of received MLT table sync request messages.
Mlt Table Sync Sent	The count of transmitted MLT table sync messages.
Mlt Table Sync Recv	The count of received MLT table sync messages.
Port Update Sent	The count of transmitted port update messages.
Port Update Recv	The count of received port update messages.
Entry Update Sent	The count of transmitted entry update messages.
Entry Update Recv	The count of received entry update messages.
Dialect Negotiate Sent	The count of transmitted protocol ID messages.
Dialect Negotiate Recv	The count of received protocol ID messages.
Update Response Sent	The count of transmitted update response messages.
Update Response Recv	The count of received update response messages.
Transaction Que HiWaterM	The count of transaction queue high watermark messages.
Poll Count Hi Water Mark	The count of poll count high watermark messages.

Viewing IPv6 OSPF statistics

View OSPF statistics to analyze trends.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View statistics:

   ```
   show ipv6 ospf statistics
   ```

Example

View IPv6 OSPF statistics:

```
Switch:1>enable
Switch:1#show ipv6 ospf statistics

================================================================================
                               OSPFv3 Statistics
================================================================================
          NumTxPkt: 9958
          NumRxPkt: 8982
      NumTxDropPkt: 33
```

```
      NumRxDropPkt: 0
       NumRxBadPkt: 0
         NumSpfRun: 42
        LastSpfRun: 0 day(s), 02:44:32
       LsdbTblSize: 45
       NumBadLsReq: 0
    NumSeqMismatch: 0
NumOspfAdjacencies: 7
```

Job aid

The following table explains the output of the **`show ipv6 ospf statistics`** command.

Field	Description
NumTxPkt	Shows the count of sent packets.
NumRxPkt	Shows the count of received packets.
NumTxDropPkt	Shows the count of sent, dropped packets.
NumRxDropPkt	Shows the count of received, dropped packets.
NumRxBadPkt	Shows the count of received, bad packets.
NumSpfRun	Shows the count of intra-area route table updates with calculations using this area link-state database.
LastSpfRun	Shows the count of the most recent SPF run.
LsdbTblSize	Shows the size of the link-state database table.
NumBadLsReq	Shows the count of bad link requests.
NumSeqMismatch	Shows the count of sequence mismatched packets.

Showing the EAPoL status of the device

Display the current device configuration.

Note:

Use the **`clear-stats`** command to clear EAP or NEAP statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display the current device configuration by using the following command:

   ```
   show eapol system
   ```

Example

```
Switch:1#show eapol system
================================================================================
                                  Eapol System
================================================================================
                      eap : enabled
          non-eap-pwd-fmt : ip-addr.mac-addr.port-number
      non-eap-pwd-fmt key :
```

```
  non-eap-pwd-fmt padding : disabled
--------------------------------------------------------------------------------
```

Showing EAPoL authenticator statistics

Display the authenticator statistics to manage network performance.

Note:

Use the **`clear-stats`** command to clear EAP or NEAP statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display the authenticator statistics:

   ```
   show eapol auth-stats interface [gigabitEthernet [{slot/port[/sub-port][-slot/port[/sub-port]][,...]}]]
   ```

Example

```
Switch:1#show eapol auth-stats interface
```

```
================================================================================
                          Eap Authenticator Statistics
================================================================================
PORT  EAP   AUTH-EAP   START LOGOFF INVALID LENGTH LAST-RX    LAST-RX
      RCVD  TX         RCVD  RCVD   FRAMES  ERROR  VER        SRC
--------------------------------------------------------------------------------
1/1   716   1074       0     0      0       0      1          18:a9:05:b1:04:ce
1/2   0     0          0     0      0       0      0          00:00:00:00:00:00
1/3   0     0          0     0      0       0      0          00:00:00:00:00:00
1/4   0     5          0     0      0       0      0          00:00:00:00:00:00
1/5   0     0          0     0      0       0      0          00:00:00:00:00:00
1/6   0     0          0     0      0       0      0          00:00:00:00:00:00
1/7   0     0          0     0      0       0      0          00:00:00:00:00:00
1/8   0     0          0     0      0       0      0          00:00:00:00:00:00
1/9   0     0          0     0      0       0      0          00:00:00:00:00:00
1/10  0     0          0     0      0       0      0          00:00:00:00:00:00
--More-- (q = quit)
```

Variable definitions

Use the data in the following table to use the **`show eapol auth-stats interface`** command.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.

Job aid

The following table describes the output for the **`show eapol auth-stats interface`** command.

Table 19: show eapol auth-stats interface field descriptions

Parameter	Description
PORT	Displays the port number in use.
EAP RCVD	Displays the number of EAPoL-EAP frames received by this Authenticator.
AUTH-EAP TX	Displays the number of EAPoL-EAP frames transmitted by the Authenticator.
START RCVD	Displays the number of EAPoL start frames received by this Authenticator.
LOGOFF RCVD	Displays the number of EAPoL logoff frames received by this Authenticator.
INVALID FRAMES	Displays the number of EAPoL frames received by this Authenticator in which the frame type is not recognized.
LENGTH ERROR	Displays the number of EAPoL frames received by this Authenticator in which the Packet Body Length field is invalid.
LAST-RX VER	Displays the last received version of the EAPoL frame by this Authenticator.
LAST-RX SRC	Displays the source MAC address of the last received EAPoL frame by this Authenticator.

Viewing EAPoL session statistics

View EAPoL session statistics to manage network performance.

Note:

Use the **`clear-stats`** command to clear EAP/NEAP statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display the session statistics:

```
show eapol session—stats interface [gigabitEthernet [{slot/port[/
sub-port][-slot/port[/sub-port]][,...]}]
```

Example

```
Switch:1#show eapol session-stats interface
================================================================================
                      Eap Authenticator Session Statistics
================================================================================
PORT  MAC    SESSION   AUTHENTIC       SESSION         TERMINATE       USER
NUM          ID        METHOD          TIME            CAUSE           NAME
--------------------------------------------------------------------------------
1/1   18:a9:05:b1:04:ce    cb000000  remote-server   0 day(s), 05:58:16    not-terminated
sachin
1/4   00:00:00:00:00:01    cb000002  remote-server   0 day(s), 05:48:01    not-terminated
000000000001
--------------------------------------------------------------------------------
```

Variable definitions

Use the data in the following table to use the **show eapol session-stats interface** command.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.

Job aid

The following table describes the output for the **show eapol session-stats interface** command.

Table 20: show eapol session-stats interface field descriptions

Parameter	Description
PORT NUM	Displays the port number in use.
MAC	Displays the MAC address of the client.
USER NAME	Displays the user name of the Supplicant Authenticator Port Access Entity (PAE).
SESSION ID	Displays a unique identifier for the session.
AUTHENTIC METHOD	Displays the authentication method (remote or local RADIUS server) used to establish the session.
SESSION TIME	Displays the duration of the session (in seconds).
TERMINATE CAUSE	Displays the reason the session terminated.

Viewing non-EAPoL MAC information

Use this procedure to view non-EAPoL client MAC information on a port.

Note:

Use the **clear-stats** command to clear EAP/NEAP statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display the non-EAPoL MAC information:

```
show eapol multihost non-eap-mac status [vlan <1-4059>][{slot/port[/
sub-port][-slot/port[/sub-port]][,...]}]
```

Example

```
Switch:1#show eapol multihost non-eap-mac status
================================================================================
                              Non-Eap Oper Status
================================================================================
PORT  MAC                  STATE              VLAN
NUM                                           ID
--------------------------------------------------------------------------------
1/3 00:00:00:11:22:33 RADIUS-Authenticated    250
--------------------------------------------------------------------------------
```

Variable definitions

Use the data in the following table to use the **`show eapol multihost non-eap-mac status`** command.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.
<1-4059>	Specifies the VLAN ID in the range of 1 to 4059. VLAN IDs 1 to 4059 are configurable. The system reserves VLAN IDs 4060 to 4094 for internal use. VLAN ID 1 is the default VLAN and you cannot create or delete VLAN ID 1.

Job aid

The following table describes the output for the **`show eapol multihost non-eap-mac status`** command.

Table 21: show eapol multihost non-eap-mac status field descriptions

Parameter	Description
PORT NUM	Displays the port number in use.
MAC	Displays the MAC address of the client.
STATE	Indicates the authentication status of the non EAP host that is authenticated using radius server.
VLAN ID	Indicates the VLAN assigned to the client.

Viewing port EAPoL operation statistics

Use this procedure to view port EAPoL operation statistics.

Note:

Use the **`clear-stats`** command to clear EAP/NEAP statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display the port EAPoL operation statistics information:

```
show eapol status interface [gigabitEthernet [{slot/port[/sub-port]
[-slot/port[/sub-port]][,...]}] [vlan <1-4059>]
```

Example

```
Switch:1#show eapol status interface
================================================================================
                                 Eap Oper Stats
================================================================================
PORT  MAC                  PAE               VLAN
NUM                        STATUS            ID
--------------------------------------------------------------------------------
1/1   18:a9:05:b1:04:ce    authenticated      10
--------------------------------------------------------------------------------
Total Number of EAP sessions : 1
```

Variable definitions

Use the data in the following table to use the **`show eapol status`** command.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.
<1-4059>	Specifies the VLAN ID for which to show the statistics.

Job aid

The following table describes the output for the **`show eapol status interface`** command.

Table 22: show eapol status interface field descriptions

Parameter	Description
PORT NUM	Displays the port number in use.
MAC	Displays the MAC address of the client.

Table continues…

Parameter	Description
PAE STATUS	Indicates the current state of the authenticator PAE state machine.
VLAN ID	Indicates the VLAN assigned to the client.

Showing RADIUS server statistics

Before you begin

- To clear statistics, you must log on to at least the Privileged EXEC mode in the ACLI.

About this task

You cannot collect the following network statistics from a console port: the number of input and output packets, and the number of input and output bytes. All other statistics from console ports are available to assist with debugging.

Procedure

1. Display RADIUS server statistics:

   ```
   show radius-server statistics
   ```

2. Clear server statistics:

   ```
   clear radius statistics
   ```

Example

```
VSP-4850GTS#show radius-server statistics

Responses with invalid server address: 0

   Radius Server(UsedBy) : 47.17.143.58(cli)
--------------------------------------------------------
         Access Requests : 52
          Access Accepts : 0
          Access Rejects : 0
           Bad Responses : 52
          Client Retries : 52
        Pending Requests : 0
        Acct On Requests : 1
       Acct Off Requests : 0
     Acct Start Requests : 47
      Acct Stop Requests : 46
   Acct Interim Requests : 0
      Acct Bad Responses : 94
   Acct Pending Requests : 0
     Acct Client Retries : 94
       Access Challanges : 0
         Round-trip Time :
          Nas Ip Address : 47.17.10.32

   Radius Server(UsedBy) : 47.17.143.58(snmp)
--------------------------------------------------------
         Access Requests : 0
          Access Accepts : 0
          Access Rejects : 0
           Bad Responses : 0
          Client Retries : 0
```

```
        Pending Requests : 0
        Acct On Requests : 0
       Acct Off Requests : 0
     Acct Start Requests : 0
      Acct Stop Requests : 0
   Acct Interim Requests : 0
      Acct Bad Responses : 0
   Acct Pending Requests : 0
     Acct Client Retries : 0
       Access Challanges : 0
         Round-trip Time :
          Nas Ip Address : 47.17.10.32

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

Job aid

The following table shows the field descriptions for the `show radius-server statistics` command output.

Table 23: show radius-server statistics command fields

Parameter	Description
RADIUS Server	The IP address of the RADIUS server.
AccessRequests	Number of access-response packets sent to the server; does not include retransmissions.
AccessAccepts	Number of access-accept packets, valid or invalid, received from the server.
AccessRejects	Number of access-reject packets, valid or invalid, received from the server.
BadResponses	Number of invalid access-response packets received from the server.
PendingRequests	Access-request packets sent to the server that have not yet received a response, or have timed out.
ClientRetries	Number of authentication retransmissions to the server.
AcctOnRequests	Number of accounting On requests sent to the server.
AcctOffRequests	Number of accounting Off requests sent to the server.
AcctStartRequests	Number of accounting Start requests sent to the server.
AcctStopRequests	Number of accounting Stop requests sent to the server.
AcctInterimRequests	Number of accounting Interim Requests sent to the server. The AcctInterimRequests counter increments only if the parameter acct-include-cli-commands is set to true.
AcctBadResponses	Number of Invalid Responses from the server that are discarded.
AcctPendingRequests	Number of requests waiting to be sent to the server.
AcctClientRetries	Number of retries made to this server.

Viewing RMON statistics

About this task

View RMON statistics to manage network performance.

Procedure

View RMON statistics:

```
show rmon stats
```

Example

```
Switch:1(config)#show rmon stats

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

INDEX PORT   OWNER
--------------------------------------------------------------------------------
1     1/10    monitor
```

Job aid

The following table describes parameters in the output for the `show rmon stats` command.

Table 24: show rmon stats field descriptions

Parameter	Description
Index	An index that uniquely identifies an entry in the Ethernet statistics table.
Port	Identifies the source of the data that this entry analyzes.
Owner	The entity that configured this entry and is therefore using the assign resources.

Displaying IPsec statistics

Use the following procedure to clear Internet Protocol Security (IPsec) system statistics counters and display IPsec statistics on an interface. The device only clears system statistics counters on system reboot.

The device only supports IPsec for IPv6 traffic, and an interface must support IPv6 to apply IPsec.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. Display statistics for IPsec for the system:

```
show ipv6 ipsec statistics system
```

3. Display statistics for IPsec for an Ethernet interface:

   `show ipv6 ipsec statistics gigabitethernet {slot/port[/sub-port][-slot/port[/sub-port]][,...]}`

4. Display statistics for IPsec for an VLAN interface:

   `show ipv6 ipsec statistics vlan <1-4059>`

5. Display statistics for IPsec on the loopback interface:

   `show ipsec statistics loopback <1-256>`

6. Clear IPsec system statistics counters:

   `clear ipsec stats all`

Example

Display IPsec statistics for an Ethernet interface and a VLAN interface:

```
Switch:1>enable
Switch:1(config)#show ipv6 ipsec statistics system

================================================================================
                            IPSEC Global Statistics
================================================================================
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
InAHSuccesses        = 0
InESPSuccesses       = 0
OutAHSuccesses       = 0
OutESPSuccesses      = 0
OutKBytes            = 0
OutBytes             = 0
InKBytes             = 0
InBytes              = 0
TotalPacketsProcessed= 0

TotalPacketsByPassed = 285984828
OutAHFailures        = 167772160
OutESPFailures       = 167772160
InMD5Hmacs           = 167772160
InSHA1Hmacs          = 167772160
InAESXCBCs           = 167772160
InAnyNullAuth        = 167772160
In3DESCBCs           = 167772160
InAESCBCs            = 167772160
InAESCTRs            = 167772160
InAnyNullEncrypt     = 167772160
OutMD5Hmacs          = 167772160
OutSHA1Hmacs         = 167772160
OutAESXCBCs          = 167772160
OutInAnyNullAuth     = 167772160
```

```
Out3DESCBCs          = 167772160
OutAESCBCs           = 167772160
OutAESCTRs           = 167772160
OutInAnyNullEncrypt  = 167772160

Switch:1(config)#show ipv6 ipsec statistics gigabitethernet 1/13

================================================================================
                              Ipsec  Port  Stats
================================================================================
Ifindex              = 204
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0

Switch:1(config)#show ipv6 ipsec statistics vlan 1

================================================================================
                               Ipsec  Vlan  Stats
================================================================================
Ifindex              = 2049
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Display IPsec statistics for a loopback interface:

```
Switch:1(config)#show ipsec statistics loopback 1

Status  == SUCCESS

================================================================================
                             Ipsec  LoopBack  Stats

================================================================================
Ifindex              = 1344
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Variable definitions

Use the data in the following table to use the **`show ipv6 ipsec statistics`** command.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.
vlan <*1-4059*>	Specifies the VLAN.

Use the data in the following table to use the **`show ipsec statistics`** command.

Variable	Value
loopback <*1–256*>	Identifies the loopback interface.

Job aid

The following table describes the fields in the output for the **`show ipv6 ipsec statistics system`** command.

Parameter	Description
InSuccesses	Specifies the number of ingress packets IPsec successfully carries.
InSPViolations	Specifies the number of ingress packets IPsec discards since boot time because of a security policy violation.
InNotEnoughMemories	Specifies the number of ingress packets IPsec discards since boot time because not enough memory is available.
InAHESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the encapsulating security payload (ESP) replay check fails.
InAHFailures	Specifies the number of ingress packets IPsec discards since boot time because the AH authentication check fails.
InESPFailures	Specifies the number of ingress packets IPsec discards since boot time because the ESP authentication check fails.
OutSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.

Table continues…

Parameter	Description
OutSPViolations	Specifies the number of egress packets IPsec discards since boot time because a security policy violation occurs.
OutNotEnoughMemories	Specifies the number of egress packets IPsec discards since boot time because not enough memory is available since boot time.
generalError	Specifies a general error.
InAHSuccesses	Specifies the number of ingress packets IPsec carries because the AH authentication succeeds.
InESPSuccesses	Specifies the number of ingress packets IPsec carries since boot time because the ESP authentication succeeds.
OutAHSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutESPSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutKBytes	Specifies the total number of kilobytes on egress.
OutBytes	Specifies the total number of bytes on egress.
InKBytes	Specifies the total number of bytes on ingress.
InBytes	Specifies the total number of bytes on ingress.
TotalPacketsProcessed	Specifies the total number of packets processed.
TotalPacketsByPassed	Specifies the total number of packets bypassed.
OutAHFailures	Specifies the number of egress packets IPsec discards since boot time because the AH authentication check fails.
OutESPFailures	Specifies the number of egress packets IPsec discards since boot time because the ESP authentication check fails.
InMD5Hmacs	Specifies the number of inbound HMAC MD5 occurrences since boot time.
InSHA1Hmacs	Specifies the number of inbound HMAC SHA1 occurrences since boot time.
InAESXCBCs	Specifies the number of inbound AES XCBC MAC occurrences since boot time.
InAnyNullAuth	Specifies the number of inbound null authentication occurrences since boot time.
In3DESCBCs	Specifies the number of inbound 3DES CBC occurrences since boot time.
InAESCBCs	Specifies the number of inbound AES CBC occurrences since boot time.

Table continues…

Parameter	Description
InAESCTRs	Specifies the number of inbound AES CTR occurrences since boot time.
InAnyNullEncrypt	Specifies the number of inbound null occurrences since boot time. Used for debugging purposes.
OutMD5Hmacs	Specifies the number of outbound HMAC MD5 occurrences since boot time.
OutSHA1Hmacs	Specifies the number of outbound HMAC SHA1 occurrences since boot time.
OutAESXCBCs	Specifies the number of outbound AES XCBC MAC occurrences since boot time.
OutInAnyNullAuth	Specifies the number of outbound null authentication occurrences since boot time.
Out3DESCBCs	Specifies the number of outbound 3DES CBC occurrences since boot time.
OutAESCBCs	Specifies the number of outbound AES CBC occurrences since boot time.
OutAESCTRs	Specifies the number of outbound AES CTR occurrences since boot time.
OutInAnyNullEncrypt	Specifies the number of outbound null occurrences since boot time. Used for debugging purposes.

The following table describes the fields in the output for the **`show ipv6 ipsec statistics gigabitethernet {slot/port[-slot/port][,...]}`** command and **`show ipsec statistics loopback <1-256>`**.

Parameter	Description
Ifindex	Specifies the interface.
InSuccesses	Specifies the number of ingress packets IPsec successfully carries.
InSPViolations	Specifies the number of ingress packets IPsec discards since boot time because of a security policy violation.
InNotEnoughMemories	Specifies the number of ingress packets IPsec discards since boot time because not enough memory is available.
InAHESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the encapsulating security payload (ESP) replay check fails.
InAHFailures	Specifies the number of ingress packets IPsec discards since boot time because the AH authentication check fails.

Table continues…

Parameter	Description
InESPFailures	Specifies the number of ingress packets IPsec discards since boot time because the ESP authentication check fails.
OutSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutSPViolations	Specifies the number of egress packets IPsec discards since boot time because a security policy violation occurs.
OutNotEnoughMemories	Specifies the number of egress packets IPsec discards since boot time because not enough memory is available since boot time.
generalError	Specifies a general error.

The following table describes the fields in the output for the **`show ipv6 ipsec statistics vlan <1-4059>`** command.

Parameter	Description
Ifindex	Specifies the interface.
InSuccesses	Specifies the number of ingress packets IPsec successfully carries.
InSPViolations	Specifies the number of ingress packets IPsec discards since boot time because of a security policy violation.
InNotEnoughMemories	Specifies the number of ingress packets IPsec discards since boot time because not enough memory is available.
InAHESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the encapsulating security payload (ESP) replay check fails.
InAHFailures	Specifies the number of ingress packets IPsec discards since boot time because the AH authentication check fails.
InESPFailures	Specifies the number of ingress packets IPsec discards since boot time because the ESP authentication check fails.
OutSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutSPViolations	Specifies the number of egress packets IPsec discards since boot time because a security policy violation occurs.
OutNotEnoughMemories	Specifies the number of egress packets IPsec discards since boot time because not enough memory is available since boot time.
generalError	Specifies a general error.

Displaying IPsec statistics

Use the following procedure to display IPsec statistics.

Procedure

1. Enter Privileged EXEC mode:

   `enable`

2. Display IPsec statistics on an Ethernet interface:

   `show ipsec statistics gigabitethernet {slot/port[/sub-port][slot/port[/sub-port]][,...]}`

3. Display the IPsec statistics on a VLAN interface:

   `show ipsec statistics vlan <1-4059>`

4. Display the system global IPsec statistics:

   `show ipsec statistics system`

5. Display IPsec statistics on a management interface:

   `show ipsec statistics mgmtethernet mgmt`

6. Display IPsec statistics on a loopback interface:

   `show ipsec statistics loopback <1-256>`

Example

Displaying IPsec statistics on an Ethernet interface:

```
Switch:1>enable
Switch:1#show ipsec statistics gigabitethernet 1/2

========================================================================================
                              Ipsec  Port  Stats

========================================================================================
Ifindex              = 193
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Displaying the IPsec statistics on a VLAN interface:

```
Switch:1>enable
Switch:1#show ipsec statistics vlan 2

========================================================================================
                               Ipsec  Vlan  Stats
```

```
=======================================================================================
Ifindex              = 2050
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Displaying the system global IPsec statistics:

```
Switch:1>enable
Switch:1#show ipsec statistics system

=======================================================================================
                            IPSEC Global Statistics

=======================================================================================
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
InAHSuccesses        = 0
InESPSuccesses       = 0
OutAHSuccesses       = 0
OutESPSuccesses      = 0
OutKBytes            = 0
OutBytes             = 0
InKBytes             = 0
InBytes              = 0
TotalPacketsProcessed= 0
TotalPacketsByPassed = 0
OutAHFailures        = 0
OutESPFailures       = 0
InMD5Hmacs           = 0
InSHA1Hmacs          = 0
InAESXCBCs           = 0
InAnyNullAuth        = 0
In3DESCBCs           = 0
InAESCBCs            = 0
InAESCTRs            = 0
InAnyNullEncrypt     = 0
OutMD5Hmacs          = 0
OutSHA1Hmacs         = 0
OutAESXCBCs          = 0
OutInAnyNullAuth     = 0
Out3DESCBCs          = 0
OutAESCBCs           = 0
OutAESCTRs           = 0
OutInAnyNullEncrypt  = 0
```

Displaying IPsec statistics on a management interface:

```
Switch:1>enable
Switch:1#show ipsec statistics mgmtethernet mgmt

=======================================================================================
                              Ipsec  Port  Stats

=======================================================================================
Ifindex              = 64
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Displaying IPsec statistics on a loopback interface:

```
Switch:1>enable
Switch:1#show ipsec statistics loopback 1

Status  == SUCCESS

=======================================================================================
                             Ipsec  LoopBack  Stats

=======================================================================================
Ifindex              = 1344
InSuccesses          = 0
InSPViolations       = 0
InNotEnoughMemories  = 0
InAHESPReplays       = 0
InESPReplays         = 0
InAHFailures         = 0
InESPFailures        = 0
OutSuccesses         = 0
OutSPViolations      = 0
OutNotEnoughMemories = 0
generalError         = 0
```

Variable definition

Use the data in the following table to use the **`show ipsec statistics`** command.

Variable	Value
profile *WORD<1–32>*	Specifies the name of the profile to be displayed.
gigabitethernet *{slot/port[/sub-port][slot/port[/sub-port]][,...]}*	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.
vlan *<1-4059>*	Specifies the VLAN ID in the range of 1 to 4059.

Table continues…

Variable	Value
	VLAN IDs 1 to 4059 are configurable. The system reserves VLAN IDs 4060 to 4094 for internal use. VLAN ID 1 is the default VLAN and you cannot create or delete VLAN ID 1.
mgmtethernet *mgmt*	Identifies the interface as a management interface.
loopback *<1–256>*	Specifies the loopback ID in the range of 1 to 256.

Job aid

The following table describes the fields in the output for the `show ipsec statistics` command.

Parameter	Description
IfIndex	Interface index for which the statistics are captured for this interface.
InSuccesses	The total number of ingress packets successfully carried on IPsec for this interface.
InSPViolations	The total number of ingress packets discarded by IPsec for security policy violation since boot time for this interface.
InNotEnoughMemories	The total number of inbound packets discarded by IPsec if not enough memory is available since boot time for this interface.
InAHESPReplays	The total number of inbound packets discarded by IPsec if AH replay check failed since boot time for this interface.
InESPReplays	The total number of inbound packets discarded by IPsec if ESP replay check failed since boot time for this interface.
InAHFailures	The total number of inbound packets discarded by IPsec if AH authentication check failed since boot time for this interface.
InESPFailures	The total number of inbound packets discarded by IPsec if ESP authentication check failed since boot time for this interface.
OutSuccesses	The total number of outbound packets successfully carried on IPsec since boot time for this interface.
OutSPViolations	The total number of outbound packets discarded by IPsec for security policy violation since boot time for this interface.
OutNotEnoughMemories	The total number of outbound packets discarded by IPsec if not enough memory is available since boot time for this interface.
generalError	The total number of general errors since boot time for this interface.

Table continues…

Parameter	Description
InAHSuccesses	The total number of inbound packets carried by IPsec if AH authentication succeeded since boot time for this interface.
OutAHSuccesses	The total number of outbound packets carried by IPsec if AH authentication succeeded since boot time for this interface.
InESPSuccesses	The total number of inbound packets carried by IPsec if ESP authentication succeeded since boot time for this interface.
OutESPSuccesses	The total number of outbound packets carried by IPsec if ESP authentication succeeded since boot time for this interface.
OutKBytes	The total number of outbound packets greater than 1 KB for this interface.
OutBytes	The total number of outbound byte sized packets for this interface.
InKBytes	The total number of inbound packets greater than 1 KB for this interface.
InBytes	The total number of inbound byte sized packets for this interface.
TotalPacketsProcessed	The total number of packets processed since boot time for this interface.
TotalPacketsByPassed	The total number of packets bypassed since boot time for this interface.
OutAHFailures	The total number of outbound packets discarded by IPsec if AH authentication check failed since boot time for this interface.
OutESPFailures	The total number of outbound packets discarded by IPsec if ESP authentication check failed since boot time for this interface.
InMD5Hmacs	The total number of inbound HMAC MD5 occurrences since boot time for this interface.
InSHA1Hmacs	The total number of inbound HMAC SHA1 occurrences since boot time for this interface.
InAESXCBCs	The total number of inbound AES XCBC MAC occurrences since boot time for this interface.
InAnyNullAuth	Total number of inbound packets without any authentication algorithm for this interface.
In3DESCBCs	The total number of inbound Triple DES CBC occurrences since boot time for this interface.
InAESCBCs	The total number of inbound AES CBC occurrences since boot time for this interface.

Table continues…

Parameter	Description
InAESCTRs	The total number of outbound DES CBC occurrences since boot time for this interface.
InAnyNullEncrypt	Total number of inbound packets without any encryption algorithm for this interface.
OutMD5Hmacs	The total number of outbound HMAC MD5 occurrences since boot time for this interface.
OutSHA1Hmacs	The total number of outbound HMAC SHA1 occurrences since boot time for this interface.
OutAESXCBCs	The total number of outbound AES XCBC MAC occurrences since boot time for this interface.
OutInAnyNullAuth	Total number of packets without any authentication algorithm for this interface.
Out3DESCBCs	The total number of outbound Triple DES CBC occurrences since boot time for this interface.
OutAESCBCs	The total number of outbound AES CBC occurrences since boot time for this interface.
OutAESCTRs	The total number of outbound DES CBC occurrence since boot time for this interface.
OutInAnyNullEncrypt	Total number of packets without any encryption algorithm for this interface.

Viewing ICMP statistics

View IPv6 ICMP statistics on an interface for ICMP messages sent over a particular interface.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View IPv6 ICMP statistics

   ```
   show ipv6 interface icmpstatistics
   ```

Example

View ICMP statistics:

```
Switch:1>show ipv6 interface icmpstatistics
==========================================================================
                                   Icmp Stats
==========================================================================

Icmp stats for IfIndex = 192

IcmpInMsgs: 0
IcmpInErrors: 0
IcmpInDestUnreachs : 0
IcmpInAdminProhibs : 0
IcmpInTimeExcds : 0
IcmpInParmProblems : 0
```

```
IcmpInPktTooBigs : 0
IcmpInEchos : 0
IcmpInEchoReplies : 0
IcmpInRouterSolicits : 0
IcmpInRouterAdverts : 0
InNeighborSolicits : 0
InNbrAdverts : 0
IcmpInRedirects : 0
IcmpInGroupMembQueries : 0
IcmpInGroupMembResponses : 0
```

Variable definitions

Use the data in the following table to use the **`show ipv6 interface icmpstatistics`** command

Variable	Value
<1-4059>	Shows ICMP statistics for the specific interface index. If you do not specify an interface index, the command output includes all IPv6 ICMP interfaces. Specifies the VLAN ID in the range of 1 to 4059. VLAN IDs 1 to 4059 are configurable. The system reserves VLAN IDs 4060 to 4094 for internal use. VLAN ID 1 is the default VLAN and you cannot create or delete VLAN ID 1.

Clearing IPv6 statistics

Clear all IPv6 statistics if you do not require previous statistics.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Clear all the IPv6 statistics:

   ```
   clear ipv6 statistics all
   ```

3. Clear interface statistics:

   ```
   clear ipv6 statistics interface [general|icmp] [gigabitethernet
   <slot/port[/sub-port]>|mgmtethernet <slot/port[/sub-port]>|vlan
   <1-4059>]
   ```

4. Clear TCP statistics:

   ```
   clear ipv6 statistics tcp
   ```

5. Enter the following command to clear UDP statistics:

   ```
   clear ipv6 statistics udp
   ```

Variable definitions

Use the information in the following table to use the **`clear ipv6 statistics`** command.

Variable	Value
vlan<*1-4059*>	Specifies the VLAN ID in the range of 1 to 4059. VLAN IDs 1 to 4059 are configurable. The system reserves VLAN IDs 4060 to 4094 for internal use. VLAN ID 1 is the default VLAN and you cannot create or delete VLAN ID 1.
gigabitethernet {slot/port[/sub-port]}	Identifies a single slot and port. 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.

Viewing IPv6 VRRP statistics

View IPv6 VRRP statistics to monitor network performance

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View statistics for the device and for all interfaces:

   ```
   show ipv6 vrrp statistics [link-local WORD<0-127>]] [vrid <1-255>]
   ```

Example

View IPv6 VRRP statistics for VRID 1.

```
Switch:1(config)#show ipv6 vrrp statistics vrid 1

=============================================================================
                      VRRP Interface Stats - GlobalRouter
=============================================================================

VRID  P/V   BECOME_MASTER ADVERTISE_RCV
-----------------------------------------------------------------------------
1     84    2             17372
1     85    2             17372
1     86    1             0
1     87    1             0
1     1001  2             17372

VRID  P/V   ADVERTISE_INT_ERR TTL_ERR       PRIO_0_RCV
-----------------------------------------------------------------------------
1     84    0                 0             0
1     85    0                 0             0
1     86    0                 0             0
1     87    0                 0             0
1     1001  0                 0             0

VRID  P/V   PRIO_0_SENT   INVALID_TYPE_ERR ADDRESS_LIST_ERR UNKNOWN_AUTHTYPE
-----------------------------------------------------------------------------

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

Variable definitions

Use the data in the following table to use the `show ipv6 vrrp statistics` command.

Variable	Value
link-local *WORD<0–127>*	Shows statistics for a specific link-local address.
vrid *<1–255>*	Shows statistics for a specific VRID.

Job aid

The following table describes the output for the `show ipv6 vrrp statistics` command.

Table 25: show ipv6 vrrp statistics command output

Heading	Description
CHK_SUM_ERR	Shows the number of VRRP packets received with an invalid VRRP checksum value.
VERSION_ERR	Shows the number of VRRP packets received with an unknown or unsupported version number.
VRID_ERR	Shows the number of VRRP packets received with an invalid VrID for this virtual router.
BECOME_MASTER	Shows the total number of times that the state of this virtual router has transitioned to master. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
ADVERTISE_RCV	Shows the total number of VRRP advertisements received by this virtual router. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
ADVERTISE_INT_ERR	Shows the total number of VRRP advertisement packets received for which the advertisement interval is different than the one configured for the local virtual router. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
TTL_ERR	Shows the total number of VRRP packets received by the virtual router with IPv4 TTL (for VRRP over IPv4) or IPv6 Hop Limit (for VRRP over IPv6) not equal to 255. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.

Table continues…

Heading	Description
PRIO_0_RCV	Shows the total number of VRRP packets received by the virtual router with a priority of 0. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
PRIO_0_SENT	Shows the total number of VRRP packets sent by the virtual router with a priority of 0. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
INVALID_TYPE_ERR	Shows the number of VRRP packets received by the virtual router with an invalid value in the 'type' field. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
ADDRESS_LIST_ERR	Shows the total number of packets received for which the address list does not match the locally configured list for the virtual router. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
UNKNOWN_AUTHTYPE	Shows the total number of packets received with an unknown authentication type.
PACKLEN_ERR	Shows the total number of packets received with a packet length less than the length of the VRRP header. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of DiscontinuityTime.

Viewing IPv6 statistics on an interface

View IPv6 statistics to view information about the IPv6 datagrams on an interface.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View statistics:

```
show ipv6 interface statistics [<1-4059>]
```

Example

View IPv6 statistics on an interface:

```
Switch:1>enable
Switch:1#show ipv6 interface statistics

================================================================================
                                Interface Stats
================================================================================


If Stats for mgmt, IfIndex = 64

InReceives: 404
InHdrErrors: 0
InTooBigErrors : 0
InNoRoutes : 0
InAddrErrors : 0
InUnknownProtos : 0
InTruncatedPkts : 0
InDiscards : 0
InDelivers : 404
OutForwDatagrams : 0
OutRequests : 417
OutDiscards : 0
OutFragOKs : 0
OutFragFails : 0
OutFragCreates : 0

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

Variable definitions

Use the data in the following table to use the **`show ipv6 interface statistics`** command

Variable	Value
vlan <*1-4059*>	Shows statistics for the specific interface index. If you do not specify an interface index, the command output includes all IPv6 interfaces. Specifies the VLAN ID in the range of 1 to 4059. VLAN IDs 1 to 4059 are configurable. The system reserves VLAN IDs 4060 to 4094 for internal use. VLAN ID 1 is the default VLAN and you cannot create or delete VLAN ID 1.

Viewing IP VRRPv3 statistics

Use the following procedure to view IP VRRPv3 statistics to monitor network performance.

Procedure

1. Enter Privileged EXEC mode:

   ```
   enable
   ```

2. Enter the following command to view VRRP statistics:

```
show ip vrrp statistics version <2-3>
```

3. Enter the following command to view VRRP statistics for the specified VRF:

   ```
   show ip vrrp statistics vrf WORD<1-16> version <2-3>
   ```

4. Enter the following command to view VRRP statistics for the specified virtual router:

   ```
   show ip vrrp statistics vrfids WORD<0-512> version <2-3>
   ```

Example

View IP VRRPv3 statistics:

```
Switch:1#show ip vrrp statistics

==========================================================================================
                        VRRP Global Stats - GlobalRouter

==========================================================================================

CHK_SUM_ERR   VERSION_ERR   VRID_ERR      VRRP_VERSION
------------------------------------------------------------------------------------------
0             0             0             2
0             0             0             3

=============================================================================================
                      VRRP Interface Stats - GlobalRouter

=============================================================================================

VRRP ID  P/V      BECOME_MASTER ADVERITSE_RCV VERSION
---------------------------------------------------------------------------------------------
3        3        1             0             2
2        1/1      1             0             3

VRRP ID  P/V      ADVERTISE_INT_ERR TTL_ERR       PRIO_0_RCV    VERSION
---------------------------------------------------------------------------------------------

3        3        0                 0             0             2
2        1/1      0                 0             0             3

VRRP ID  P/V      PRIO_0_SENT   INVALID_TYPE_ERR ADDRESS_LIST_ERR UNKNOWN_AUTHTYPE    VERSION
---------------------------------------------------------------------------------------------
3        3        0             0                0                0                   2
2        1/1      0             0                0                0                   3

VRRP ID  P/V      AUTHTYPE_ERR  PACKLEN_ERR   VERSION
---------------------------------------------------------------------------------------------
3        3        0             0             2
2        1/1      0             0             3
```

Variable definitions

Use the data in the following table to use the **`ip vrrp version`** command.

Variable	Value
version	Configures the VRRP version on the specified interface.
<2–3>	Specifies the version of VRRP (2 or 3) to be configured on the specified interface.
vrf WORD<1–16>	Specifies the name of the VRF.
vrfids WORD<0–512>	Specifies the ID of the VRF, and is an integer in the range of 0–512.

Displaying VLACP statistics for specific ports

Display VLACP statistics for specific ports to manage network performance.

About this task

You can enable sequence numbers for each VLACPDU to assist in monitoring performance. The switch counts mismatched PDU sequence numbers to determine packet loss information. By default, sequence numbers are enabled.

You can use the show commands from Privileged EXEC mode but must enter Global Configuration mode to enable or disable the sequence numbers.

Procedure

1. Enter Global Configuration mode:

   `enable`

   `configure terminal`

2. Confirm sequence numbers are enabled:

   `show vlacp`

3. **(Optional)** Enable sequence numbers for VLACPDUs:

   `vlacp sequence-num`

4. View VLACP statistics:

   `show interfaces gigabitEthernet statistics vlacp [{slot/port[/sub-port][-slot/port[/sub-port]][,...]} ]`

5. **(Optional)** View VLACP statistics history:

   `show interfaces gigabitEthernet statistics vlacp history [{slot/port[/sub-port][-slot/port[/sub-port]][,...]} ]`

6. **(Optional)** Clear VLACP statistics:

   `clear vlacp stats [port {slot/port[/sub-port][-slot/port[/sub-port]][,...]}]`

7. **(Optional)** Disable sequence numbers for VLACPDUs:

   `no vlacp sequence-num`

Example

Determine if sequence numbers are enabled, and then view port statistics. Port numbering may differ depending on your product and configuration.

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

================================================================================
                            Vlacp Global Information
================================================================================
                SystemId: 32:11:9f:20:00:00
```

```
                   Vlacp: enable
   Vlacp Sequence Number: enable

Switch:1(config)#show interfaces gigabitEthernet statistics vlacp
================================================================================
                                Port Stats Vlacp
================================================================================
PORT       TX         RX         SEQNUM
NUM        VLACPDU    VLACPDU    MISMATCH
--------------------------------------------------------------------------------
8/1        106058     105554     0
12/11      15         12         0
12/23      0          0          0
```

Variable definitions

Use the data in the following table to use the commands in this procedure.

Variable	Value
{slot/port[/sub-port][-slot/port[/sub-port]][,...]}	Identifies the slot and port in one of the following formats: a single slot and port (slot/port), a range of slots and ports (slot/port-slot/port), or a series of slots and ports (slot/port,slot/port,slot/port). 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.

Job aid

The following table describes fields in the output for the **`show interfaces gigabitEthernet statistics vlacp`** command.

Field	Description
PORT NUM	Shows the slot and port number.
TX VLACPDU	Shows the number of VLACPDUs transmitted on the port.
RX VLACPDU	Shows the number of valid VLACPDUs received on the port.
SEQNUM MISMATCH	Shows the number of mismatched VLACPDUs in terms of received sequence numbers on the port.

Viewing statistics using EDM

Use statistics to help monitor the performance of the Avaya Virtual Services Switch 4000.

About this task

To reset all statistics counters, click **Clear Counters**. After you click this button, all Cumulative, Average, Minimum, Maximum, and LastVal columns reset to zero, and automatically begin to recalculate statistical data.

Important:

The **Clear Counters** function does not affect the AbsoluteValue counter for the device. The **Clear Counters** function clears all cached data in EDM except AbsoluteValue. Perform the following steps to reset AbsoluteValues.

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 **System** tab.
5. In ActionGroup1, select **resetCounters**, and then click **Apply**.

Graphing chassis statistics

Create graphs of chassis statistics to generate a visual representation of your data.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders:**Configuration** > **Graph**.
3. Click **Chassis**.
4. On the Graph Chassis tab, select the tab with the data you want to graph:
   - System
   - SNMP
   - IP
   - ICMP In
   - ICMP Out
   - TCP
   - UDP
5. Select the statistic you want to graph.
6. Select the graph type:
   - line chart
   - area chart
   - bar chart
   - pie chart

Graphing port statistics

You can create graphs for many port statistics to generate a visual representation of your data.

Procedure

1. In the Device Physical View, select the port or ports for which you want to create a graph.
2. Perform the following steps:
    - Right-click a port or multiple ports. On the shortcut menu, choose **Graph**.
    - In the navigation tree, expand the following folders: **Configuration** > **Graph**, and then click **Port**.
3. When the graph port dialog box appears, click the tab for which you want to graph the statistics.
4. Select the item for which you want to graph the statistics.
5. Select a graph type:
    - bar
    - pie
    - chart
    - line

Viewing chassis system statistics

Use the following procedure to create graphs for chassis statistics.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **System** tab.

System field descriptions

The following table describes the fields on the **System** tab.

Name	Description
DramUsed	The percentage of DRAM space used.

Table continues…

Name	Description
	Only the AbsoluteValue column is valid in the System tab. All other columns display as N/A because they are percentages and not actual memory counters.
DramFree	The amount in kilobytes of free DRAM.
CpuUtil	Percentage of CPU utilization.

Viewing chassis SNMP statistics

View chassis SNMP statistics to monitor network performance.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **SNMP** tab.

SNMP field descriptions

The following table describes parameters on the **SNMP** tab.

Name	Description
InPkts	The number of messages delivered to the SNMP entity from the transport service.
OutPkts	The number of SNMP messages passed from the SNMP protocol entity to the transport service.
InTotalReqVars	The number of MIB objects retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
InTotalSetVars	The number of MIB objects altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.
InGetRequests	The number of SNMP Get-Request PDUs the SNMP protocol accepts and processes.
InGetNexts	The number of SNMP Get-Next PDUs the SNMP protocol accepts and processes.
InSetRequests	The number of SNMP Set-Request PDUs the SNMP protocol accepts and processes.
InGetResponses	The number of SNMP Get-Response PDUs the SNMP protocol accepts and processes.
OutTraps	The number of SNMP Trap PDUs the SNMP protocol generates.

Table continues…

Name	Description
OutTooBigs	The number of SNMP PDUs the SNMP protocol generates for which the value of the error-status field is tooBig.
OutNoSuchNames	The number of SNMP PDUs the SNMP protocol generates for which the value of the error-status field is noSuchName.
OutBadValues	The number of SNMP PDUs the SNMP protocol generates for which the value of the error-status field is badValue.
OutGenErrs	The number of SNMP PDUs the SNMP protocol generates for which the value of the error-status field is genErr.
InBadVersions	The number of SNMP messages delivered to the SNMP protocol entity for an unsupported SNMP version.
InBadCommunityNames	The number of SNMP messages delivered to the SNMP protocol entity that used an SNMP community name not known to said entity.
InBadCommunityUses	The 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.
InASNParseErrs	The number of ASN.1 or BER errors the SNMP protocol encountered when decoding received SNMP messages.
InTooBigs	The number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is tooBig.
InNoSuchNames	The number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is noSuchName.
InBadValues	The number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is badValue.
InReadOnlys	The number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is readOnly. It is a protocol error to generate an SNMP PDU containing the value "readOnly" in the error-status field. This object is provided to detect incorrect implementations of the SNMP.
InGenErrs	The number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is genErr.

Viewing chassis IP statistics

View chassis IP statistics to monitor network performance.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **IP** tab.

IP field descriptions

The following table describes parameters on the **IP** tab.

Name	Description
InReceives	The number of input datagrams received from interfaces, including those received in error.
InHdrErrors	The number of input datagrams discarded due to errors in the IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options.
InAddrErrors	The number of input datagrams discarded because the IP address in the IP header destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported Classes (for example, Class E). For entities that are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
ForwDatagrams	The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP Gateways, this counter includes only those packets that were Source-Routed by way of this entity and had successful Source-Route option processing.
InUnknownProtos	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
InDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing but that were discarded (for example, for lack of buffer space). This counter does not include any datagrams discarded while awaiting reassembly.
InDelivers	The number of input datagrams successfully delivered to IP user-protocols (including ICMP).
OutRequests	The number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission. This counter does not include any datagrams counted in ipForwDatagrams.
OutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but that were discarded (for example, for lack of buffer space). This counter includes datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.
OutNoRoutes	The number of IP datagrams discarded because no route was found to transmit them to their destination. This counter includes any packets counted in ipForwDatagrams that meet this no-route criterion. This counter includes any datagrams a host cannot route because all default gateways are down.
FragOKs	The number of IP datagrams that were successfully fragmented at this entity.

Table continues…

Name	Description
FragFails	The number of IP datagrams that were discarded because they needed to be fragmented at this entity but can not be, for example, because the Don't Fragment flags were set.
FragCreates	The number of IP datagram fragments that were generated as a result of fragmentation at this entity.
ReasmReqds	The number of IP fragments received that needed to be reassembled at this entity.
ReasmOKs	The number of IP datagrams successfully reassembled.
ReasmFails	The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, and so on). This number 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 combining them as they are received.

Viewing chassis ICMP In statistics

View chassis ICMP In statistics to monitor network performance.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **ICMP In** tab.

ICMP In field descriptions

The following table describes parameters on the **ICMP In** tab.

Name	Description
SrcQuenchs	The number of ICMP Source Quench messages received.
Redirects	The number of ICMP Redirect messages received.
Echos	The number of ICMP Echo (request) messages received.
EchoReps	The number of ICMP Echo Reply messages received.
Timestamps	The number of ICMP Timestamp (request) messages received.
TimestampReps	The number of ICMP Timestamp Reply messages received.
AddrMasks	The number of ICMP Address Mask Request messages received.
AddrMaskReps	The number of ICMP Address Mask Reply messages received.
ParmProbs	The number of ICMP Parameter Problem messages received.
DestUnreachs	The number of ICMP Destination Unreachable messages received.
TimeExcds	The number of ICMP Time Exceeded messages received.

Viewing chassis ICMP Out statistics

View chassis ICMP Out statistics to monitor network performance.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **ICMP Out** tab.

ICMP Out field descriptions

The following table describes parameters on the **ICMP Out** tab.

Name	Description
SrcQuenchs	The number of ICMP Source Quench messages sent.
Redirects	The number of ICMP Redirect messages received. For a host, this object is always zero, because hosts do not send redirects.
Echos	The number of ICMP Echo (request) messages sent.
EchoReps	The number of ICMP Echo Reply messages sent.
Timestamps	The number of ICMP Timestamp (request) messages sent.
TimestampReps	The number of ICMP Timestamp Reply messages sent.
AddrMasks	The number of ICMP Address Mask Request messages sent.
AddrMaskReps	The number of ICMP Address Mask Reply messages sent.
ParmProbs	The number of ICMP Parameter Problem messages sent.
DestUnreachs	The number of ICMP Destination Unreachable messages sent.
TimeExcds	The number of ICMP Time Exceeded messages sent.

Viewing ICMP statistics

View ICMP statistics for ICMP configuration information.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **IPv6**.
2. Click **IPv6**.
3. Click **Interfaces** tab.
4. Select the interface on which you want to view the ICMP statistics.
5. Click **ICMPstats** option from the menu.

ICMP stats field descriptions

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

Name	Description
InMsgs	Specifies the total number of ICMP messages which the entity received. **Note:** This counter includes all those counted by icmpInErrors.
InErrors	Specifies the number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).
InDestUnreachs	Specifies the number of ICMP Destination Unreachable messages received by the interface.
InAdminProhibs	Specifies the number of ICMP destination unreachable/communication administratively prohibited messages received by the interface.
InTimeExcds	Specifies the number of ICMP Time Exceeded messages by the interface.
InParmProblems	Specifies the number of ICMP Parameter Problem messages received by the interface.
InPktTooBigs	Specifies the number of ICMP Packet Too Big messages received by the interface.
InEchos	Specifies the number of ICMP Echo (request) messages received by the interface.
InEchoReplies	Specifies the number of ICMP Echo Reply messages received by the interface.
InRouterSolicits	Specifies the number of ICMP Router Solicit messages received by the interface.
InRouterAdvertisements	Specifies the number of ICMP Router Advertisement messages received by the interface
InNeighborSolicits	Specifies the number of ICMP Neighbor Solicit messages received by the interface.
InNeighborAdvertisements	Specifies the number of ICMP Neighbor Advertisement messages received by the interface.
InRedirects	Specifies the number of ICMP Redirect messages received by the interface.
InGroupMembQueries	Specifies the number of ICMPv6 Group Membership Query messages received by the interface

Table continues…

Name	Description
InGroupMembResponses	Specifies the number of ICPv6 Group Membership Response messages received by the interface.
InGroupMembReductions	Specifies the number of ICMPv6 Group Membership Reduction messages received by the interface.
OutMsgs	Specifies the total number of ICMP messages which this interface attempted to send. Note that this counter includes all those counted by icmpOutErrors.
OutErrors	Specifies the number of ICMP messages which this interface did not send due to problems discovered within ICMP such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IPv6 to route the resultant datagram. In some implementations there may be no types of error which contribute to this counter's value.
OutDestUnreachs	Specifies the number of ICMP Destination Unreachable messages sent by the interface.
OutAdminProhibs	Specifies the number of ICMP destination unreachable/communication administratively prohibited messages sent.
OutTimeExcds	Specifies the number of ICMP Time Exceeded messages sent by the interface.
OutParmProblems	Specifies the number of ICMP Parameter Problem messages sent by the interface.
OutPktTooBigs	Specifies the number of ICMP Packet Too Big messages sent by the interface.
OutEchos	Specifies the number of ICMP Echo (request) messages sent by the interface.
OutEchoReplies	Specifies the number of ICMP Echo Reply messages sent by the interface.
OutRouterSolicits	Specifies the number of ICMP Router Solicitation messages sent by the interface.
OutRouterAdvertisements	Specifies the number of ICMP Router Advertisement messages sent by the interface.
OutNeighborSolicits	Specifies the number of ICMP Neighbor Solicitation messages sent by the interface.
OutNeighborAdvertisements	Specifies the number of ICMP Neighbor Advertisement messages sent by the interface.
OutRedirects	Specifies the number of Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects.

Table continues…

Name	Description
OutGroupMembQueries	Specifies the number of ICMPv6 Group Membership Query messages sent.
OutGroupMembResponses	Specifies the number of ICMPv6 Group Membership Response messages sent.
OutGroupMembReductions	Specifies the number of ICMPv6 Group Membership Reduction messages sent.

Viewing chassis TCP statistics

View TCP statistics to monitor network performance.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **TCP** tab.

TCP field descriptions

The following table describes parameters on the **TCP** tab.

Name	Description
ActiveOpens	The number of times TCP connections made a direct transition to the SYN-SENT state from the CLOSED state.
PassiveOpens	The number of times TCP connections made a direct transition to the SYN-RCVD state from the LISTEN state.
AttemptFails	The number of times TCP connections made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections made a direct transition to the LISTEN state from the SYN-RCVD state.
EstabResets	The number of times TCP connections made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.
CurrEstab	The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.
InSegs	The number of segments received, including those received in error. This count includes segments received on currently established connections.
OutSegs	The number of segments sent, including those on current connections, but excluding those containing only retransmitted octets.
RetransSegs	The number of segments retransmitted that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

Table continues…

Name	Description
InErrs	The number of segments received in error (for example, bad TCP checksums).
OutRsts	The number of TCP segments sent containing the RST flag.
HCInSegs	The number of segments received, including those received in error. This count includes segments received on currently established connections. This object is the 64-bit equivalent of InSegs.
HCOutSegs	The number of segments sent, including those on current connections, but excluding those containing only retransmitted octets. This object is the 64-bit equivalent of OutSegs.

Viewing chassis UDP statistics

Display User Datagram Protocol (UDP) statistics to see information about the UDP datagrams.

Procedure

1. In the Device Physical View, select the chassis.
2. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
3. Click **Chassis**.
4. Click the **UDP** tab.
5. Select the information you want to graph.
6. Select the type of graph you want:
   - line
   - area
   - bar
   - pie
7. To clear counters, click **Clear Counters**. Discontinuities in the value of these counters can occur when the management system reinitializes, and at other times as indicated by discontinuities in the value of sysUpTime.

UDP field descriptions

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

Name	Description
NoPorts	The number of received UDP datagrams with no application at the destination port.

Table continues…

Name	Description
	Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by discontinuities in the value of sysUpTime.
InErrors	The number of received UDP datagrams that were not delivered for reasons other than the lack of an application at the destination port. Discontinuities in the value of this counter can occur at reinitialization of the management system and at other times as indicated by discontinuities in the value of sysUpTime.
InDatagrams	The number of UDP datagrams delivered to UDP users, for devices that can receive more than 1 000 000 UDP datagrams for each second. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by discontinuities in the value of sysUpTime.
OutDatagrams	The number of UDP datagrams sent from this entity. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by discontinuities in the value of sysUpTime.
HCInDatagrams	The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.
HCOutDatagrams	The number of UDP datagrams sent from this entity, for devices that can transmit more than 1 million UDP datagrams for each second. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by discontinuities in the value of sysUpTime.

Viewing port interface statistics

View port interface statistics to manage network performance.

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 **Interface** tab.

Interface field descriptions

The following table describes parameters on the **Interface** tab.

Name	Description
InOctets	Specifies the number of octets received on the interface, including framing characters.
OutOctets	Specifies the number of octets transmitted from the interface, including framing characters.
InUcastPkts	Specifies the number of packets delivered by this sublayer to a higher sublayer that were not addressed to a multicast or broadcast address at this sublayer.
OutUcastPkts	Specifies the number of packets that higher-level protocols requested be transmitted that were not addressed to a multicast address at this sublayer. The total number includes those packets discarded or not sent.
InMulticastPkts	Specifies the number of packets delivered by this sublayer to a higher sublayer that were addressed to a multicast address at this sublayer. For a MAC layer protocol, this number includes both group and functional addresses.
OutMulticastPkts	Specifies the number of packets that higher-level protocols requested be transmitted, and that are addressed to a multicast address at this sublayer, including those that were discarded or not sent. For a MAC layer protocol, this number includes both group and functional addresses.
InBroadcastPkts	Specifies the number of packets delivered by this sublayer to a higher sublayer that are addressed to a broadcast address at this sublayer.
OutBroadcastPkts	Specifies the 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.
InDiscards	Specifies the number of inbound packets that are discarded because of frames with errors or invalid frames or, in some cases, to fill up buffer space.
InErrors	For packet-oriented interfaces, specifies the number of inbound packets that contained errors preventing 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.
InUnknownProtos	For packet-oriented interfaces, specifies 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 were discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter is always 0.
HCInPfcPkts	Specifies the total number of Priority Flow Control (PFC) packets received by this interface.

Table continues…

Name	Description
HCOutPfcPkts	Specifies the total number of Priority Flow Control (PFC) packets transmitted by this interface.
HCInFlowCtrlPkts	Specifies the number of flow control packets received by this interface.
HCOutFlowCtrlPkts	Specifies the number of flow control packets transmitted by this interface.
NumStateTransition	Specifies the number of times the port went in and out of service; the number of state transitions from up to down.

Viewing port Ethernet errors statistics

View port Ethernet errors statistics to manage network performance.

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 **Ethernet Errors** tab.

Ethernet Errors field descriptions

The following table describes parameters on the **Ethernet Errors** tab.

Name	Description
AlignmentErrors	Specifies acount of frames received on a particular interface that are not an integral number of octets in length and do not pass the 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 obtain are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
FCSErrors	Specifies 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 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.
InternalMacTransmitErrors	Specifies a count of frames for which 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

Table continues…

Name	Description
	corresponding instance of either the LateCollisions object, the ExcessiveCollisions object, or the CarrierSenseErrors 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 particular interface that are not otherwise counted.
InternalMacReceiveErrors	Specifies a count of frames for which reception on a particular interface 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. 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 receive errors on a particular interface that are not otherwise counted.
CarrierSenseErrors	Specifies the number of times that the carrier sense condition is lost or not asserted when the switch attempts 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.
FrameTooLongs	Specifies a count of frames received on a particular interface that exceed 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.
SQETestErrors	Specifies 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 generation described in section 7.2.4.6 of the same document.
DeferredTransmissions	Specifies 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.
SingleCollisionFrames	Specifies a count of successfully transmitted frames on a particular interface for which 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 UcastPkts, MulticastPkts, or BroadcastPkts objects and is not counted by the corresponding instance of the MultipleCollisionFrames object.
MultipleCollisionFrames	Specifies a count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one

Table continues…

Name	Description
	collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the UcastPkts, MulticastPkts, or BroadcastPkts objects and is not counted by the corresponding instance of the SingleCollisionFrames object.
LateCollisions	Specifies 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 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.
ExcessiveCollisions	Specifies a count of frames for which transmission on a particular interface fails due to excessive collisions.
FrameTooShorts	Specifies the number of frames, encountered on this interface, that are too short.
LinkFailures	Specifies the number of link failures encountered on this interface.
PacketErrors	Specifies the number of packet errors encountered on this interface.
CarrierErrors	Specifies the number of carrier errors encountered on this interface.
LinkInactiveErrors	Specifies the number of link inactive errors encountered on this interface.

Viewing port bridging statistics

View port bridging errors statistics to manage network performance.

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 **Bridging** tab.

Bridging field descriptions

The following table describes parameters on the **Bridging** tab.

Name	Description
InUnicastFrames	The number of incoming unicast frames bridged.
InMulticastFrames	The number of incoming multicast frames bridged.
InBroadcastFrames	The number of incoming broadcast frames bridged.
InDiscards	The number of frames discarded by the bridging entity.
OutFrames	The number of outgoing frames bridged.

Viewing port spanning tree statistics

View port spanning tree statistics to manage network performance.

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 **Spanning Tree** tab.

Spanning Tree field descriptions

The following table describes parameters on the **Spanning Tree** tab.

Name	Description
InConfigBpdus	The number of Config BPDUs received.
InTcnBpdus	The number of Topology Change Notifications BPDUs received.
InBadBpdus	The number of unknown or malformed BPDUs received.
OutConfigBpdus	The number of Config BPDUs transmitted.
OutTcnBpdus	The number of Topology Change Notifications BPDUs transmitted.

Viewing port routing statistics

View port routing statistics to manage network performance.

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 **Routing** tab.

Routing field descriptions

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

Name	Description
InUnicastFrames	The number of incoming unicast frames routed.
InMulticastFrames	The number of incoming multicast frames routed.
InDiscards	The number of frames discarded by the routing entity.

Table continues…

Name	Description
OutUnicastFrames	The number of outgoing unicast frames routed.
OutMulticastFrames	The number of outgoing multicast frames routed.

Viewing IPv6 statistics for an interface

View IPv6 statistics to view information about the IPv6 datagrams on an interface.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **IPv6**.
2. Click **IPv6**.
3. Click the **Interfaces** tab.
4. Select an interface.
5. Click **IfStats**.
6. **(Optional)** Select one or more values, and then click on the type of graph to graph the data.

Statistics field descriptions

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

Name	Description
InReceives	Shows the total number of input datagrams received by the interface, including those received in error.
InHdrErrors	Shows the number of input datagrams discarded due to errors in their IPv6 headers, including version number mismatch, other format errors, hop count exceeded, and errors discovered in processing the IPv6 options.
InTooBigErrors	Shows the number of input datagrams that could not be forwarded because their size exceeded the link MTU of the outgoing interface.
InNoRoutes	Shows the number of input datagrams discarded because no route could be found to transmit them to their destination.
InAddrErrors	Shows the number of input datagrams discarded because the IPv6 address in the IPv6 header destination field was not a valid address to be received at this entity. This count includes invalid addresses, for example, ::0, and unsupported addresses, for example, addresses with unallocated prefixes. For entities which are not IPv6 routers and do not forward datagrams, this counter includes

Table continues…

Name	Description
	datagrams discarded because the destination address was not a local address.
InUnknownProtos	Shows the number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol. This counter is incremented at the interface to which these datagrams were addressed, which is not always the input interface for some of the datagrams.
InTruncatedPkts	Shows the number of input datagrams discarded because the datagram frame did not carry enough data.
InDiscards	Shows the number of input IPv6 datagrams for which no problems were encountered to prevent their continued processing, but which were discarded, for example, for lack of buffer space. This counter does not include datagrams discarded while awaiting re-assembly.
InDelivers	Shows the total number of datagrams successfully delivered to IPv6 user-protocols (including ICMP). This counter is incremented at the interface to which these datagrams were addressed which is not always the input interface for some of the datagrams.
OutForwDatagrams	Shows the number of output datagrams which this entity received and forwarded to their final destinations. In entities which do not act as IPv6 routers, this counter includes only those packets which were Source-Routed using this entity, and the Source-Route processing was successful. For a successfully forwarded datagram the counter of the outgoing interface is incremented.
OutRequests	Shows the total number of IPv6 datagrams which local IPv6 user-protocols (including ICMP) supplied to IPv6 in requests for transmission. This counter does not include datagrams counted in **OutForwDatagrams**.
OutDiscards	Shows the number of output IPv6 datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded, for example , for lack of buffer space. This counter includes datagrams counted in **OutForwDatagrams** if such packets met this (discretionary) discard criterion.
OutFragOKs	Shows the number of IPv6 datagrams that have been successfully fragmented at this output interface.

Table continues…

Name	Description
OutFragFails	Shows the number of IPv6 datagrams that have been discarded because they needed to be fragmented at this output interface but could not be.
OutFragCreates	Shows the number of output datagram fragments that have been generated as a result of fragmentation at this output interface.
ReasmReqds	Shows the number of IPv6 fragments received which needed to be reassembled at this interface. This counter is incremented at the interface to which these fragments were addressed, which is not always the input interface for some of the fragments.
ReasmOKs	Shows the number of IPv6 datagrams successfully reassembled. This counter is incremented at the interface to which these datagrams were addressed, which is not always the input interface for some of the fragments.
ReasmFails	Shows the number of failures detected by the IPv6 re- assembly algorithm). This value is not necessarily a count of discarded IPv6 fragments because some algorithms can lose track of the number of fragments by combining them as they are received. This counter is incremented at the interface to which these fragments were addressed, which is not always the input interface for some of the fragments.
InMcastPkts	Shows the number of multicast packets received by the interface.
OutMcastPkts	Shows the number of multicast packets transmitted by the interface.

Viewing DHCP statistics for an interface

View DHCP statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **DHCP Relay**.
3. Click the **Interfaces Stats** tab.

Interfaces Stats field descriptions

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

Name	Description
IfIndex	Identifies the physical interface.
AgentAddr	Shows the IP address configured as the relay on this interface. This address is either the IP of the physical interface or the IP of the VRRP address.
NumRequests	Shows the number of DHCP and BootP requests on this interface.
NumReplies	Shows the number of DHCP and BootP replies on this interface.

Graphing DHCP statistics for a port

View DHCP statistics to manage network performance.

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 **DHCP** tab.
5. Select one or more values.
6. Click the type of graph to create.

DHCP field descriptions

The following table describes parameters on the **DHCP** tab.

Name	Description
NumRequests	The number of DHCP and/or BootP requests on this interface.
NumReplies	The number of DHCP and/or BootP replies on this interface.

Viewing DHCP statistics for a port

View DHCP statistics to manage network performance.

Procedure

1. In the Device Physical view, select a port.
2. In the navigation tree, open the following folders: **Configuration** > **Edit** > **Port**
3. Click **IP**.
4. Click the **DHCP Relay** tab.
5. Click **Graph**.

6. Select one or more values.
7. Click the type of graph.

DHCP Stats field descriptions

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

Name	Description
NumRequests	The number of DHCP and BootP requests on this interface.
NumReplies	The number of DHCP and BootP replies on this interface.

Viewing IPv6 DHCP Relay statistics for a port

Display individual IPv6 DHCP Relay statistics for specific ports to manage network performance. You can also create a graph of selected statistical values.

Procedure

1. On the Device Physical view, select a port.
2. In the navigation pane, expand the following folders: **Configuration** > **IPv6**
3. Click the **DHCP Relay** tab.
4. Click the **Interface** tab.
5. Select the interface on which you want to view the IPv6 DHCP Relay statistics.
6. Click **Statistics**.
7. Select one or more values.
8. Click the type of graph.

Statistics field descriptions

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

Name	Description
NumRequests	Shows the number of DHCP and BootP requests on this interface.
NumReplies	Shows the number of DHCP and BootP replies on this interface.

Graphing DHCP statistics for a VLAN

View DHCP statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN**
2. Click **VLANs**.
3. On the **Basic** tab, select a VLAN.
4. Click **IP**.
5. Click the **DHCP Relay** tab.
6. Click **Graph**.
7. Select one or more values.
8. Click the type of graph.

DHCP Stats field descriptions

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

Name	Description
NumRequests	The number of DHCP and BootP requests on this interface.
NumReplies	The number of DHCP and BootP replies on this interface.

Displaying DHCP-relay statistics for Option 82

Display DHCP-relay statistics for all interfaces to manage network performance.

Procedure

1. In the Navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **DHCP-Relay**.
3. Click the **Option 82 Stats** tab.

Option 82 Stats field descriptions

Use the data in the following table to use the **Option 82 Stats** tab.

Name	Description
IfIndex	Shows the name of the interface on which you enabled option 82. Shows the port number if the interface is a brouter port or the VLAN number if the interface is a VLAN.
AgentAddr	Shows the IP address configured as the relay on this interface. This address is either the IP of the physical interface or the IP of the VRRP address.

Table continues…

Name	Description
FoundOp82	Shows the number of packets that the interface received that already had option82 in them.
Dropped	Shows the number of packets the interface dropped because of option 82–related issues. These reasons could be that the packet was received from an untrusted source or spoofing was detected. To determine the cause of the drop, you must enable trace on level 170.
CircuitId	Shows the value inserted in the packets as the circuit ID. The value is the index of the interface.
AddedCircuitId	Shows how many packets (requests from client to server) the circuit ID was inserted for that interface. If you expect this value to increase but it does not, and the interface does not drop a packet, it is possible the packet does not have enough space to insert the option. You must enable trace on level 170 to determine the cause.
RemovedCircuitId	Shows how many packets (replies from server to client) the circuit id was removed for that interface.
RemoteId	Shows the value inserted in the packets as the remote ID. The value is the MAC address of the interface.
AddedRemoteId	Shows how many packets (requests from client to server) the remote ID was inserted for that interface. If you expect this value to increase but it does not, and the interface does not drop a packet, it is possible the packet does not have enough space to insert the option. You must enable trace on level 170 to determine the cause.
RemovedRemoteId	Shows how many packets (replies from server to client) the remote ID was removed for that interface.

Viewing LACP port statistics

View LACP port statistics to monitor the performance of the port.

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 **LACP** tab.

5. To change the poll interval, in the toolbar click the **Poll Interval** box, and then select a new interval.

LACP field descriptions

Use the data in the following table to view the LACP statistics.

Name	Description
LACPDUsRx	The number of valid LACPDU received on this aggregation port.
MarkerPDUsRx	The number of valid marker PDUs received on this aggregation port.
MarkerResponsePDUsRx	The number of valid marker response PDUs received on this aggregation port.
UnknownRx	The number of frames received that either: • carry Slow Protocols Ethernet type values, but contain an unknown PDU. • are addressed to the Slow Protocols group MAC Address, but do not carry the Slow Protocols Ethernet Type.
IllegalRx	The number of frames received that carry the Slow Protocols Ethernet Type value (43B.4), but contain a badly formed PDU or an illegal value of Protocol Subtype (43B.4).
LACPDUsTx	The number of LACPDUs transmitted on this aggregation port.
MarkerPDUsTx	The number of marker PDUs transmitted on this aggregation port.
MarkerResponsePDUsTx	The number of marker response PDUs transmitted on this aggregation port.

Viewing port policer statistics

View port policer statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Graph**.
2. Click **Port**.
3. Click the **Policer** tab.

Policer field descriptions

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

Name	Description
TotalPkts	Shows the total number of packets received on the port.

Table continues…

Name	Description
TotalBytes	Shows the total number of bytes received on the port.
YellowBytes	Shows the total number of bytes received on the port that were above the committed rate but below the peak rate.
RedBytes	Shows the total number of bytes received on the port that were above the peak rate.

Displaying file statistics

Display the amount of memory used and available for onboard flash memory, as well as the number of files.

Procedure

1. In the navigation tree, expand the following folders:**Configuration** > **Edit**.
2. Click **File System**.
3. Click the **Storage Usage** tab.

Device Info field descriptions

Use the data in the following table to use the **Storage Usage** tab.

Name	Description
FlashBytesUsed	Specifies the number of bytes used in internal flash memory.
FlashBytesFree	Specifies the number of bytes available for use in internal flash memory.
FlashNumFiles	Specifies the number of files in internal flash memory.

Viewing ACE port statistics

About this task

Use port statistics to ensure that the ACE is operating correctly.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Security** > **Data Path**.
2. Click **Advanced Filters (ACE/ACLs)**.
3. Click the **ACL** tab.
4. Select a field on the **ACL** tab.
5. Click **ACE**.
6. Click the **Statistics** tab.

Statistics field descriptions

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

Name	Description
AclId	Specifies the associated ACL index.
AceId	Specifies the ACE index.
MatchCountPkts	Specifies a packet count of the matching packets.
MatchCountOctets	Specifies the number of octets of the matching packets.

Viewing ACL statistics

About this task

Graph statistics for a specific ACL ID to view default statistics.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Security** > **Data Path**.
2. Click **Advanced Filters (ACE/ACLs)**.
3. Click the **ACL** tab.
4. Select an ACL.
5. Click **Graph**.
6. You can click **Clear Counters** to clear the **Statistics** fields.

Statistics field descriptions

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

Name	Description
AclId	Specifies the ACL ID.
MatchDefaultSecurityPkts	Shows a security packet count of traffic that does not match an ACE rule or hits the default action if count is configured in the ACL global action.
MatchDefaultSecurityOctets	Shows a security byte count of traffic that does not match an ACE rule or hits the default action if count is configured in the ACL global action.
MatchDefaultQosPkts	Shows a QoS packet count of traffic that does not match an ACE rule or hits the default action if count is configured in the ACL global action.
MatchDefaultQosOctets	Shows a QoS byte count of traffic that does not match an ACE rule or hits the default action if count is configured in the ACL global action.

Table continues…

Name	Description
MatchGlobalSecurityPkts	Shows a security packet count of traffic that matches an ACE rule or hits the default action if count is configured in the ACL global action.
MatchGlobalSecurityOctets	Shows a security byte count of traffic that matches an ACE rule or hits the default action if count is configured in the ACL global action.
MatchGlobalQosPkts	Shows a QoS packet count of traffic that matches an ACE rule or hits the default action if count is configured in the ACL global action.
MatchGlobalQosOctets	Shows a QoS byte count of traffic that matches an ACE rule or hits the default action if count is configured in the ACL global action.

Clearing ACL statistics

About this task

Clear ACL statistics when you want to gather a new set of statistics.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Security** > **Data Path**.
2. Click **Advanced Filters (ACE/ACLs)**.
3. Click the **ACL** tab.
4. Select a field.
5. Click **ClearStats**.

Viewing VLAN and Spanning Tree CIST statistics

About this task

View CIST port statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN** > **Spanning Tree**.
2. Click **MSTP**.
3. Click the **CIST Port** tab.
4. Select a port, and then click **Graph**.

CIST field descriptions

The following table describes parameters on the **CIST** tab.

Name	Descriptions
ForwardTransitions	Specifies the number of times this port has transitioned to the forwarding state.
RxMstBpduCount	Specifies the number of MSTP BPDUs received on this port.
RxRstBpduCount	Specifies the number of RSTP BPDUs received on this port.
RxConfigBpduCount	Specifies the number of configuration BPDUs received on this port.
RxTcnBpduCount	Specifies the number of TCN BPDUs received on this port.
TxMstBpduCount	Specifies the number of MSTP BPDUs transmitted from this port.
TxRstBpduCount	Specifies the number of RSTP BPDUs transmitted from this port.
TxConfigBpduCount	Specifies the number of configuration BPDUs transmitted from this port.
TxTcnBpduCount	Specifies the number of TCN BPDUs transmitted from this port.
InvalidMstBpduRxCount	Specifies the number of Invalid MSTP BPDUs received on this port.
InvalidRstBpduRxCount	Specifies the number of Invalid RSTP BPDUs received on this port.
InvalidConfigBpduRxCount	Specifies the number of invalid configuration BPDUs received on this port.
InvalidTcnBpduRxCount	Specifies the number of invalid TCN BPDUs received on this port. The number of times this port has migrated from one STP protocol version to another. The relevant protocols are STP-compatible and RSTP/MSTP. A trap is generated on the occurrence of this event.
ProtocolMigrationCount	Specifies the number of times this port has migrated from one STP protocol version to another. The relevant protocols are STP-compatible and RSTP. A trap is generated on the occurrence of this event.

Viewing VLAN and Spanning Tree MSTI statistics

About this task

View multiple spanning tree instance (MSTI) port statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN** > **Spanning Tree**.
2. Click **MSTP**.
3. Click the **MSTI Port** tab.
4. Select a port, and then click **Graph**.

MSTI port stats field descriptions

The following table describes parameters on the **MSTI Port Stats** tab.

Name	Description
ForwardTransitions	Specifies the number of times this port has transitioned to the forwarding state for this specific instance.
ReceivedBPDUs	Specifies the number of BPDUs received by this port for this spanning tree instance.
TransmittedBPDUs	Specifies the number of BPDUs transmitted on this port for this spanning tree instance.
InvalidBPDUsRcvd	Specifies the number of invalid BPDUs received on this port for this spanning tree instance.

Viewing VRRP interface stats

About this task

View VRRP statistics to manage network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **VRRP**.
3. Select the **Interface** tab.
4. Select an interface.
5. Click **Graph**.

Interface stats field descriptions

The following table describes parameters on the **Interface Stats** tab.

Name	Description
AdvertiseRcvd	Specifies the number of VRRP advertisements received by this virtual router.
AdvertiseIntervalErrors	Specifies the number of received VRRP advertisement packets with a different interval is than configured for the local virtual router.
IPTtlErrors	Specifies the number of VRRP packets received by the virtual router with IP TTL (Time-To-Live) not equal to 255.
PriorityZeroPktsRcvd	Specifies the number of VRRP packets received by the virtual router with a priority of 0.

Table continues…

Name	Description
PriorityZeroPktsSent	Specifies the number of VRRP packets sent by the virtual router with a priority of 0'.
InvalidTypePktsRcvd	Specifies the number of VRRP packets received by the virtual router with an invalid value in the 'type' field.
AddressListErrors	Specifies the packets received address list the address list does not match the locally configured list for the virtual router.
AuthTypeMismatch	Specifies the count of authentication type mismatch messages.
PacketLengthErrors	Specifies the count of packet length errors.
AuthFailures	Specifies the count of authentication failure messages.

Viewing VRRP statistics

About this task

View VRRP statistics to monitor network performance.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **VRRP**.
3. Select the **Stats** tab.

Stats field descriptions

The following table describes parameters on the VRRP statistics tab.

Name	Description
ChecksumErrors	Specifies the number of VRRP packets received with an invalid VRRP checksum value.
VersionErrors	Specifies the number of VRRP packets received with an unknown or unsupported version number.
VrIDErrors	Specifies the number of VRRP packets received with an invalid VrID for this virtual router.

Viewing SMLT statistics

View SMLT statistics to manage network performance.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **VLAN**.
2. Click **MLT/LACP**.
3. Select the **Ist/SMLT Stats** tab.

IST/SMLT Stats field descriptions

The following table describes parameters on the IST/SMLT Stats tab.

Name	Description
SmltIstDownCnt	The number of times the session between the two peering switches has gone down since last boot.
SmltHelloTxMsgCnt	The count of transmitted hello messages.
SmltHelloRxMsgCnt	The count of received hello messages.
SmltLearnMacAddrTxMsgCnt	The count of transmitted learned MAC address messages.
SmltLearnMacAddrRxMsgCnt	The count of received learned MAC address messages.
SmltMacAddrAgeOutTxMsgCnt	The count of transmitted aging out MAC address messages.
SmltMacAddrAgeOutRxMsgCnt	The count of received aging out MAC address messages.
SmltMacAddrAgeExpTxMsgCnt	The count of transmitted MAC address age expired messages.
SmltMacAddrAgeExpRxMsgCnt	The count of received MAC address age expired messages.
SmltStgInfoTxMsgCnt	The count of transmitted STG information messages.
SmltStgInfoRxMsgCnt	The count of received STG information messages.
SmltDelMacAddrTxMsgCnt	The count of transmitted MAC address deleted messages.
SmltDelMacAddrRxMsgCnt	The count of received MAC address received messages.
SmltSmltDownTxMsgCnt	The count of transmitted SMLT down messages.
SmltSmltDownRxMsgCnt	The count of received SMLT down messages
SmltUpTxMsgCnt	The count of transmitted SMLT up messages.
SmltUpRxMsgCnt	The count of received SMLT up messages.
SmltSendMacTblTxMsgCnt	The count of sent send MAC table messages.
SmltSendMacTblRxMsgCnt	The count of received send MAC table messages.
SmltIgmpTxMsgCnt	The count of sent IGMP messages.
SmltIgmpRxMsgCnt	The count of received IGMP messages.

Table continues…

Name	Description
SmltPortDownTxMsgCnt	The count of sent port down messages.
SmltPortDownRxMsgCnt	The count of received port down messages.
SmltReqMacTblTxMsgCnt	The count or sent MAC table request messages.
SmltReqMacTblRxMsgCnt	The count of received MAC table request messages.
SmltRxUnknownMsgTypeCnt	The count of received unknown message type messages.
SmltPortTblSyncReqTxMsgCnt	The count of sent sync request messages.
SmltPortTblSyncReqRxMsgCnt	The count of received sync request messages.
SmltPortTblSyncTxMsgCnt	The count of sent sync messages.
SmltPortTblSyncRxMsgCnt	The count of received sync messages.
SmltPortUpdateTxMsgCnt	The count of sent update messages.
SmltPortUpdateRxMsgCnt	The count of received update messages.
SmltEntryUpdateTxMsgCnt	The count of sent entry update messages.
SmltEntryUpdateRxMsgCnt	The count of received entry update messages.
SmltDialectNegotiateTxMsgCnt	The count of sent protocol ID messages.
SmltDialectNegotiateRxMsgCnt	The count of received protocol ID messages.
SmltUpdateRespTxMsgCnt	The count of sent update response messages.
SmltUpdateRespRxMsgCnt	The count of received update response messages.
SmltTransQHighWaterMarkMsgCnt	The count of transaction queue high watermark messages.
SmltPollCountHighWaterMarkCnt	The count of poll count high watermark.

Viewing IPv6 VRRP statistics for an interface

View IPv6 VRRP statistics for a VLAN or port.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **IPv6**.
2. Click **VRRP**.
3. Click the **Interface** tab.
4. Select an interface.
5. Click **Statistics**.

Statistics field descriptions

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

Name	Description
MasterTransitions	Shows the total number of times that the state of this virtual router has transitioned to master. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
RcdAdvertisements	Shows the total number of VRRP advertisements received by this virtual router. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
AdvIntervalErrors	Shows the total number of VRRP advertisement packets received for which the advertisement interval is different than the one configured for the local virtual router. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
IpTtlErrors	Shows the total number of VRRP packets received by the virtual router with IPv4 TTL (for VRRP over IPv4) or IPv6 Hop Limit (for VRRP over IPv6) not equal to 255. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
RcvdPriZeroPackets	Shows the total number of VRRP packets received by the virtual router with a priority of 0. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
SentPriZeroPackets	Shows the total number of VRRP packets sent by the virtual router with a priority of 0. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
RcvdInvalidTypePkts	Shows the number of VRRP packets received by the virtual router with an invalid value in the 'type' field. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
AddressListErrors	Shows the total number of packets received for which the address list does not match the locally configured list for the virtual router. Discontinuities in

Table continues…

Name	Description
	the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
PacketLengthErrors	Shows the total number of packets received with a packet length less than the length of the VRRP header. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of DiscontinuityTime.
RcvdInvalidAuthentications	Shows the total number of packets received with an unknown authentication type.

Viewing IPv6 VRRP statistics

View IPv6 VRRP statistics to monitor network performance.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **IPv6**.
2. Click **VRRP**.
3. Click the **Stats** tab.

Stats field descriptions

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

Name	Description
InetAddrType	Shows the type of IP address (IPv4 or IPv6).
ChecksumErrors	Shows the number of VRRP packets received with an invalid VRRP checksum value.
VersionErrors	Shows the number of VRRP packets received with an unknown or unsupported version number.
VrIdErrors	Shows the number of VRRP packets received with an invalid VrID for this virtual router.

Viewing IP VRRPv3 statistics

About this task

Use the following procedure to view IPv6 VRRPv3 statistics for monitoring the network performance.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** --> **IP**.

2. Click **VRRP**.
3. Click the **V3 Stats** tab.

V3 Stats field descriptions

Use the data in the following table to interpret the **V3 Stats** tab.

Name	Description
InetAddrType	Shows that the address type of the statistical entry is IPv4.
ChecksumErrors	Specifies the total number of VRRP packets received with an invalid VRRP checksum value.
VersionErrors	Specifies the total number of VRRP packets received with an unknown or unsupported version number.
VrIdErrors	Specifies the total number of VRRP packets received with an invalid VRID for the virtual router.

Viewing RSTP status statistics

About this task

You can view status statistics for Rapid Spanning Tree Protocol (RSTP).

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN** > **Spanning Tree**.
2. Click **RSTP**.
3. In the **RSTP Status** tab, select a port, and then click **Graph**.

RSTP Status field descriptions

The following table describes the **RSTP Status** fields.

Name	Description
RxRstBpduCount	Specifies the number of RSTP BPDUs this port received.
RxConfigBpduCount	Specifies the number of configuration BPDUs this port received.
RxTcnBpduCount	Specifies the number of TCN BPDUs this port received.
TxRstBpduCount	Specifies the number of RSTP BPDUs this port transmitted.
TxConfigBpduCount	Specifies the number of Config BPDUs this port transmitted.
TxTcnBpduCount	Specifies the number of TCN BPDUs this port transmitted.
InvalidRstBpduRxCount	Specifies the number of invalid RSTP BPDUs this port received. A trap is generated on the occurrence of this event.

Table continues…

Name	Description
InvalidConfigBpduRx Count	Specifies the number of invalid configuration BPDUs this port received. A trap is generated on the occurrence of this event.
InvalidTcnBpduRxCount	Specifies the number of invalid TCN BPDUs this port received. A trap is generated on the occurrence of this event.
ProtocolMigrationCount	Specifies the number of times this port migrated from one STP protocol version to another. The relevant protocols are STP-Compatible and RSTP. A trap is generated on the occurrence of this event.

Viewing MLT interface statistics

About this task

Use MLT interface statistics tab to view interface statistics for the selected MLT.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN**.
2. Click **MLT/LACP**.
3. Click the **MultiLink/LACP Trunks** tab.
4. Select an MLT.
5. Click **Graph**.

MultiLink/LACP Trunks field descriptions

Use the data in the following table to use the **MultiLink/LACP Trunks** tab.

Name	Description
InOctets	Specifies the total number of octets received on the MLT interface, including framing characters.
OutOctets	Specifies the total number of octets transmitted out of the MLT interface, including framing characters.
InUcastPkts	Specifies the number of packets delivered by this MLT to higher level protocols that were not addressed to a multicast or broadcast address at this sublayer.
OutUcastPkts	Specifies the number of packets that higher–level protocols requested be transmitted that were not addressed to a multicast address at this MLT. This total number includes discarded or unsent packets.
InMulticastPkt	Specifies the number of packets delivered to this MLT that were addressed to a multicast address at this sublayer. For a MAC layer protocol, this number includes both Group and Functional addresses.
OutMulticast	Specifies the total number of packets that higher-level protocols requested be transmitted, and that were addressed to a multicast address at this MLT,

Table continues…

Name	Description
	including those that were discarded or unsent. For a MAC layer protocol, this number includes both Group and Functional addresses.
InBroadcastPkt	Specifies the number of packets delivered to this MLT that were addressed to a broadcast address at this sublayer.
OutBroadcast	Specifies the total number of packets that higher-level protocols requested be transmitted, and that were addressed to a broadcast address at this MLT, including those that were discarded or not sent.
InLsmPkts	Specifies the total number of Link State Messaging (LSM) packets delivered on this MLT.
OutLsmPkts	Specifies the total number of Link State Messaging (LSM) packets transmitted on this MLT.

Viewing MLT Ethernet error statistics

About this task

Use MLT Ethernet error statistics to view the error statistics.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **VLAN**.
2. Click **MLT/LACP**.
3. Click the **MultiLink/LACP Trunks** tab.
4. Select an MLT, and then click **Graph**.
5. Click the **Ethernet Errors** tab.

Ethernet Errors field descriptions

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

Name	Description
AlignmentErrors	Specifies the frame count frames received on a particular MLT that is not an integral number of octets in length and does not pass the 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 occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
FCSErrors	Specifies the frame count received on an MLT that is an integral number of octets in length, but does not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object increments when the FrameCheckError status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error

Table continues…

Name	Description
	conditions occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
IMacTransmitError	Specifies the frame count for which 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.
IMacReceiveError	Specifies the frame count 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. 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 receive errors on a particular interface that are not otherwise counted.
CarrierSenseError	Specifies the number of times that 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.
FrameTooLong	Specifies the frame count 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). 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.
SQETestError	Specifies the number of times that the SQE test error message is generated by the PLS sublayer for a particular MLT. The SQE test error message is defined in section 7.2.2.2.4 of ANSI/ IEEE 802.3-1985.
DeferredTransmiss	Specifies the frame count for which the first transmission attempt on a particular MLT is delayed because the medium is busy. The count represented by an instance of this object does not include frames involved in collisions.
SingleCollFrames	Specifies a count of successfully transmitted frames on a particular MLT for which 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 MultipleCollisionFrames object.
MultipleCollFrames	Specifies the successfully transmitted frame count on a particular MLT for which 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

Table continues…

Name	Description
	instance of either the ifOutUcastPkts object, the ifOutMulticastPkts object, or the ifOutBroadcastPkts object, and is not counted by the corresponding instance of the SingleCollisionFrames object.
LateCollisions	Specifies the number of times that a collision is detected on a particular MLT later than 512 bit-times into the transmission of a packet; 512 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.
ExcessiveCollis	Specifies the frame count for which transmission on a particular MLT fails due to excessive collisions.

Viewing IPv6 OSPF statistics

View OSPF statistics to analyze trends. You can also graph statistics for all OSPF packets transmitted by the switch.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **IPv6**.
2. Click **OSPF**.
3. Click **Stats**.

Stats field descriptions

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

Name	Description
TxPackets	Shows the count of sent packets.
RxPackets	Shows the count of received packets.
TxDropPackets	Shows the count of sent, dropped packets.
RxDropPackets	Shows the count of received, dropped packets.
RxBadPackets	Shows the count of received, bad packets.
SpfRuns	Shows the count of intra-area route table updates with calculations using this area link-state database.
LastSpfRun	Shows the count of the most recent SPF run.
LsdbTblSize	Shows the size of the link state database table.
BadLsReqs	Shows the count of bad link requests.
SeqMismatches	Shows the count of sequence mismatched packets.

Displaying IPsec interface statistics

Use this procedure to view IPsec statistics and counter values for each IPsec-enabled interface.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Security** > **Control Path**.
2. Click **IPSec**.
3. Click the **Interface Stats** tab.

Stats field descriptions

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

Name	Description
IfIndex	Shows the interface index for which the statistic is captured.
InSuccesses	Specifies the number of ingress packets IPsec successfully carries.
InSPViolations	Specifies the number of ingress packets IPsec discards since boot time because of a security policy violation.
InNotEnoughMemories	Specifies the number of ingress packets IPsec discards since boot time because not enough memory is available.
InAHESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the AH replay check fails.
InESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the ESP replay check fails.
InAHFailures	Specifies the number of ingress packets IPsec discards since boot time because the AH authentication check fails.
InESPFailures	Specifies the number of ingress packets IPsec discards since boot time because the ESP authentication check fails.
OutSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutSPViolations	Specifies the number of egress packets IPsec discards since boot time because a security policy violation occurs.

Table continues…

Name	Description
OutNotEnoughMemories	Specifies the number of egress packets IPsec discards since boot time because not enough memory is available since boot time.
generalError	Specifies a general error.
InAhSuccesses	Specifies the number of ingress packets IPsec carries because the AH authentication succeeds.
OutAHSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
InESPSuccesses	Specifies the number of ingress packets IPsec carries since boot time because the ESP authentication succeeds.
OutESPSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutKBytes	Specifies the total number of kilobytes on egress.
OutBytes	Specifies the total number of bytes on egress.
InKBytes	Specifies the total number of bytes on ingress.
InBytes	Specifies the total number of bytes on ingress.
TotalPacketsProcessed	Specifies the total number of packets processed.
TotalPacketsByPassed	Specifies the total number of packets bypassed.
OutAHFailures	Specifies the number of egress packets IPsec discards since boot time because the AH authentication check fails.
OutESPFailures	Specifies the number of egress packets IPsec discards since boot time because the ESP authentication check fails.
InMD5Hmacs	Specifies the number of inbound HMAC MD5 occurrences since boot time.
InSHA1Hmacs	Specifies the number of inbound HMAC SHA1 occurrences since boot time.
InAESXCBCs	Specifies the number of inbound AES XCBC MAC occurrences since boot time.
InAnyNullAuth	Specifies the number of inbound null authentication occurrences since boot time.
In3DESCBCs	Specifies the number of inbound 3DES CBC occurrences since boot time.
InAESCBCs	Specifies the number of inbound AES CBC occurrences since boot time.
InAESCTRs	Specifies the number of inbound AES CTR occurrences since boot time.

Table continues…

Name	Description
InAnyNulEncrypt	Specifies the number of inbound null occurrences since boot time. Used for debugging purposes.
OutMD5Hmacs	Specifies the number of outbound HMAC MD5 occurrences since boot time.
OutSHA1Hmacs	Specifies the number of outbound HMAC SHA1 occurrences since boot time.
OutAESXCBCs	Specifies the number of outbound AES XCBC MAC occurrences since boot time.
OutInAnyNullAuth	Specifies the number of outbound null authentication occurrences since boot time.
Out3DESCBCs	Specifies the number of outbound 3DES CBC occurrences since boot time.
OutAESCBCs	Specifies the number of outbound AES CBC occurrences since boot time.
OutAESCTRs	Specifies the number of outbound AES CTR occurrences since boot time.
OutInAnyNullEncrypt	Specifies the number of outbound null occurrences since boot time. Used for debugging purposes.

Displaying switch level statistics for IPsec-enabled interfaces

Use this procedure to view IPsec statistics and counter values at the switch level for all IPsec-enabled interfaces.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** > **Security** > **Control Path**.
2. Click **IPSec**.
3. Click the **Global Stats** tab.

Global Stats field descriptions

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

Name	Description
InSuccesses	Specifies the number of ingress packets IPsec successfully carries.
InSPViolations	Specifies the number of ingress packets IPsec discards since boot time because of a security policy violation.

Table continues…

Name	Description
InNotEnoughMemories	Specifies the number of ingress packets IPsec discards since boot time because not enough memory is available.
InAHESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the AH replay check fails.
InESPReplays	Specifies the number of ingress packets IPsec discards since boot time because the ESP replay check fails.
InAHFailures	Specifies the number of ingress packets IPsec discards since boot time because the AH authentication check fails.
InESPFailures	Specifies the number of ingress packets IPsec discards since boot time because the ESP authentication check fails.
OutSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutSPViolations	Specifies the number of egress packets IPsec discards since boot time because a security policy violation occurs.
OutNotEnoughMemories	Specifies the number of egress packets IPsec discards since boot time because not enough memory is available since boot time.
generalError	Specifies a general error.
InAHSuccesses	Specifies the number of ingress packets IPsec carries because the AH authentication succeeds.
OutAHSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
InESPSuccesses	Specifies the number of ingress packets IPsec carries since boot time because the ESP authentication succeeds.
OutESPSuccesses	Specifies the number of egress packets IPsec successfully carries since boot time.
OutKBytes	Specifies the total number of kilobytes on egress.
OutBytes	Specifies the total number of bytes on egress.
InKBytes	Specifies the total number of bytes on ingress.
InBytes	Specifies the total number of bytes on ingress.
TotalPacketsProcessed	Specifies the total number of packets processed.
TotalPacketsByPassed	Specifies the total number of packets bypassed.

Table continues…

Name	Description
OutAHFailures	Specifies the number of egress packets IPsec discards since boot time because the AH authentication check fails.
OutESPFailures	Specifies the number of egress packets IPsec discards since boot time because the ESP authentication check fails.
InMD5Hmacs	Specifies the number of inbound HMAC MD5 occurrences since boot time.
InSHA1Hmacs	Specifies the number of inbound HMAC SHA1 occurrences since boot time.
InAESXCBCs	Specifies the number of inbound AES XCBC MAC occurrences since boot time.
InAnyNullAuth	Specifies the number of inbound null authentication occurrences since boot time.
In3DESCBCs	Specifies the number of inbound 3DES CBC occurrences since boot time.
InAESCBCs	Specifies the number of inbound AES CBC occurrences since boot time.
InAESCTRs	Specifies the number of inbound AES CTR occurrences since boot time.
InAnyNulEncrypt	Specifies the number of inbound null occurrences since boot time. Used for debugging purposes.
OutMD5Hmacs	Specifies the number of outbound HMAC MD5 occurrences since boot time.
OutSHA1Hmacs	Specifies the number of outbound HMAC SHA1 occurrences since boot time.
OutAESXCBCs	Specifies the number of outbound AES XCBC MAC occurrences since boot time.
OutInAnyNullAuth	Specifies the number of outbound null authentication occurrences since boot time.
Out3DESCBCs	Specifies the number of outbound 3DES CBC occurrences since boot time.
OutAESCBCs	Specifies the number of outbound AES CBC occurrences since boot time.
OutAESCTRs	Specifies the number of outbound AES CTR occurrences since boot time.
OutInAnyNullEncrypt	Specifies the number of outbound null occurrences since boot time. Used for debugging purposes.

Viewing BGP global stats

View BGP global stats.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **BGP**.
3. Click the **Global Stats** tab.

Global Stats field descriptions

Use the data in the following table to use the BGP Global Stats tab.

Name	Description
AbsoluteValue	Displays the counter value.
Cumulative	Displays the total value since you opened the Stats tab.
Average/sec	Displays the average value for each second.
Minimum/sec	Displays the minimum value for each second.
Maximum/sec	Displays the maximum value for each second.
LastVal/sec	Displays the last value for each second.
Starts	Displays the number of times the BGP connection started.
Stops	Displays the number of times the BGP connection stopped.
Opens	Displays the number of times BGP opens TCP.
Closes	Displays the number of times BGP closes TCP.
Fails	Displays the number of times TCP attempts failed.
Fatals	Displays the number of times TCP crashes due to fatal error.
ConnExps	Displays the number of times the TCP retry timer expired.
HoldExps	Displays the number of times the hold timer expired.
KeepExps	Displays the number of times the keepalive timer expired.
RxOpens	Displays the number of open instances BGP receives.
RxKeeps	Displays the number of keepalive instances BGP receives.

Table continues…

Name	Description
RxUpdates	Displays the number of update instances BGP receives.
RxNotifys	Displays the number of notification instances BGP receives.
TxOpens	Displays the number of open instances BGP transmitted.
TxKeeps	Displays the number of keepalive instances BGP transmitted.
TxUpdates	Displays the number of updates instances BGP transmits.
TxNotifys	Displays the number of notification instances BGP transmits.
BadEvents	Displays the number of invalid events FSM received.
SyncFails	Displays the number of times FDB sync failed.
TrEvent	Displays the trace event.
RxECodeHeader	Displays the total header errors received.
RxECodeOpen	Displays the total open errors received.
RxECodeUpdate	Displays the total update errors received.
RxECodeHoldtimer	Displays the total hold timer errors received.
RxECodeFSM	Displays the total FSM errors received.
RxECodeCease	Displays the total cease errors received.
RxHdrCodeNoSync	Displays the header not synchronized errors received.
RxHdrCodeInvalidMsgLen	Displays the header invalid message length errors received.
RxHdrCodeInvalidMsgType	Displays the header invalid message type errors received.
RxOpCodeBadVer	Displays the open errors received for Bad Version.
RxOpCodeBadAs	Displays the open errors received for le Bad AS Number.
RxOpCodeBadRtID	Displays the open errors received for Bad BGP Rtr ID.
RxOpCodeUnsuppOption	Displays the open errors received for Unsupported Option.
RxOpCodeAuthFail	Displays the open errors received for Auth Failures.
RxOpCodeBadHold	Displays the open errors received for Bad Hold Value.
RxUpdCodeMalformedAttrList	Displays the update errors received for Malformed Attr List.

Table continues…

Name	Description
RxUpdCodeWelKnownAttrUnrecog	Displays the update errors received for Welknown Attr Unrecog.
RxUpdCodeWelknownAttrMiss	Displays the update errors received for Welknown Attr Missing.
RxUpdCodeAttrFlagError	Displays the update errors received for Attr Flag Error.
RxUpdCodeAttrLenError	Displays the update errors received for Attr Len Error.
RxUpdCodeBadORIGINAttr	Displays the update errors received for Bad ORIGIN Attr.
RxUpdCodeASRoutingLoop	Displays the update errors received for AS Routing Loop.
RxUpdCodeBadNHAttr	Displays the update errors received for Bad NEXT-HOP Attr.
RxUpdCodeOptionalAttrError	Displays the update errors received for Optional Attr Error.
RxUpdCodeBadNetworkField	Displays the update errors received for Bad Network Field.
RxUpdCodeMalformedASPath	Displays the update errors received for Malformed AS Path.
TxECodeHeader	Displays the total Header errors transmitted.
TxECodeOpen	Displays the total Open errors transmitted.
TxECodeUpdate	Displays the total Update errors transmitted.
TxECodeHoldtimer	Displays the total Hold timer errors transmitted.
TxECodeFSM	Displays the total FSM errors transmitted.
TxECodeCease	Displays the total Cease errors transmitted.
TxHdrCodeNoSync	Displays the header Not Synchronized errors transmitted.
TxHdrCodeInvalidMsgLen	Displays the header Invalid msg len errors transmitted.
TxHdrCodeInvalidMsgType	Displays the header Invalid msg type errors transmitted.
TxOpCodeBadVer	Displays the open errors transmitted for Bad Version.
TxOpCodeBadAs	Displays the open errors transmitted for Bad AS Number.
TxOpCodeBadRtID	Displays the open errors transmitted for Bad BGP Rtr ID.
TxOpCodeUnsuppOption	Displays the open errors transmitted for Unsupported Option.

Table continues…

Name	Description
TxOpCodeAuthFail	Displays the open errors transmitted for Auth Failures.
TxOpCodeBadHold	Displays the open errors transmitted for Bad Hold Value.
TxUpdCodeMalformedAttrList	Displays the update errors transmitted for Malformed Attr List.
TxUpdCodeWelknownAttrUnrecog	Displays the update errors transmitted for Welknown Attr Unrecog.
TxUpdCodeWelknownAttrMiss	Displays the update errors transmitted for Welknown Attr Missing.
TxUpdCodeAttrFlagError	Displays the update errors transmitted for Attr Flag Error.
TxUpdCodeAttrLenError	Displays the update errors transmitted for Attr Len Error.
TxUpdCodeBadORIGINAttr	Displays the update errors transmitted for Bad ORIGIN Attr.
TxUpdCodeASRoutingLoop	Displays the update errors transmitted for AS Routing Loop
TxUpdCodeBadNHAttr	Displays the update errors transmitted for Bad NEXT-HOP Attr
TxUpdCodeOptionalAttrError	Displays the update errors transmitted for Optional Attr Error.
TxUpdCodeBadNetworkField	Displays the update errors transmitted for Bad Network Field.
TxUpdCodeMalformedASPath	Displays the update errors transmitted for Malformed AS Path.

Viewing statistics for a VRF

About this task

View VRF statistics to ensure the instance is performing as expected.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IP**.
2. Click **VRF**.
3. Select a VRF.
4. Click the **Stats** button.

Stats field descriptions

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

Name	Description
StatRouteEntries	Specifies the number of routes for this VRF.
StatFIBEntries	Specifies the number of Forwarding Information Base (FIB) entries for this VRF.

Viewing EAPoL Authenticator statistics

Use EAPoL Authenticator statistics to display the Authenticator Port Access Entity (PAE) statistics for each selected port.

Procedure

1. On the Device Physical View, select the port you want to graph.

   A yellow outline appears around the selected ports

   If you want to select multiple ports, press Ctrl and hold down the key while you click the ports you want to configure. A yellow outline appears around the selected ports.
2. In the navigation pane, expand the following folders: **Configuration** > **Graph**, and then click **Port**.
3. Click **EAPOL Stats**.
4. If you selected multiple ports, from the Graph port EAPoL Stats tab Show list, select: Absolute Value, Cumulative, Average/sec, Minimum/sec, Maximum/sec, or LastVal/sec.

EAPOL Stats field descriptions

The following table describes values on the **EAPOL Stats** tab.

Name	Description
InvalidFramesRx	Displays the number of EAPoL frames received by this Authenticator in which the frame type is not recognized.
EapLengthErrorFramesRx	Displays the number of EAPoL frames received by this Authenticator in which the Packet Body Length field is invalid.
StartFramesRx	Displays the number of EAPoL start frames received by this Authenticator.
EapFramesRx	Displays the number of EAPoL-EAP frames received by this Authenticator.
LogoffFramesRx	Displays the number of EAPoL Logoff frames received by this Authenticator.
LastRxFrameVersion	Displays the last received version of the EAPoL frame by this Authenticator.
LastRxFrameSource	Displays the source MAC address of the last received EAPoL frame by this Authenticator.
AuthEapFramesTx	Displays the number of EAPoL-EAP frames transmitted by the Authenticator.

Viewing EAPoL session statistics

Use the following procedure to display multiple host session information for a port.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** --> **Security** --> **Data Path**.
2. Click **802.1x–EAPOL**.
3. Click the **MultiHost Session** tab.

MultiHost session field descriptions

The following table describes values on the **MultiHost Session** tab.

Name	Description
StatsPortNumber	Indicates the port number associated with this port.
StatsClientMACAddr	Indicates the MAC address of the client.
Id	Indicates the unique identifier for the session.
AuthenticMethod	Indicates the authentication method used to establish the session.
Time	Indicates the elapsed time of the session.
TerminateCause	Indicates the cause of the session termination.
UserName	Indicates the user name that represents the identity of the supplicant PAE.

Viewing non-EAPoL MAC information

Use this procedure to view non-EAPoL client MAC information on a port.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** --> **Security** --> **Data Path**.
2. Click **802.1x–EAPOL**.
3. Click the **NEAP Radius** tab.

NEAP Radius field descriptions

The following table describes values on the **NEAP Radius** tab.

Name	Description
MacPort	Indicates the port number associated with this port.
MacAddr	Indicates the MAC address of the client.
MacStatus	Indicates the authentication status of the non EAP host that is authenticated using the RADIUS server.
VlanId	Indicates the VLAN assigned to the client.

Viewing Multihost status information

Use the following procedure to display multiple host status for a port.

Procedure

1. In the navigation pane, expand the following folders: **Configuration** --> **Security** --> **Data Path**.
2. Click **802.1x–EAPOL**.
3. Click the **MultiHost Status** tab.

MultiHost status field descriptions

The following table describes values on the **MultiHost Status** tab.

Name	Description
PortNumber	Indicates the port number associated with this port.
ClientMACAddr	Indicates the MAC address of the client.
PaeState	Indicates the current state of the authenticator PAE state machine.
VlanId	Indicates the VLAN assigned to the client.

Showing RADIUS server statistics

About this task

Use the server statistics feature to display the number of input and output packets and the number of input and output bytes. Statistics from console ports are available to assist with debugging.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Security** > **Control Path**.
2. Click **RADIUS**.
3. Click the **RADIUS Servers Stats** tab.

RADIUS Server Stats field descriptions

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

Name	Description
AddressType	Specifies the type of IP address. RADIUS supports IPv4 addresses only.
Address	Shows the IP address of the RADIUS server.
Used by	Identifies the client.
AccessRequests	Shows the number of access-response packets sent to the server; does not include retransmissions.
AccessAccepts	Shows the number of access-accept packets, valid or invalid, received from the server.
AccessRejects	Shows the number of access-reject packets, valid or invalid, received from the server.
BadResponses	Shows the number of invalid access-response packets received from the server.
PendingRequests	Shows the access-request packets sent to the server that have not yet received a response or that have timed out.
ClientRetries	Shows the number of authentication retransmissions to the server.
AcctOnRequests	Shows the number of accounting on requests sent to the server.
AcctOffRequests	Shows the number of accounting off requests sent to the server.
AcctStartRequests	Shows the number of accounting start requests sent to the server.
AcctStopRequests	Shows the number of accounting stop requests sent to the server.
AcctInterimRequests	Number of Accounting Interim requests sent to the server. ❗ **Important:** The AcctInterimRequests counter increments only if you select AcctIncludeCli from the RADIUS Global tab.
AcctBadResponses	Shows the number of Invalid responses discarded from the server.
AcctPendingRequests	Shows the number of requests waiting to be sent to the server.
AcctClientRetries	Shows the number of retries made to this server.
RoundTripTime	Shows the time difference between the instance when a RADIUS request is sent and the corresponding response is received.
AccessChallenges	Shows the number of RADIUS access-challenges packets sent to this server. This does not include retransmission.
NasIpAddress	Shows the RADIUS client NAS Identifier for this server.

Showing SNMP statistics

About this task

Display SNMP statistics to monitor the number of specific error messages, such as the number of messages that were delivered to SNMP but were not allowed.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **Security** > **Control Path**.
2. Click **General**.
3. Click the **SNMP** tab.

SNMP field descriptions

Use the data in the following table to display SNMP statistics.

Name	Description
OutTooBigs	Shows the number of SNMP PDUs that the SNMP protocol entity generated and for which the value of the error-status field is tooBig.
OutNoSuchNames	Shows the number of SNMP PDUs that the SNMP protocol entity generated and for which the value of the error-status is noSuchName.
OutBadValues	Shows the number of SNMP PDUs that SNMP protocol entity generated and for which the value of the error-status field is badValue.
OutGenErrors	Shows the number of SNMP PDUs that the SNMP protocol entity generated and for which the value of the error-status field is genErr.
InBadVersions	Shows the number of SNMP messages that were delivered to the SNMP protocol entity and were for an unsupported SNMP version.
InBadCommunityNames	Shows the number of SNMP messages delivered to the SNMP protocol entity that used an SNMP community name not known to the entity.
InBadCommunityUses	Shows the 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.
InASNParseErrs	Shows the number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding received SNMP messages.
InTooBigs	Shows the number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is tooBig.
InNoSuchNames	Shows the number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is noSuchName.

Table continues…

Name	Description
InBadValues	Shows the number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is badValue.
InReadOnlys	Shows the number of valid SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is "read-only". It is a protocol error to generate an SNMP PDU that contains the value "read-only" in the error-status field; this object is provided as a means of detecting incorrect implementations of the SNMP.
InGenErrors	Shows the number of SNMP PDUs delivered to the SNMP protocol entity and for which the value of the error-status field is "genErr."

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 **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.

Viewing RMON statistics

Before you begin

- You must enable RMON statistics collection.

About this task

Use the following procedure to view RMON statistics for each port.

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** tab.
5. Select the statistics you want to graph.
6. Select a graph type:
   - bar
   - pie
   - chart
   - line

RMON field descriptions

The following table describes fields on the **RMON** tab.

Name	Description
Octets	Specifies the number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). You can use this object as a reasonable estimate of Ethernet utilization. If additional precision is desired, sample the Pkts and Octets objects before and after a common interval. The differences in the sampled values are Pkts and Octets, and the number of seconds in the interval is Interval. These values are used to calculate the Utilization as follows: `Pkts * (9.6+6.4) + (Octets * .8)` Utilization = ... Interval * 10,000 The result of this equation is the value Utilization, which is the percent utilization of the Ethernet segment on a scale of 0 to 100 percent.
Pkts	Specifies the number of packets (including bad packets, broadcast packets, and multicast packets) received.

Table continues…

Name	Description
BroadcastPkts	Specifies the number of good packets received that were directed to the broadcast address. This number does not include multicast packets.
MulticastPkts	Specifies the number of good packets received that were directed to a multicast address. This number does not include packets directed to the broadcast address.
CRCAlignErrors	Specifies the number of packets received that had a length (excluding framing bits, but including FCS octets) between 64 and 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 received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
OversizePkts	Specifies the number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
Fragments	Specifies the number of packets received 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 runs (which are normal occurrences due to collisions) and noise hits.
Collisions	Specifies the best estimate of the number of collisions on this Ethernet segment. 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 are transmitting 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 much smaller role when considering 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 only detect collisions when it is transmitting. Thus, probes placed on a station and a repeater reports the same number of collisions. An RMON probe inside a repeater reports 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.

Displaying IS-IS system statistics

Use the following procedure to display Intermediate-System-to-Intermediate-System (IS-IS) system statistics.

Procedure

1. In the navigation tree, choose **Configuration** > **IS-IS**.
2. Click **Stats**.
3. Click the **System Stats** tab.

System Stats field descriptions

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

Name	Description
CorrLSPs	Indicates the number of corrupted in-memory link-state packets (LSPs) detected. LSPs received from the wire with a bad checksum are silently dropped and not counted.
AuthFails	Indicates the number of authentication key failures recognized by this Intermediate System.
LSPDbaseOloads	Indicates the number of times the LSP database has become overloaded.
ManAddrDropFromAreas	Indicates the number of times a manual address has been dropped from the area.
AttmptToExMaxSeqNums	Indicates the number of times the IS has attempted to exceed the maximum sequence number.
SeqNumSkips	Indicates the number of times a sequence number skip has occurred.
OwnLSPPurges	Indicates the number of times a zero-aged copy of the system's own LSP is received from some other node.
IDFieldLenMismatches	Indicates the number of times a PDU is received with a different value for ID field length to that of the receiving system.
PartChanges	Indicates partition changes.
AbsoluteValue	Displays the counter value.
Cumulative	Displays the total value since you opened the Stats tab.
Average/sec	Displays the average value for each second.
Minimum/sec	Displays the minimum value for each second.
Maximum/sec	Displays the maximum value for each second.
LastVal/sec	Displays the last value for each second.

Displaying IS-IS interface counters

Use the following procedure to display IS-IS interface counters.

Procedure

1. From the navigation tree, choose **Configuration** > **IS-IS**.
2. Click **Stats**.
3. Click the **Interface Counters** tab.

Interface Counters field descriptions

Use the data in the following table to use the **Interface Counters** tab.

Name	Description
Index	Shows a unique value identifying the IS-IS interface.
Type	Shows the type of IS-IS interface.
AdjChanges	Shows the number of times an adjacency state change has occurred on this circuit.
InitFails	Shows the number of times initialization of this circuit has failed. This counts events such as PPP NCP failures. Failures to form an adjacency are counted by isisCircRejAdjs.
RejAdjs	Shows the number of times an adjacency has been rejected on this circuit.
IDFieldLenMismatches	Shows the number of times an IS-IS control PDU with an ID field length different to that for this system has been received.
MaxAreaAddrMismatches	Shows the number of times an IS-IS control PDU with a max area address field different to that for this system has been received.
AuthFails	Shows the number of times an IS-IS control PDU with the correct auth type has failed to pass authentication validation.
LANDesISChanges	Shows the number of times the Designated IS has changed on this circuit at this level. If the circuit is point to point, this count is zero.

Displaying IS-IS interface control packets

Use the following procedure to display IS-IS interface control packets.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IS-IS**.
2. Click **Stats**.

3. Click the **Interface Control Packets** tab.

Interface Control Packets field descriptions

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

Name	Description
Index	Shows a unique value identifying the Intermediate-System-to-Intermediate-System (IS-IS) interface.
IfIndex	Shows the interface index for the Ethernet or MLT interface.
Direction	Indicates whether the switch is sending or receiving the PDUs.
Hello	Indicates the number of IS-IS Hello frames seen in this direction at this level.
LSP	Indicates the number of IS-IS LSP frames seen in this direction at this level.
CSNP	Indicates the number of IS-IS Complete Sequence Number Packets (CSNP) frames seen in this direction at this level.
PSNP	Indicates the number of IS-IS Partial Sequence Number Packets (PSNP) frames seen in this direction at this level.

Graphing IS-IS interface counters

Use the following procedure to graph IS-IS interface counters.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IS-IS**.
2. Click **IS-IS**.
3. Click the **Interfaces** tab.
4. Select an existing interface.
5. Click the **Graph** button.

Interface Counters field descriptions

The following table describes the fields in the **Interface Counters** tab.

Name	Description
InitFails	Indicates the number of times initialization of this circuit has failed. This counts events such as PPP NCP failures.
RejAdjs	Indicates the number of times an adjacency has been rejected on this circuit.

Table continues…

Name	Description
IDFieldLenMismatches	Indicates the number of times an Intermediate-System-to-Intermediate-System (IS-IS) control PDU with an ID field length different from that for this system has been received.
MaxAreaAddrMismatches	Indicates the number of times an IS-IS control PDU with a max area address field different from that for this system has been received.
AuthFails	Indicates the number of times an IS-IS control PDU with the correct auth type has failed to pass authentication validation.
LANDesISChanges	Indicates the number of times the Designated IS has changed on this circuit at this level. If the circuit is point to point, this count is zero.
AbsoluteValue	Displays the counter value.
Cumulative	Displays the total value since you opened the Stats tab.
Average/Sec	Displays the average value for each second.
Minimum/Sec	Displays the minimum value for each second.
Maximum/Sec	Displays the maximum value for each second.
Last Val/Sec	Displays the last value for each second.

Graphing IS-IS interface sending control packet statistics

Use the following procedure to graph IS-IS interface receiving control packet statistics.

Procedure

1. In the navigation tree, expand the following folders: **Configuration** > **IS-IS**.
2. Click **IS-IS**.
3. Click the **Interfaces** tab.
4. Select an existing interface.
5. Click the **Graph** button.
6. Click the **Interface Sending Control Packets** tab.

Interface Sending Control Packets field descriptions

The following table describes the fields in the **Interface Sending Control Packets** tab.

Name	Description
Hello	Indicates the number of IS-IS Hello (IIH) PDUs seen in this direction at this level. Point-to-Point IIH PDUs are counted at the lowest enabled level: at L1 on L1 or L1L2 circuits, and at L2 otherwise.

Table continues…

Name	Description
LSP	Indicates the number of IS-IS LSP frames seen in this direction at this level.
CSNP	Indicates the number of IS-IS Complete Sequence Number Packet (CSNP) frames seen in this direction at this level.
PSNP	Indicates the number of IS-IS Partial Sequence Number Packets (PSNPs) seen in this direction at this level.
AbsoluteValue	Displays the counter value.
Cumulative	Displays the total value since you opened the Stats tab.
Average/Sec	Displays the average value for each second.
Minimum/Sec	Displays the minimum value for each second.
Maximum/Sec	Displays the maximum value for each second.
Last Val/Sec	Displays the last value for each second.

Graphing IS-IS interface receiving control packet statistics

Use the following procedure to graph IS-IS interface sending control packet statistics.

Procedure

1. From the navigation tree, choose **Configuration** > **IS-IS**.
2. Click **IS-IS**.
3. Click the **Interfaces** tab.
4. Select an existing interface.
5. Click the **Graph** button.
6. Click the **Interface Receiving Control Packets** tab.

Interface Receiving Control Packets field descriptions

The following table describes the fields in the **Interface Receiving Control Packets** tab.

Name	Description
Hello	Indicates the number of IS-IS Hello PDUs seen in this direction at this level. Point-to-Point IIH PDUs are counted at the lowest enabled level: at L1 on L1 or L1L2 circuits, and at L2 otherwise.
LSP	Indicates the number of IS-IS link-state packet (LSP) frames seen in this direction at this level.
CSNP	Indicates the number of IS-IS Complete Sequence Number Packet (CSNP) frames seen in this direction at this level.
PSNP	Indicates the number of IS-IS Partial Sequence Number Packets (PSNPs) seen in this direction at this level.

Table continues…

Name	Description
AbsoluteValue	Displays the counter value.
Cumulative	Displays the total value since you opened the Stats tab.
Average/Sec	Displays the average value for each second.
Minimum/Sec	Displays the minimum value for each second.
Maximum/Sec	Displays the maximum value for each second.
Last Val/Sec	Displays the last value for each second.

Chapter 8: RMON configuration using ACLI

This section contains procedures to configure RMON using Avaya Command Line Interface (ACLI).

For information about RMON statistics, see the following sections in the Statistics chapter:

- Displaying RMON statistics for specific ports on page 43
- Viewing RMON statistics on page 67

Configuring RMON

Enable RMON1 and RMON2 globally, and configure RMON1 alarms, events, history, statistics, 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 history 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 RMON1 statistics:

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

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

Variable definitions

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

Table 26: 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 system also generates a single event if the first sample after

Table continues…

Variable	Value
	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. • 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
	Note: When configuring from ACLI, the default owner is **`cli`**; when configuring with SNMP, the default owner is **`snmp`**. The default command only sets the owner to default. No other parameters can be changed after you create the alarm. 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]	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 — Specifies if this event stores a log when the event is triggered by the alarm. • trap — Specifies if this event sends a trap when the event is triggered by the alarm. The trap will be sent to all the snmp-server hosts configured in the snmp table. • 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. • community *WORD<1-127>* — Specifies the SNMP community where you can send SNMP traps, with a string length 1 to 127. You can set the community, but the trap is not filtered out. The trap is sent to all configured snmp-server hosts, regardless of the value of this field. 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.

Table continues…

Variable	Value
	• 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 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.
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>]`
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 this table to use the **`vlan rmon`** command.

Variable	Value
<1-4059>	Specifies the VLAN ID on which to configure RMON.

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     1/10    monitor
```

Variable definitions

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

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.
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.
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.
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 status

View the current RMON status on the switch.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View RMON status:

   ```
   show rmon
   ```

Example

```
Switch: show rmon

RMON Info :
Status        : enable
```

Displaying RMON address maps

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

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

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View RMON address maps:

   ```
   show rmon address-map
   ```

Example

```
Switch: show rmon address-map
================================================================================
                             Rmon Address Map Table
================================================================================
PROTOIDX  HOSTADDR         SOURCE  PHYADDR            LASTCHANGE
--------------------------------------------------------------------------------
1         12.1.1.1         2060    b0:ad:aa:42:a5:03  10/09/15 17:30:41
```

Job aid

The following table describes the fields in the output for the **show rmon address-map** command.

Parameter	Description
PROTOIDX	Shows a unique identifier for the entry in the table.
HOSTADDR	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.
PHYADDR	Shows the physical address on which the network address was most recently seen.
LASTCHANGE	Shows when the entry was created or last changed. If this value changes frequently, it can indicate duplicate address problems.

Displaying RMON application host statistics

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

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View RMON application host statistics:

   ```
   show rmon application-host-stats WORD<1-64>
   ```

Example

```
Switch:# show rmon application-host-stats ?
  WORD<1-64>  Select one of these application protocols
              {TCP|UDP|FTP|TELNET|HTTP|RLOGIN|SSH|TFTP|SNMP|HTTPS}
Switch:# show rmon application-host-stats FTP

================================================================================
                          Rmon Application Host Stats
================================================================================
HOSTADDR         INPKT      OUTPKT     INOCT      OUTOCT     CREATETIME
--------------------------------------------------------------------------------
12.1.1.1         0          0          0          0          10/09/15 17:29:54
```

Job aid

The following table describes the fields in the output for the **`show rmon application-host-stats`** command.

Parameter	Description
HOSTADDR	Shows the network address for this entry. The format of the value depends on the protocol portion of the local index.
INPKT	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.
OUTPKT	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.
INOCT	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.
OUTOCT	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 when the entry was last activated.

Displaying RMON control tables

View RMON control tables to see the data source for both network layer and application layer host statistics.

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View RMON control tables:

   ```
   show rmon ctl-table
   ```

Example

```
Switch: show rmon ctl-table

================================================================================
                               Rmon Control Table
================================================================================

================================================================================
                            Protocol Directory Table
================================================================================
IDX  PROTOCOL  ADDRMAPCFG  HOSTCFG    MATRIXCFG     OWNER
--------------------------------------------------------------------------------
1    IP        SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
2    TCP       SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
3    UDP       SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
4    FTP       SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
5    SSH       SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
6    TELNET    SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
7    HTTP      SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
8    RLOGIN    SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
9    TFTP      SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
10   SNMP      SUPPORTED   SUPPORTED  NOT SUPPORTED VSP
11   HTTPS     SUPPORTED   SUPPORTED  NOT SUPPORTED VSP


================================================================================
                          Protocol Distribution Control Table
================================================================================
IDX  DATASOURCE       DROPFRAMES  CREATETIME         OWNER
--------------------------------------------------------------------------------
1    0.0.0.0          0           09/22/15 19:29:13  VSP


================================================================================
                           Address Map Control Table
================================================================================
IDX  DATASOURCE       DROPFRAMES  OWNER
--------------------------------------------------------------------------------
1    0.0.0.0          0           VSP


================================================================================
                               Host Control Table
================================================================================
IDX  DATASOURCE       NHDROPFRAMES  AHDROPFRAMES  OWNER
--------------------------------------------------------------------------------
1    0.0.0.0          0            0            VSP
```

Job aid

The following table describes the fields in the output for the **`show rmon ctl-tabl`** command.

Parameter	Description
ADDRMAPCFG	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The value can be one of the following: • **NOT SUPPORTED** • **SUPPORTED OFF**

Table continues…

Parameter	Description
	• **SUPPORTED ON** If the value is **SUPPORTED ON**, the probe adds entries to the address map table that maps the network layer address to the MAC layer address.
AHDROPFRAMES	Shows the total number of application layer host frames that the probe receives and drops. This value does not include packets that were not counted because they had MAC-layer errors.
CREATETIME	Shows when the entry was last activated.
DATASOURCE	Shows the source of data for the entry.
DROPFRAMES	Shows the total number of frames that the probe receives and drops. This value does not include packets that were not counted because they had MAC-layer errors.
HOSTCFG	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The value can be one of the following: • **NOT SUPPORTED** • **SUPPORTED OFF** • **SUPPORTED ON** If the value is **SUPPORTED ON**, the probe adds entries to the Host Control table to collect statistics for network layer and application layer hosts.
IDX	Shows a unique identifier for the entry in the table.
MATRIXCFG	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The value can be one of the following: • **NOT SUPPORTED** • **SUPPORTED OFF** • **SUPPORTED ON**
NHDROPFRAMES	Shows the total number of network host frames that the probe receives and drops. This value does not include packets that were not counted because they had MAC-layer errors.
OWNER	Shows the entity that configured this entry.
PROTOCOL	Shows the protocols RMON2 can monitor: • Internet Protocol (IP) • Transmission Control Protocol (TCP) • User Datagram Protocol (UDP) • File Transfer Protocol (FTP) • Secure Shell version 2 (SSHv2) • Telnet

Table continues…

Parameter	Description
	• Hypertext Transfer Protocol (HTTP) • Remote login (RLOGIN) • Trivial File Transfer Protocol (TFTP) • Simple Networking Management Protocol (SNMP) • Hypertext Transfer Protocol Secure (HTTPS)

Displaying RMON 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. Log on to the switch to enter User EXEC mode.
2. View RMON network host statistics:

   ```
   show rmon network-host-stats
   ```

Job aid

The following table describes the fields in the output for the **`show rmon network-host-stats`** command.

Parameter	Description
HOSTADDR	Shows the host address for this entry.
INPKT	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.
OUTPKT	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.
INOCT	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.
OUTOCT	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 when the entry was last activated.

Displaying RMON protocol distribution statistics

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

Procedure

1. Log on to the switch to enter User EXEC mode.
2. View RMON protocol distribution statistics:

   `show rmon protocol-dist-stats`

Example

```
Switch: show rmon protocol-dist-stats

================================================================================
                            Rmon Protocol Dist Stats
================================================================================
PROTOCOL  PKTS       OCTETS
--------------------------------------------------------------------------------
IP        0          0
TCP       0          0
UDP       0          0
FTP       0          0
SSH       0          0
TELNET    0          0
HTTP      0          0
RLOGIN    0          0
TFTP      0          0
SNMP      0          0
HTTPS     0          0
```

Chapter 9: RMON configuration using EDM

This section contains procedures to configure RMON using Enterprise Device Manager (EDM).

For information about RMON statistics, see the following sections in the Statistics chapter:

- Enabling RMON statistics on page 142
- Viewing RMON statistics on page 143

Enabling RMON globally

About this task

You must globally enable RMON before you can use RMON2 functions. If you attempt to enable an RMON2 function before the global flag is disabled, EDM informs you that the flag is disabled and prompts you to enable the flag. You can configure RMON1 while RMON is globally disabled.

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. 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.

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
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.

Table continues…

Name	Description
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.

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 27: 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.
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.

Table continues…

Parameter	Description
	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, 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 entry.

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.
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

Table continues…

Name	Description
	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.
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. **Note:** You must create the event prior to associating it to an alarm.
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

Table continues…

Name	Description
	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 valid event index. You cannot modify this object if the associated alarmStatus object is equal to valid. **Note:** You must create the event prior to associating it to an alarm.
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.

Viewing RMON 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 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 an 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.
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.
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.

Deleting an event

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 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.

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 Protocol (UDP) • File Transfer Protocol (FTP) • Hypertext Transfer Protocol (HTTP) • Telnet • Remote login (rlogin) • Trivial File Transfer Protocol (TFTP) • Simple Networking Management Protocol (SNMP)
AddressMapConfig	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The value 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 value 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.

Table continues…

Name	Description
MatrixConfig	Describes and configures the probe support for the network layer and application layer host tables for this protocol. The value 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.
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.

Table continues…

Name	Description
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

Table continues…

Name	Description
	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.

Table continues…

Name	Description
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
LocalIndex	Shows a unique identifier for the entry in the table.
HostAddress	Identifies the network layer address of 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,

Table continues…

Name	Description
	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: Service Level Agreement Monitor

The switch supports the Service Level Agreement Monitor (SLA Mon™) agent as part of the Avaya SLA Mon solution.

SLA Mon uses a server and agent relationship to perform end-to-end network Quality of Service (QoS) validation and to distribute monitoring devices. You can use the test results to target under-performing areas of the network for deeper analysis.

SLA Mon server and agent

The switch supports the SLA Mon agent. You must have an Avaya Diagnostic Server with SLA Mon technology in your network to use the SLA Mon feature. Most of the SLA Mon configuration occurs on the server; configuration on the SLA Mon agent is minimal.

The SLA Mon server initiates the SLA Mon functions on one or more agents, and the agents run specific QoS tests at the request of the server. Agents can exchange packets between one another to conduct the QoS tests.

SLA Mon can monitor a number of key items, including the following:

- network paths
- Differentiated Services Code Point (DSCP) markings
- loss
- jitter
- delay

The following figure shows an SLA Mon implementation.

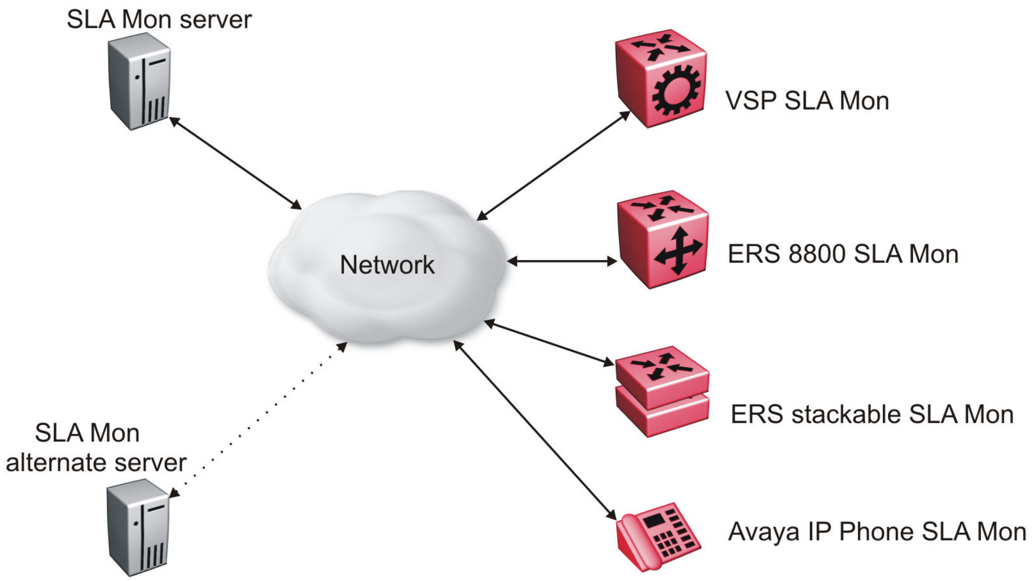

Figure 4: SLA Monitor network

An SLA Mon agent remains dormant until it receives a User Datagram Protocol (UDP) discovery packet from a server. The agent accepts the discovery packet to register with an SLA Mon server. If the registration process fails, the agent remains dormant until it receives another discovery packet.

An agent can attempt to register with an SLA Mon server once every 60 seconds. After a successful registration, the agent reregisters with the server every 6 hours to exchange a new encryption key.

An agent only accepts commands from the SLA Mon server to which it is registered. An agent can use alternate SLA Mon servers to provide backup for time-out and communication issues with the primary SLA Mon server.

Note:

If you configure the SLA Mon agent address under an IP address for a VLAN or brouter, you must remove the SLA Mon address before you can remove the IP address for the VLAN or brouter.

QoS tests

SLA Mon uses two types of tests to determine QoS benchmarks:

- Real Time Protocol (RTP)

  This test measures network performance — for example, jitter, delay, and loss — by injecting a short stream of UDP packets from source to destination (an SLA Mon agent).

- New Trace Route (NTR)

This test is similar to traceroute but also includes DSCP values at each hop in the path from the source to the destination. The destination does not need to be an SLA Mon agent.

Limitations

SLA Mon agent communications are IPv4–based. Agent communications do not currently support IPv6.

SLA Mon configuration using CLI

Configuring the SLA Mon agent

Configure the SLA Mon agent to communicate with an Avaya Diagnostic Server with SLA Mon technology to perform Quality of Service (QoS) tests of the network.

Before you begin

- To use the SLA Mon agent, you must have an Avaya Diagnostic Server with SLA Mon technology in your network.

About this task

To configure the SLA Mon agent, you must assign an IP address and enable it. Remaining agent parameters are optional and you can operate the agent using the default values.

Note:

If you want to change SLA Mon parameters, you must first disable SLA Mon.

If you configure the SLA Mon agent address under an IP address for a VLAN or brouter, you must remove the SLA Mon address before you can remove the IP address for the VLAN or brouter. To remove the SLA Mon address, first use the command **`no slamon oper-mode enable`**, followed by **`slamon agent ip address 0.0.0.0`**.

Procedure

1. Enter Application Configuration mode:

   ```
   enable
   ```

   ```
   configure terminal
   ```

   ```
   application
   ```

2. Configure the SLA Mon agent IP address:

Note:

The SLA Mon agent IP address must not use the IP address of an IP interface on the switch.

```
slamon agent ip address {A.B.C.D} [vrf WORD<1-16>]
```

3. **(Optional)** Configure the UDP port for agent-server communication:

   ```
   slamon agent port <0-65535>
   ```

4. **(Optional)** Restrict which servers an agent can use:

   ```
   slamon server ip address {A.B.C.D} [{A.B.C.D}]
   ```

   ```
   slamon server port <0-65535>
   ```

5. **(Optional)** Control the port used for Real Time Protocol (RTP) and New Trace Route (NTR) testing:

   ```
   slamon agent-comm-port <0-65535>
   ```

6. **(Optional)** Install a Secure Socket Layer (SSL) certificate for the agent:

   ```
   slamon install-cert-file WORD<0-128>
   ```

7. Enable the agent:

   ```
   slamon oper-mode enable
   ```

8. Verify the agent configuration:

   ```
   show application slamon agent
   ```

Example

Configure the SLA Mon agent IP address. Configure the agent so that it only accepts registration packets from a specific server communicating on a specific port. Finally, enable the SLA Mon agent, and then verify the configuration.

```
Switch:1>enable
Switch:1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch:1(config)#application
Switch:1(config-app)#slamon agent ip address 192.0.2.1
Switch:1(config-app)#slamon server ip address 192.0.2.25
Switch:1(config-app)#slamon server port 50011
Switch:1(config-app)#slamon oper-mode enable
Switch:1(config-app)#show application slamon agent
==================================================================
                            SLA Monitor Agent Info
==================================================================
SLAMon Operational Mode: Enabled
SLAMon Agent Address: 192.0.2.1
SLAMon Agent Port: 50011
SLAMon Agent Registration Status: Registered
SLAMon Registered Server Address: 192.0.2.25
SLAMon Registered Server Port: 50011
SLAMon Server Registration Time: 130
SLAMon Encryption Mode: Supported
SLAMon Configured Agent Address: 192.0.2.1
SLAMon Configured Agent Port: 0
SLAMon Configured Server Address: 192.0.2.25 0.0.0.0
```

```
SLAMon Configured Server Port: 50011 0
SLAMon Agent-To-Agent Communication Port: 50012
SLAMon Configured Agent-To-Agent Communication Port: 0
SLAMon Configured Agent Address Vrf Name:
```

Next steps

If you have configured SLA Mon, but the agent does not function as expected, use the **`show khi performance pthread [{slot[-slot][,...]}]`** command to verify that the slamon task is running.

If the SLA Mon agent is not running, use the commands **`no slamon oper-mode enable`** and **`slamon oper-mode enable`** to start the agent.

If the agent task is running, perform typical troubleshooting steps to verify agent accessibility:

- Verify IP address assignment and port use.
- Ping the server IP address.
- Verify the server configuration.
- Use the **`trace level 192 <0-4>`** command to observe the status of the SLA Mon software module.

Variable definitions

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

Variable	Value
agent-comm-port *<0–65535>*	Configures the port used for RTP and NTR testing in agent-to-agent communication. The default port is 50012. If you configure this value to zero (0), the default port is used.
agent ip address {A.B.C.D}	Configures the SLA Mon agent IP address. You must configure the IP address before the agent can process received discovery packets from the server. The agent ip address is a mandatory parameter. The default value is 0.0.0.0.
agent port *<0–65535>*	Configures the UDP port for agent-server communication. The SLA Mon agent receives discovery packets on this port. The default is port 50011. The server must use the same port.
install-cert-file	Installs an SSL certificate. *WORD<0-128>* specifies the file name and path of the certificate to install. If you install a certificate on the SLA Mon agent, you must ensure a matching configuration on the server. By default, the agent uses an Avaya SIP certificate to secure communications with the server.
oper-mode enable	Enables the SLA Mon agent. The default is disabled.

Table continues…

Variable	Value
	If you disable the agent, it does not respond to discovery packets from a server. If you disable the agent because of resource concerns, consider changing the server configuration instead, to alter the test frequency or duration, or the number of targets.
server ip address {A.B.C.D} [{A.B.C.D}]	Restricts the SLA Mon agent to use the server at this IP address only. The default is 0.0.0.0, which means the agent can register with any server. You can specify a secondary server as well.
server port *<0–65535>*	Restricts the SLA Mon agent to use this registration port only. The default is 0, which means the agent disregards the source port information in server traffic. The server must use the same port.
vrf *WORD<1-16>*	Specifies the name of a VRF.

SLA Mon configuration using EDM

Configuring the SLA Mon agent

Configure the SLA Mon agent to communicate with an Avaya Diagnostic Server with SLA Mon technology to perform Quality of Service (QoS) tests of the network.

Before you begin

- To use the SLA Mon agent, you must have an Avaya Diagnostic Server with SLA Mon technology in your network.

About this task

To configure the SLA Mon agent, you must assign an IP address and enable it. Remaining agent parameters are optional and you can operate the agent using the default values.

Note:

If you want to change SLA Mon parameters, you must first disable SLA Mon.

If you configure the SLA Mon agent address under an IP address for a VLAN or brouter, you must remove the SLA Mon address, before you can remove the IP address for the VLAN or brouter. To remove the SLA Mon address, first select disabled from the **Status** field, then configure the IP address in the **ConfiguredAgentAddr** field to 0.0.0.0.

Procedure

1. In the navigation pane, expand the **Configuration** > **Serviceability** folders.
2. Click **SLA Monitor**.
3. Click the **SLA Monitor** tab.
4. For the status, select **enabled**.
5. In the **ConfiguredAgentAddr** field, enter the SLA Mon agent IP address
6. Configure optional parameters as required.
7. Click **Apply**.

SLA Monitor field descriptions

Use the data in the following table to use the **SLA Monitor** tab.

Name	Description
Status	Enables or disables the SLA Mon agent. The default is disabled. If you disable the agent, it does not respond to discovery packets from a server. If you disable the agent because of resource concerns, consider changing the server configuration instead, to alter the test frequency or duration, or the number of targets.
CertFileInstallAction	Installs or uninstalls a Secure Sockets Layer (SSL) certificate file. The default is noAction.
CertFile	Specifies the file name and path of the SSL certificate. If you install a certificate on the SLA Mon agent, you must ensure a matching configuration on the server. By default, the agent uses an Avaya SIP certificate to secure communications with the server.
ConfiguredAgentAddrType	Specifies the address type of the agent: IPv4.
ConfiguredAgentAddr	Configures the agent IP address. You must configure the IP address before the agent can process received discovery packets from the server. The agent IP address is a mandatory parameter. The default value is 0.0.0.0.
ConfiguredAgentPort	Configures the UDP port for agent-server communication. The SLA Mon agent receives discovery packets on this port. The default is port 50011. The server must use the same port.
ConfiguredAgentVrfName	Specifies the name of a VRF.
ConfiguredServerAddrType	Specifies the address type of the server: IPv4.

Table continues…

Name	Description
ConfiguredServerAddr	Restricts the SLA Mon agent to use the server at this IP address only. If the default of 0.0.0.0 is used, then the SLA Mon agent can register with any server.
ConfiguredServerPort	Restricts the SLA Mon agent to use this registration port only. The default is 0, which means the agent disregards the source port information in server traffic. The server must use the same port.
ConfiguredAltServerAddrType	Specifies the address type of the secondary server: IPv4.
ConfiguredAltServerAddr	Configures a secondary server in the event that the primary server is unreachable.
ConfiguredAltServerPort	Restricts the SLA Mon agent to use this registration port on the secondary server only. The default is 0, which means the agent disregards the source port information in server traffic. The server must use the same port.
SupportedApps	Shows the type of testing supported: Real Time Protocol (RTP) and New Trace Route (NTR).
AgentAddressType	Shows the SLA Mon agent address type.
AgentAddress	Shows the configured SLA Mon agent IP address.
AgentPort	Shows the configured SLA Mon agent port.
RegisteredWithServer	Indicates if the SLA Mon agent has registered with a server.
RegisteredServerAddrType	Shows the address type for the registered server.
RegisteredServerAddr	Shows the IP address for the registered server.
RegisteredServerPort	Shows the port number for the registered server.
RegistrationTime	Shows the amount of time, in seconds, since the SLA Mon agent registered with the server.
AgentToAgentPort	Shows the port for SLA Mon agent-to-agent communication.
ConfiguredAgentToAgentPort	Configures the port used for RTP and NTR testing in SLA Mon agent-to-agent communication. The default port is 50012. If you configure this value as zero (0), the default port is used.

Chapter 11: MACsec performance

MACsec statistics

MAC Security (MACsec) is an IEEE 802® standard that allows authorized systems in a network to transmit data confidentially and to take measures against data transmitted or modified by unauthorized devices.

The switch supports the following statistics that provide a measure of MACsec performance.

Table 28: General MACsec statistics

Statistics	Description
TxUntaggedPkts	Specifies the number of transmitted packets without the MAC security tag (SecTAG), with MACsec disabled on the interface.
TxTooLongPkts	Specifies the number of transmitted packets discarded because the packet length is greater than the Maximum Transmission Unit (MTU) of the Common Port interface.
RxUntaggedPkts	Specifies the number of received packets without the MAC security tag (SecTAG), with MACsec *not* operating in strict mode.
RxNoTagPkts	Specifies the number of received packets without the MAC security tag (SecTAG), with MACsec operating in strict mode.
RxBadTagPkts	Specifies the number of received packets discarded with an invalid SecTAG or with a zero value Packet Number (PN)/invalid Integrity Check Value (ICV).
RxUnknownSCIPkts	Specifies the number of packets received with an unknown Secure Channel Identifier (SCI) and with MACsec *not* operating in strict mode.
RxNoSCIPkts	Specifies the number of packets received with an unknown Secure Channel Identifier (SCI) and with MACsec operating in strict mode.
RxOverrunPkts	Specifies the number of packets discarded because the number of received packets exceeded the cryptographic performance capabilities.

Table 29: Secure-channel inbound MACsec statistics

Statistics	Description
UnusedSAPkts	Specifies the summation of received unencrypted packets on all SAs of this secure channel, with MACsec *not* in strict mode.
NoUsingSAPkts	Specifies the summation of received packets that were discarded along with either encrypted packets or packets that were received with MACsec operating in strict mode.

Table continues…

Statistics	Description
LatePkts	Specifies the number of packets received that have been discarded for this Secure Channel (SC) with Replay Protect enabled. **Note:** The current release does not support Replay Protect.
NotValidPkts	Specifies the summation of packets that were discarded in all SAs of the SC because they were not valid with one of the following conditions: • MACsec was operating in strict mode • The packets received were encrypted but contained erroneous fields.
InvalidPkts	Specifies the summation of all packets received that were not valid for this SC, with MACsec operating in *check* mode.
DelayedPkts	Specifies the summation of packets for this SC, with the Packet Number (PN) of the packets lower than the lower bound replay protection PN. **Note:** The current release does not support Replay Protect.
UncheckedPkts	The total number of packets for this SC that: • were encrypted and had failed the integrity check • were *not* encrypted and had failed the integrity check • were received when MACsec validation was not enabled
OKPkts	Specifies the total number of valid packets for all SAs of this Secure Channel.
OctetsValidated	Specifies the number of octets of plaintext recovered from received packets that were integrity protected but not encrypted.
OctetsDecrypted	Specifies the number of octets of plaintext recovered from received packets that were integrity protected and encrypted.

Table 30: Secure-channel outbound MACsec statistics

Statistics	Description
ProtectedPkts	Specifies the number of integrity protected but not encrypted packets for this transmitting SC.
EncryptedPkts	Specifies the number of integrity protected and encrypted packets for this transmitting SC.
OctetsProtected	Specifies the number of plain text octets that are integrity protected but not encrypted on the transmitting SC.
OctetsEncrypted	Specifies the number of plain text octets that are integrity protected and encrypted on the transmitting SC.

Viewing MACsec statistics using the ACLI

Use the following procedure to view MAC Security (MACsec) statistics using ACLI.

Viewing MACsec statistics

Perform this procedure to view the MACsec statistics.

Procedure

1. Enter Privileged EXEC mode:

   `enable`

2. View the general MACsec statistics:

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

3. View the secure-channel inbound MACsec statistics:

   `show macsec statistics [{slot/port[/sub-port][-slot/port[/sub-port]][,...]}] secure-channel inbound`

4. View the secure-channel outbound MACsec statistics:

   `show macsec statistics [{slot/port[/sub-port][-slot/port[/sub-port]][,...]}] secure-channel outbound`

Example

Display general MACsec statistics, inbound MACsec statistics, and outbound MACsec statistics:

```
Switch:1>enable
Switch:1#show macsec statistics 1/49

=====================================================================
                             MACSEC Port Statistics
=====================================================================
        TxUntagged       TxTooLong       RxUntagged      RxNoTag
PortId   Packets          Packets         Packets        Packets
---------------------------------------------------------------------
1/49       0               0               0               0

          RxBadTag      RxUnknown       RxNoSCI       RxOverrun
PortId    Packets       SCIPackets      Packets        Packets
---------------------------------------------------------------------
1/49       0               0               0               0
```

```
Switch:1#show macsec statistics 1/49 secure-channel inbound

===========================================================================
                 MACSEC Port Inbound Secure Channel Statistics
===========================================================================
           UnusedSA     NoUsingSA       Late         NotValid      Invalid
PortId     Packets      Packets        Packets       Packets       Packets
---------------------------------------------------------------------------
```

```
1/49       0               0               0           100037        0

           Delayed     Unchecked        Ok         Octets          Octets
PortId     Packets      Packets       Pkts      Validated       Decrypted
---------------------------------------------------------------------------
1/49       0               0               0         53528828      0
```

```
Switch:1#show macsec statistics 1/49 secure-channel outbound

===========================================================================
                 MACSEC Port Outbound Secure Channel Statistics
===========================================================================
          Protected      Encrypted      Octets          Octets
PortId     Packets        Packets      Protected       Encrypted
---------------------------------------------------------------------------
1/49       0               99946           0               53434154
```

Viewing MACsec statistics using EDM

Use the following procedures to view MAC Security (MACsec) statistics using EDM.

Viewing MACsec interface statistics

Use this procedure to view the MACsec interface statistics using EDM.

Procedure

1. On the Device Physical View, select port 1/49 or 1/50.
2. In the navigation tree, expand the following folders: **Edit** > **Port** > **General**.
3. Click the **MacSec Interface Stats** tab.

   Note:

   Use the **Clear Stats** button to the clear MACsec interface statistics. The **Clear Stats** button is available to clear single-port as well as multiple-port MACsec interface statistics.

MacSec interface field descriptions

The following table describes the fields in the **MacSec Interface Stats** tab.

Field	Description
TxUntaggedPkts	Specifies the number of transmitted packets without the MAC security tag (SecTAG), with MACsec disabled on the interface.
TxTooLongPkts	Specifies the number of transmitted packets discarded because the packet length is greater than

Table continues…

Field	Description
	the maximum transmission unit (MTU) of the common port interface.
RxUntaggedPkts	Specifies the number of received packets without the MAC security tag (SecTAG), with MACsec *not* operating in strict mode.
RxNoTagPkts	Specifies the number of received packets without the MAC security tag (SecTAG), with MACsec operating in strict mode.
RxBadTagPkts	Specifies the number of received packets discarded with an invalid SecTAG, or with a zero value packet number (PN), or invalid Integrity Check Value (ICV).
RxUnknownSCIPkts	Specifies the number of packets received with an unknown secure channel identifier (SCI), and with MACsec *not* operating in strict mode.
RxNoSCIPkts	Specifies the number of packets received with an unknown secure channel identifier (SCI), and with MACsec operating in strict mode.
RxOverrunPkts	Specifies the number of packets discarded because the number of received packets exceeded the cryptographic performance capabilities.

Viewing secure channel (SC) inbound statistics

Use this procedure to view the secure channel (SC) inbound statistics using EDM.

Procedure

1. On the Device Physical View, select port 1/49 or 1/50.
2. In the navigation pane, expand the following folders: **Edit** > **Port** > **General**.
3. Click the **SC Inbound Stats** tab.

   Note:

   Use the **Clear Stats** button to the clear single-port secure channel inbound statistics. The **Clear Stats** button is not available to clear multiple-port secure channel inbound statistics.

SC Inbound Stats field descriptions

The following table describes the fields in the **SC Inbound Stats** tab.

Field	Description
UnusedSAPkts	Specifies the summary of received unencrypted packets on all SAs of this secure channel, with MACsec *not* in strict mode.
NoUsingSAPkts	Specifies the summary of received packets that were discarded along with either encrypted packets or packets that were received with MACsec operating in strict mode.
LatePkts	Specifies the number of packets received that have been discarded for this secure channel (SC) with Replay Protect enabled. **Note:** The current release does not support Replay Protect.
NotValidPkts	Specifies the summary of packets that were discarded in all SAs of the SC because they were not valid with one of the following conditions: • MACsec was operating in strict mode. • The packets received were encrypted but contained erroneous fields.
InvalidPkts	Specifies the summary of all packets received that were not valid for this SC, with MACsec operating in *check* mode.
DelayedPkts	Specifies the summary of packets for this SC, with the packet number (PN) of the packets lower than the lower bound replay protection PN. **Note:** The current release does not support Replay Protect.
UncheckedPkts	The total number of packets for this SC that: • Were encrypted and had failed the integrity check. • Were *not* encrypted and had failed the integrity check. • Were received when MACsec validation was not enabled.
OKPkts	Specifies the total number of valid packets for all SAs of this secure channel.
OctetsValidated	Specifies the number of octets of plaintext recovered from received packets that were integrity protected but not encrypted.

Table continues…

Field	Description
OctetsDecrypted	Specifies the number of octets of plaintext recovered from received packets that were integrity protected and encrypted.

Viewing secure channel (SC) outbound statistics

Use this procedure to view the secure channel (SC) outbound statistics using EDM.

Procedure

1. On the Device Physical View, select port 1/49 or 1/50.
2. In the navigation tree, expand the following folders: **Edit** > **Port** > **General**.
3. Click the **SC Outbound Stats** tab.

   Note:

   Use the **Clear Stats** button to the clear single-port secure channel outbound statistics. The **Clear Stats** button is not available to clear multiple-port secure channel outbound statistics.

SC Outbound Stats field descriptions

The following table describes the fields in the **SC Outbound Stats** tab.

Field	Description
ProtectedPkts	Specifies the number of integrity protected but not encrypted packets for this transmitting SC.
EncryptedPkts	Specifies the number of integrity protected and encrypted packets for this transmitting SC.
OctetsProtected	Specifies the number of plain text octets that are integrity protected but not encrypted on the transmitting SC.
OctetsEncrypted	Specifies the number of plain text octets that are integrity protected and encrypted on the transmitting SC.

Chapter 12: RMON alarm variables

RMON alarm variables are divided into three categories. Each category has subcategories.

The following table lists the alarm variable categories and provides a brief variable description.

RMON alarm variables

Table 31: 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 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.

Table continues…

Category	Subcategory	Variable	Definition
		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 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.

Table continues…

Category	Subcategory	Variable	Definition
		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 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

Table continues…

Category	Subcategory	Variable	Definition
			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 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.

Table continues…

Category	Subcategory	Variable	Definition
		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 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

Table continues…

Category	Subcategory	Variable	Definition
			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 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.

Table continues…

Category	Subcategory	Variable	Definition
		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 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

Table continues…

Category	Subcategory	Variable	Definition
			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.
	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.
		rip2ifStatRcvBadPackets	The number of routes in valid RIP packets that were ignored for any reason.
		rip2ifStatRcvBadRoutes	The number of RIP response packets received by the RIP process that were subsequently discarded for any reason.

Table continues…

Category	Subcategory	Variable	Definition
		rcStatOspfBufferAllocFailures.0	The number of times that OSPF failed to allocate buffers.
		rcStatOspfBufferFreeFailures.0	The number of times that OSPF failed to free buffers.
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.
		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.

Table continues…

Category	Subcategory	Variable	Definition
		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.
		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).

Table continues…

Category	Subcategory	Variable	Definition
		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.
	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.

Table continues…

Category	Subcategory	Variable	Definition
		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.
		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.

Table continues…

Category	Subcategory	Variable	Definition
		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.
		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

Table continues…

Category	Subcategory	Variable	Definition
			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 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.

Table continues…

Category	Subcategory	Variable	Definition
		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.
		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.

Table continues…

Category	Subcategory	Variable	Definition
		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 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	rcSysCpuUtil.0	Percentage of SF/CPU utilization.

Table continues…

Category	Subcategory	Variable	Definition
		rcSysSwitchFabricUtil.0	Percentage of switching fabric 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	Nonvolatile RAM (NVRAM) in use in kilobytes.
		rcSysLastChange.0	Last management-initiated configuration change since sysUpTime.
		rcSysLastVlanChange.0	Last management-initiated VLAN configuration change since sysUpTime.
		rcSysLastSaveToNVRam.0	SysUpTime of the last time the NVRAM on the SF/CPU board was written to.
		rcSysLastSaveToStandbyNVRam.0	SysUpTime of the last time the standby NVRAM (on the backup SF/CPU board) was written to.
	RIP	rip2GlobalRoute Changes.0	The number of changes made to the IP Route database by RIP.
		rip2GlobalQueries.0	The number of responses sent to RIP queries from other systems.
		rip2ifStatSentUpdates	The number of triggered RIP updates actually sent on this interface.
	OSPF	ospfExternLSACount.0	The number of external (LSA type 5) link-state advertisements in the link-state database.
		ospfOriginateNewLSAs.0	The number of new link-state advertisements that have originated. The number increments each time the router originates a new LSA.
		ospfrxNewLSAs.0	The number of link-state advertisements received determined to be new installations.
		ospfSpfRuns	Indicates the number of SPF calculations performed by OSPF.
		ospfAreaBdrRtrCount	The total number of area border routers reachable within this area.

Table continues…

Category	Subcategory	Variable	Definition
		ospfASBdrRtrCount	The total number of autonomous system border routers reachable within this area.
		ospfAreaLSACount	The total number of link-state advertisements in this area's link state database.
		ospfIfState	This signifies a change in the state of an OSPF virtual interface.
		ospfIfEvents	The number of times this OSPF interface changed the state or an error occurred.
		ospfVirtIfState	The state of the OSPF virtual link.
		ospfVirtIfEvents	The number of state changes or error events on this virtual link.
		ospfVirtNbrState	The state of the Virtual Neighbor Relationship.
		ospfVirtNbrEvents	The number of times this virtual link changed the state or an error occurred.
	Igmp	igmpInterfaceWrongVersions	The number of queries received whose IGMP version does not match. IGMP requires that all routers on the LAN are configured to run the same version of IGMP.
		igmpInterfaceJoins	The number of times a group membership was added on this interface.
		igmpInterfaceLeaves	The number of times a group membership was deleted on this interface.
	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.

Table continues…

Category	Subcategory	Variable	Definition
		rcStatMltIfExtnIfHCInOctets	The total number of octets received on this MLT interface 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.

Note:

In addition to these elements that are offered in a graphical way by EDM, you can manually set any valid OID in the variable field to be monitored by an alarm. For these cases, the name of the variable cannot be translated automatically in OID, the exact OID must be set as a sequence of numbers.