CONFIGURATION GUIDE

Ruckus FastIron Monitoring Configuration Guide, 08.0.61

Supporting FastIron Software Release 08.0.61

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Document Conventions

The following tables list the text and notice conventions that are used throughout this guide.

TABLE 1 Text conventions

Convention	Description	Example
`monospace`	Identifies command syntax examples.	`device(config)# interface ethernet 1/1/6`
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the **Start** menu, click **All Programs**.
italics	Publication titles	Refer to the *Ruckus Small Cell Release Notes* for more information

Notes, Cautions, and Warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE
A NOTE provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

CAUTION
A CAUTION statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

DANGER
A DANGER statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Command Syntax Conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
bold text	Identifies command names, keywords, and command options.
italic text	Identifies a variable.
[ ]	Syntax components displayed within square brackets are optional.
	Default responses to system prompts are enclosed in square brackets.
{ **x** | **y** | **z** }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x | **y**	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, *member*[*member*...].
\	Indicates a "soft" line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Document Feedback

Ruckus is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to Ruckus at: docs@ruckuswireless.com

When contacting us, please include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)
- For example:
  - Ruckus Small Cell Alarms Guide SC Release 1.3
  - Part number: 800-71306-001
  - Page 88

Ruckus Product Documentation Resources

Visit the Ruckus website to locate related documentation for your product and additional Ruckus resources.

Release Notes and other user documentation are available at https://support.ruckuswireless.com/documents. You can locate documentation by product or perform a text search. Access to Release Notes requires an active support contract and Ruckus Support Portal user account. Other technical documentation content is available without logging into the Ruckus Support Portal.

White papers, data sheets, and other product documentation are available at https://www.ruckuswireless.com.

Online Training Resources

To access a variety of online Ruckus training modules, including free introductory courses to wireless networking essentials, site surveys, and Ruckus products, visit the Ruckus Training Portal at https://training.ruckuswireless.com.

Contacting Ruckus Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their Ruckus Networks products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the Support Portal using https://support.ruckuswireless.com, or go to https://www.ruckuswireless.com and select **Support**.

What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Request for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, and Asia Pacific, toll-free numbers are available at https://support.ruckuswireless.com/contact-us and Live Chat is also available.

Self-Service Resources

The Support Portal at https://support.ruckuswireless.com/contact-us offers a number of tools to help you to research and resolve problems with your Ruckus products, including:

- Technical Documentation—https://support.ruckuswireless.com/documents
- Community Forums—https://forums.ruckuswireless.com/ruckuswireless/categories
- Knowledge Base Articles—https://support.ruckuswireless.com/answers

- Software Downloads and Release Notes—https://support.ruckuswireless.com/software
- Security Bulletins—https://support.ruckuswireless.com/security

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management

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Supported hardware

This guide supports the following product families:

- ICX 7150 Series
- ICX 7250 Series
- ICX 7450 Series
- ICX 7750 Series

For information about the specific models and modules supported in a product family, refer to the hardware installation guide for that product family.

What's new in this document

The following tables describe information added or modified in this guide for FastIron software release 8.0.61.

TABLE 2 Summary of enhancements in FastIron release 8.0.61

Feature	Description	Described in
DOM	Included features supporting ICX 7150 and updated the supported media types.	Digital Optical Monitoring on page 58
EEE	EEE is supported for ICX7450 and ICX7250 standalone, stacking and SPX environment as well.	Energy Efficient Ethernet on page 45
VCT	Virtual Cable Testing (VCT) is enhanced with 10M support for copper ports, with restrictions.	Virtual cable testing on page 55

How command information is presented in this guide

For all new content supported in FastIron release 08.0.20 and later, command information is documented in a standalone command reference guide.

In the *Ruckus FastIron Command Reference*, the command pages are in alphabetical order and follow a standard format to present syntax, parameters, mode, usage guidelines, examples, and command history.

NOTE
Many commands introduced before FastIron release 08.0.20 are also included in the guide.

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OAM Overview

For easy software image management, all Ruckus devices support the download and upload of software images between the flash modules on the devices and a Trivial File Transfer Protocol (TFTP) server on the network.

Ruckus devices have two flash memory modules:

- Primary flash - The default local storage device for image files and configuration files.
- Secondary flash - A second flash storage device. You can use the secondary flash to store redundant images for additional booting reliability or to preserve one software image while testing another one.

Only one flash device is active at a time. By default, the primary image will become active upon reload.

You can update the software contained on a flash module using TFTP to copy the update image from a TFTP server onto the flash module. In addition, you can copy software images and configuration files from a flash module to a TFTP server.

NOTE

Ruckus devices are TFTP clients but not TFTP servers. You must perform the TFTP transaction from the Ruckus device. You cannot "put" a file onto the Ruckus device using the interface of your TFTP server.

NOTE
If you are attempting to transfer a file using TFTP but have received an error message, refer to Diagnostic error codes and remedies for TFTP transfers on page 32.

Software versions installed and running on a device

Use the following methods to display the software versions running on the device and the versions installed in flash memory.

Determining the flash image version running on the device

To determine the flash image version running on a device, enter the **show version** command while in any mode of the CLI. Some examples are shown below.

Compact devices

To determine the flash image version running on a Compact device, enter the **show version** command while in any CLI mode. The following shows an example output.

```
device# show version
  Copyright (c) 1996-2015 Ruckus Networks. All rights
reserv                                                                    ed.
    UNIT 1: compiled on Aug 31 2015 at 04:56:36 labeled as SPR08040q017
      (24061724 bytes) from Secondary
        SW: Version 08.0.40q017T213
      Compressed Boot-Monitor Image size = 786944, Version:10.1.05T215
(spz10105                                                                   b008)
       Compiled on Thu Jul 16 06:27:06 2015

  HW: Stackable ICX7450-24
  Internal USB: Serial #: 9900614090900038
      Vendor: ATP Electronics, Total size = 1919 MB
==========================================================================
UNIT 1: SL 1: ICX7450-24 24-port Management Module
      Serial  #:CYT3346K035
      License: ICX7450_L3_SOFT_PACKAGE   (LID: eavIIJLmFIK)
      License Compliance: ICX7450-PREM-LIC-SW is Compliant
      P-ASIC  0: type B548, rev 01  Chip BCM56548_A0
==========================================================================
UNIT 1: SL 2: ICX7400-4X10GF 4-port 40G Module
      Serial  #:CYV3346K07G
==========================================================================
UNIT 1: SL 3: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3346K06F
==========================================================================
UNIT 1: SL 4: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3346K00A
==========================================================================
 1000 MHz ARM processor ARMv7 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
 2048 MB DRAM
STACKID 1  system uptime is 6 day(s) 5 hour(s) 36 minute(s) 29 second(s)
The system : started=cold start
```

The version information in this example:

- "SW: Version 08.0.40q017T213" indicates the flash code version number.

- "labeled as SPR08040q017" indicates the flash code image label. The label indicates the image type and version and is especially useful if you change the image file name.
- "Secondary SW: Version 08.0.40q017T213" indicates the flash code image file name that was loaded.

Displaying flash image version on chassis devices

To determine the flash image version running on a chassis device, enter the **show version** command while in any CLI mode. The following is an example output.

```
device#show version
==========================================================================
Active Management CPU [Slot-9]:
  SW: Version 07.4.00T3e3 Copyright (c) 1996-2012 Ruckus Networks. All rights reserved.
      Compiled on Mar 02 2012 at 11:54:29 labeled as SXR07400
      (4585331 bytes) Primary /GA/SXR07400.bin
      BootROM: Version 07.2.00T3e5 (FEv2)
      Chassis Serial  #: Bxxxxxxxxx
         License: SX_V6_HW_ROUTER_IPv6_SOFT_PACKAGE   (LID: yGFJGOiFLd)
  HW: Chassis FastIron SX 800-PREM6 (PROM-TYPE SX-FIL3U-6-IPV6)
==========================================================================
Standby Management CPU [Slot-10]:
  SW: Version 07.4.00T3e3 Copyright (c) 1996-2012 Ruckus Networks. All rights reserved.
      Compiled on Mar 02 2012 at 11:54:29 labeled as SXR07400
      BootROM: Version 07.2.00T3e5 (FEv2)
  HW: Chassis FastIron SX 800-PREM6 (PROM-TYPE SX-FIL3U-6-IPV6)
==========================================================================
SL 1: SX-FI-8XG 8-port 10G Fiber
      Serial  #: BQKxxxxxxxx
      P-ASIC  0: type C341, rev 00  subrev 00
==========================================================================
SL 2: SX-FI-24GPP 24-port Gig Copper + PoE+
      Serial  #: BTUxxxxxxxx
      P-ASIC  2: type C300, rev 00  subrev 00
==========================================================================
SL 8: SX-FI-48GPP 48-port Gig Copper + PoE+
      Serial  #: BFVxxxxxxxx
      P-ASIC 14: type C300, rev 00  subrev 00
==========================================================================
SL 9: SX-FIZMR6 0-port Management
      Serial  #: Wxxxxxxxxx
         License: SX_V6_HW_ROUTER_IPv6_SOFT_PACKAGE   (LID: yGFJGOiFLd)
==========================================================================
SL 10: SX-FIZMR6 0-port Management
      Serial  #: Wxxxxxxxxx
         License: SX_V6_HW_ROUTER_IPv6_SOFT_PACKAGE   (LID: ÿÿÿÿÿÿÿÿÿÿ)
==========================================================================
Active Management Module:
  660 MHz Power PC processor 8541 (version 0020/0020) 66 MHz bus
  512 KB boot flash memory
16384 KB code flash memory
  512 MB DRAM
Standby Management Module:
  660 MHz Power PC processor 8541 (version 0020/0020) 66 MHz bus
  512 KB boot flash memory
16384 KB code flash memory
  512 MB DRAM
The system uptime is 1 minutes 2 seconds
The system : started=warm start   reloaded=by "reload"
```

The version information in this example:

- "03.1.00aT3e3" indicates the flash code version number. The "T3e3" is used by Ruckus for record keeping.
- "labeled as SXR03100a" indicates the flash code image label. The label indicates the image type and version and is especially useful if you change the image file name.
- "Primary SXR03100a.bin" indicates the flash code image file name that was loaded.

Displaying the boot image version running on the device

To determine the boot image running on a device, enter the **show flash** command while in any CLI mode. The following shows an example output.

```
device# show flash
Active Management Module (Slot 9):
Compressed Pri Code size = 3613675, Version 03.1.00aT3e3 (sxr03100a.bin)
Compressed Sec Code size = 2250218, Version 03.1.00aT3e1 (sxs03100a.bin)
Compressed BootROM Code size = 524288, Version 03.0.01T3e5
Code Flash Free Space = 9699328
Standby Management Module (Slot 10):
Compressed Pri Code size = 3613675, Version 03.1.00aT3e3 (sxr03100a.bin)
Compressed Sec Code size = 2250218, Version 03.1.00aT3e1 (sxs03100a.bin)
Compressed BootROM Code size = 524288, Version 03.0.01T3e5
Code Flash Free Space = 524288
```

Displaying the image versions installed in flash memory

Enter the **show flash** command to display the boot and flash images installed on the device. An example of the command output is shown in Displaying the boot image version running on the device on page 18:

- The "Compressed Pri Code size" line lists the flash code version installed in the primary flash area.
- The "Compressed Sec Code size" line lists the flash code version installed in the secondary flash area.
- The "Boot Monitor Image size" line lists the boot code version installed in flash memory. The device does not have separate primary and secondary flash areas for the boot image. The flash memory module contains only one boot image.

  NOTE
  To minimize the boot-monitor image size on FastIron devices, the **ping** and **tftp** operations performed in the boot-monitor mode are restricted to copper ports on the FastIron Chassis management modules and to the out-of-band management port on the FastIron stackable switches. The other copper or fiber ports on these devices do not have the ability to ping or tftp from the boot-monitor mode.

Flash image verification

The Flash Image Verification feature allows you to verify boot images based on hash codes, and to generate hash codes where needed. This feature lets you select from three data integrity verification algorithms:

- MD5 - Message Digest algorithm (RFC 1321)
- **SHA1** - US Secure Hash Algorithm (RFC 3174)
- CRC - Cyclic Redundancy Checksum algorithm

Flash image CLI commands

The following examples show how the **verify** command can be used in a variety of circumstances.

To generate an MD5 hash value for the secondary image, enter the following command.

```
device# verify md5 secondary
device#.........................Done
Size = 2044830, MD5 01c410d6d153189a4a5d36c955653862
```

To generate a SHA-1 hash value for the secondary image, enter the following command.

```
device# verify sha secondary
device#.........................Done
Size = 2044830, SHA1 49d12d26552072337f7f5fcaef4cf4b742a9f525
```

To generate a CRC32 hash value for the secondary image, enter the following command.

```
device# verify crc32 secondary
device#.........................Done
Size = 2044830, CRC32 b31fcbc0
```

To verify the hash value of a secondary image with a known value, enter the following commands.

```
device# verify md5 secondary 01c410d6d153189a4a5d36c955653861
device#.........................Done
Size = 2044830, MD5 01c410d6d153189a4a5d36c955653862
Verification FAILED.
```

In the previous example, the codes did not match, and verification failed. If verification succeeds, the output will look like this.

```
device# verify md5 secondary 01c410d6d153189a4a5d36c955653861
device#.........................Done
Size = 2044830, MD5 01c410d6d153189a4a5d36c955653861
Verification SUCEEDED.
```

The following examples show this process for SHA-1 and CRC32 algorithms.

```
device# verify sha secondary 49d12d26552072337f7f5fcaef4cf4b742a9f525
device#.........................Done
Size = 2044830, sha 49d12d26552072337f7f5fcaef4cf4b742a9f525
Verification SUCCEEDED.
```

and

```
device# verify crc32 secondary b31fcbc0
device#.........................Done
Size = 2044830, CRC32 b31fcbc0
Verification SUCCEEDED.
```

Software Image file types

This section lists the boot and flash image file types supported and how to install them on the FastIron ICX family of switches. For information about a specific version of code, refer to the release notes.

NOTE
The boot images are applicable to the listed devices only and are not interchangeable.

TABLE 3 Software image files

Product	Boot image	Flash image
ICX 7250 ICX 7450	spzxxxxx.bin	SPSxxxxx.bin (Layer 2) or SPRxxxxx.bin (Layer 3)
ICX 7750	swzxxxxx.bin	SWSxxxxx.bin (Layer 2) or SWRxxxxx.bin (Layer 3)

Flash timeout

The operations that require access to the flash device are expected to be completed within the default flash timeout value of 12 minutes.

If the operations exceed the timeout value, the flash device is locked and further flash operations cannot be processed. To facilitate prolonged flash operations without the device being locked, you can manually configure the flash timeout for a longer duration using the **flash-timeout** command. You can configure the flash timeout to a value from 12 through 60 minutes. The new timeout value is applicable for all flash operations and will be effective from the next flash operation.

Software upgrades

For instructions about upgrading the software, refer to the *Ruckus FastIron Software Upgrade Guide*.

Boot code synchronization feature

The Ruckus device supports automatic synchronization of the boot image in the active and redundant management modules. When the new boot image is copied into the active module, it is automatically synchronized with the redundant management module.

NOTE
There is currently no option for manual synchronization of the boot image.

To activate the boot synchronization process, enter the following command.

```
device#copy tftp flash 10.20.65.194 /GA/SXZ07200.bin bootrom
```

The system responds with the following message.

```
device#Load to buffer (8192 bytes per dot)
..................Write to boot flash.....................
TFTP to Flash Done.
device#Synchronizing with standby module...
Boot image synchronization done.
```

Viewing the contents of flash files

To display a list of files stored in flash memory, enter the **show files** command at the device prompt.

```
device# show files
Type       Size   Name
----------------------
F        24018046 primary
F        24018046 secondary
F             520 startup-config.backup
F             610 startup-config.txt

48037222 bytes 4 File(s) in FI root

     1768706048 bytes free in FI root
     1768706048 bytes free in /
```

Using SNMP to upgrade software

You can use a third-party SNMP management application such as HP OpenView to upgrade software on a Ruckus device.

NOTE
The syntax shown in this section assumes that you have installed HP OpenView in the "/usr" directory.

NOTE
Ruckus recommends that you make a backup copy of the startup-config file before you upgrade the software. If you need to run an older release, you will need to use the backup copy of the startup-config file.

1. Configure a read-write community string on the Ruckus device, if one is not already configured. To configure a read-write community string, enter the following command from the global configuration mode of the CLI.**snmp-server community** string **ro | rw** where *string* is the community string and can be up to 32 characters long.
2. On the Ruckus device, enter the following command from the global configuration mode of the CLI.

   no snmp-server pw-check

   This command disables password checking for SNMP set requests. If a third-party SNMP management application does not add a password to the password field when it sends SNMP set requests to a Ruckus device, by default the Ruckus device rejects the request.
3. From the command prompt in the UNIX shell, enter the following command.

   /usr/OV/bin/snmpset -c rw-community-string brcd-ip-addr **1.3.6.1.4.1.1991.1.1.2.1.5.0 ipaddress** tftp-ip-addr **1.3.6.1.4.1.1991.1.1.2.1.6.0 octetstringascii** file-name **1.3.6.1.4.1.1991.1.1.2.1.7.0 integer** command-integer

   where

   rw-community-string is a read-write community string configured on the Ruckus device.

   brcd-ip-addr is the IP address of the Ruckus device.

   tftp-ip-addr is the TFTP server IP address.

   file-name is the image file name.

   command-integer is one of the following.

   20 - Download the flash code into the primary flash area.

   22 - Download the flash code into the secondary flash area.

Software reboot

You can use boot commands to immediately initiate software boots from a software image stored in primary or secondary flash on a Ruckus device or from a BootP or TFTP server. You can test new versions of code on a Ruckus device or choose the preferred boot source from the console boot prompt without requiring a system reset.

NOTE
It is very important that you verify a successful TFTP transfer of the boot code before you reset the system. If the boot code is not transferred successfully but you try to reset the system, the system will not have the boot code with which to successfully boot.

By default, the Ruckus device first attempts to boot from the image stored in its primary flash, then its secondary flash, and then from a TFTP server. You can modify this booting sequence from the global configuration mode of the CLI using the **boot system** command.

To initiate an immediate boot from the CLI, enter one of the **boot system** commands.

NOTE
When using the **boot system tftp** command, the IP address of the device and the TFTP server should be in the same subnet.

Software boot configuration notes

- If you are booting the device from a TFTP server through a fiber connection, use the following command: **boot system tftp** ip-address filename **fiber-port** .
- The **boot system tftp** command is not supported in a stacking environment.

Displaying the boot preference

Use the **show boot-preference** command to display the boot sequence in the startup config and running config files. The boot sequence displayed is also identified as either user-configured or the default.

The following example shows the default boot sequence preference.

```
device# show boot-preference
Boot system preference(Configured):
        Boot system flash secondary
Boot system preference(Default):
        Boot system flash primary
        Boot system flash secondary
```

The results of the **show run** command for the example above appear as follows.

```
device# show run
Current configuration:
!
ver 08.0.40q042T213
!
stack unit 1
  module 1 icx7450-24-port-management-module
  module 2 icx7400-xgf-4port-40g-module
  module 3 icx7400-qsfp-1port-40g-module
  module 4 icx7400-qsfp-1port-40g-module
!
monitor-profile 1 type erspan
destination-ip 2.2.2.2
source-ip 1.1.1.1
!
monitor-profile 2 type erspan
destination-ip 2.2.2.2
source-ip 1.1.1.1
!
monitor-profile 3 type erspan
!
monitor-profile 4 type erspan
!
vlan 1 name DEFAULT-VLAN by port
!
vlan 10 by port
 tagged ethe 1/4/1
 router-interface ve 10
 multicast6 passive
```

```
 multicast6 pimsm-snooping
!
vlan 100 by port
 tagged ethe 1/1/1
 router-interface ve 100
!
system-max gre-tunnels 24
!
vrf vrf1
 rd 1:11
exit-vrf
!
vrf blue
 rd 1:1
exit-vrf
!
vrf vrf0
exit-vrf
!
vrf 0
exit-vrf
!
vrf v1
 rd 1:5
exit-vrf
!
buffer-sharing-full
!
priority-flow-control enable
optical-monitor 4000
boot sys fl sec
enable telnet authentication
ip dns domain-list englab.ruckus.com
ip dns server-address 10.x.x.x
ip show-service-number-in-log
ip route 0.0.0.0/0 10.xx.xx.xx distance 254
ip multicast passive
!
ipv6 multicast passive
telnet server enable vlan 10
!
batch buffer 1 c
gvrp-enable
hello-interval
host-max-num
c
!
dot1x-mka-enable
!
ip multicast-debug-mode
ip multicast-routing
ip multicast-routing rpf-check mac-movement
!
router pim
!
!
ipv6 router pim
!
interface management 1
 ip address 10.xxx.xxx.xxx 255.255.255.0 dynamic
!
interface ethernet 1/1/1
 port-name ERSPAN
 dual-mode
 mon profile 1 both
 unknown-unicast limit 3 kbps
 port security
  age 2 absolute
!
interface ethernet 1/1/2
 ip address 1.1.1.1 255.255.255.0
 ip address 2.2.2.2 255.255.255.0
```

```
!
interface ve 10
!
interface ve 100
!
router msdp
 sa-filter originate route-map w2
!
end
```

Loading and saving configuration files

For easy configuration management, all Ruckus devices support both the download and upload of configuration files between the devices and a TFTP server on the network.

You can upload either the startup configuration file or the running configuration file to the TFTP server for backup and use in booting the system:

- Startup configuration file - This file contains the configuration information that is currently saved in flash. To display this file, enter the **show configuration** command at any CLI prompt.
- Running configuration file - This file contains the configuration active in the system RAM but not yet saved to flash. These changes could represent a short-term requirement or general configuration change. To display this file, enter the **show running-config** or **write terminal** command at any CLI prompt.

Each device can have one startup configuration file and one running configuration file. The startup configuration file is shared by both flash modules. The running configuration file resides in DRAM.

When you load the startup-config file, the CLI parses the file three times.

1. During the first pass, the parser searches for **system-max** commands. A **system-max** command changes the size of statically configured memory.
2. During the second pass, the parser implements the **system-max** commands if present and also implements trunk configuration commands (**trunk** command) if present.
3. During the third pass, the parser implements the remaining commands.

Replacing the startup configuration with the running configuration

After you make configuration changes to the active system, you can save those changes by writing them to flash memory. When you write configuration changes to flash memory, you replace the startup configuration with the running configuration.

To replace the startup configuration with the running configuration, enter the following command at any enable or configuration command prompt.

```
device# write memory
```

NOTE
To return the unit to the default startup configuration, use the **delete startup-config** command.

Replacing the running configuration with the startup configuration

If you want to back out of the changes you have made to the running configuration and return to the startup configuration, enter the following command from the privileged exec mode of the CLI.

```
device# reload
```

Logging changes to the startup-config file

You can configure a Ruckus device to generate a Syslog message when the startup-config file is changed. The trap is enabled by default.

The following Syslog message is generated when the startup-config file is changed.

```
startup-config was changed
```

If the startup-config file was modified by a valid user, the following Syslog message is generated.

```
startup-config was changed by
username
```

To disable or re-enable Syslog messages when the startup-config file is changed, use the following command.

```
device# [no] logging enable config-changed
```

Copying a configuration file to or from a TFTP server

To copy the startup-config or running-config file to or from a TFTP server, use the following method.

NOTE
For details about the **copy** command used with IPv6, refer to Using the IPv6 copy command on page 28.

NOTE
You can name the configuration file when you copy it to a TFTP server. However, when you copy a configuration file from the server to a Ruckus device, the file is always copied as "startup-config" or "running-config", depending on which type of file you saved to the server.

To initiate transfers of configuration files to or from a TFTP server using the CLI, enter one of the following commands:

- **copy startup-config tftp tftp-ip-addr filename** - Use this command to upload a copy of the startup configuration file from the Layer 2 Switch or Layer 3 Switch to a TFTP server.
- **copy running-config tftp tftp-ip-addr filename** - Use this command to upload a copy of the running configuration file from the Layer 2 Switch or Layer 3 Switch to a TFTP server.
- **copy tftp startup-config tftp-ip-addr filename** - Use this command to download a copy of the startup configuration file from a TFTP server to a Layer 2 Switch or Layer 3 Switch.

NOTE
It is recommended to use a script or the **copy running-config tftp** command for extensive configuration. You should not copy-paste configuration with more than 2000 characters into CLI.

Dynamic configuration loading

You can load dynamic configuration commands (commands that do not require a reload to take effect) from a file on a TFTP server into the running-config on the Ruckus device. You can make configuration changes off-line, then load the changes directly into the device running-config, without reloading the software.

Dynamic configuration usage considerations

- Use this feature only to load configuration information that does not require a software reload to take effect. For example, you cannot use this feature to change statically configured memory (**system-max** command) or to enter trunk group configuration information into the running-config.

- Do not use this feature if you have deleted a trunk group but have not yet placed the changes into effect by saving the configuration and then reloading. When you delete a trunk group, the command to configure the trunk group is removed from the device running-config, but the trunk group remains active. To finish deleting a trunk group, save the configuration (to the startup-config file), then reload the software. After you reload the software, then you can load the configuration from the file.
- Do not load port configuration information for member ports in a trunk group. Since all ports in a trunk group use the port configuration settings of the LAG virtual interface in the group, the software cannot implement the changes to the member port.

Preparing the configuration file

A configuration file that you create must follow the same syntax rules as the startup-config file the device creates.

- The configuration file is a script containing CLI configuration commands. The CLI reacts to each command entered from the file in the same way the CLI reacts to the command if you enter it. For example, if the command results in an error message or a change to the CLI configuration mode, the software responds by displaying the message or changing the CLI mode.
- The software retains the running-config that is currently on the device, and changes the running-config only by adding new commands from the configuration file. If the running config already contains a command that is also in the configuration file you are loading, the CLI rejects the new command as a duplicate and displays an error message. For example, if the running-config already contains a a command that configures ACL 1, the software rejects ACL 1 in the configuration file, and displays a message that ACL 1 is already configured.
- The file can contain global configuration commands or configuration commands for interfaces, routing protocols, and so on. You cannot enter User exec or privileged exec commands.
- The default CLI configuration mode in a configuration file is the global configuration model. Thus, the first command in the file must be a global configuration command or " ! ". The ! (exclamation point) character means "return to the global configuration mode".

  NOTE
  You can enter text following " ! " as a comment. However, the " !" is not a comment marker. It returns the CLI to the global configuration mode.

  NOTE
  If you copy-and-paste a configuration into a management session, the CLI ignores the " ! " instead of changing the CLI to the global configuration mode. As a result, you might get different results if you copy-and-paste a configuration instead of loading the configuration using TFTP.

- Make sure you enter each command in the correct CLI mode. Since some commands have identical forms at both the global configuration mode and individual configuration modes, if the CLI response to the configuration file results in the CLI entering a configuration mode you did not intend, then you can get unexpected results.

For example, if a trunk group is active on the device, and the configuration file contains a command to disable STP on one of the secondary ports in the trunk group, the CLI rejects the commands to enter the interface configuration mode for the port and moves on to the next command in the file you are loading. If the next command is a spanning-tree command whose syntax is valid at the global mode as well as the interface configuration mode, then the software applies the command globally. Here is an example.

The configuration file contains these commands.

```
interface ethernet 1/1/2
no spanning-tree
```

The CLI responds like this.

```
device(config)# interface ethernet 1/1/2
Error - cannot configure secondary ports of a trunk
device(config)# no spanning-tree
device(config)#
```

- If the file contains commands that must be entered in a specific order, the commands must appear in the file in the required order. For example, if you want to use the file to replace an IP address on an interface, you must first remove the old address using "no" in front of the **ip address** command, then add the new address. Otherwise, the CLI displays an error message and does not implement the command. Here is an example.

The configuration file contains these commands.

```
interface ethernet 1/1/2
ip address 10.10.10.10/24
```

The running-config already has a command to add an address to port 1/1/2, so the CLI responds like this.

```
device(config)# interface ethernet 1/1/2
device(config-if-e1000-11)# ip add 10.10.10.10/24
Error: can only assign one primary ip address per subnet
device(config-if-e1000-1/1/2)#
```

To successfully replace the address, enter commands into the file as follows.

```
interface ethernet 1/1/2
no ip address 10.20.20.20/24
ip address 10.10.10.10/24
```

This time, the CLI accepts the command, and no error message is displayed.

```
device(config)# interface ethernet 1/1/2
device(config-if-e1000-1/1/2)# no ip add 10.20.20.20/24
device(config-if-e1000-1/1/2)# ip add 10.10.10.10/24
device(config-if-e1000-1/1/2)#
```

- Always use the **end** command at the end of the file. The **end** command must appear on the last line of the file, by itself.

Loading the configuration information into the running-config

To load the file from a TFTP server, use the following command:

copy tftp running-config *ip-addr filename*

> **NOTE**
> In the current FastIron release, the **copy tftp running-config** command merges only the access-lists and mac-filters configuration from the configuration file on the TFTP server to the running configuration on the device.

> **NOTE**
> If you are loading a configuration file that uses a truncated form of the CLI command **access-list** , the software will not go into batch mode.

For example, the following command line *will initiate* batch mode.

```
access-list 131 permit host pc1 host pc2
```

The following command line *will not* initiate batch mode.

```
acc 131 permit host pc1 host pc2
```

Maximum file sizes for startup-config file and running-config

Each Ruckus device has a maximum allowable size for the running-config and the startup-config file. If you use TFTP to load additional information into a device running-config or startup-config file, it is possible to exceed the maximum allowable size. If this occurs, you will not be able to save the configuration changes.

The maximum size for the running-config and the startup-config file is 640K each.

To determine the size of a running-config or startup-config file, copy it to a TFTP server, then use the directory services on the server to list the size of the copied file. To copy the running-config or startup-config file to a TFTP server, use the following commands:

- Command to copy the running-config to a TFTP server:
  - **copy running-config tftp** *ip-addr filename*
- Command to copy the startup-config file to a TFTP server:
  - **copy startup-config tftp** *ip-addr filename*

Loading and saving configuration files with IPv6

This section describes the IPv6 **copy** command.

Using the IPv6 copy command

The **copy** command for IPv6 allows you to do the following:

- Copy a file from a specified source to an IPv6 TFTP server
- Copy a file from an IPv6 TFTP server to a specified destination

Copying a file to an IPv6 TFTP server

You can copy a file from the following sources to an IPv6 TFTP server:

- Flash memory
- Running configuration
- Startup configuration

Copying a file from flash memory

For example, to copy the primary or secondary boot image from the device flash memory to an IPv6 TFTP server, enter a command such as the following.

```
device# copy flash tftp 2001:DB8:e0ff:7837::3 test.img secondary
```

This command copies the secondary boot image named test.img from flash memory to a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3.

Copying a file from the running or startup configuration

For example, to copy the running configuration to an IPv6 TFTP server, enter a command such as the following.

```
device# copy running-config tftp 2001:DB8:e0ff:7837::3 newrun.cfg
```

This command copies the running configuration to a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3 and names the file on the TFTP server newrun.cfg.

Copying a file from an IPv6 TFTP server

You can copy a file from an IPv6 TFTP server to the following destinations:

- Flash memory
- Running configuration
- Startup configuration

Copying a file to flash memory

For example, to copy a boot image from an IPv6 TFTP server to the primary or secondary storage location in the device flash memory, enter a command such as the following.

```
device# copy tftp flash 2001:DB8:e0ff:7837::3 test.img secondary
```

This command copies a boot image named test.img from an IPv6 TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3 to the secondary storage location in the device flash memory.

Copying a file to the running or startup configuration

For example, to copy a configuration file from an IPv6 TFTP server to the running or startup configuration, enter a command such as the following.

```
device# copy tftp running-config 2001:DB8:e0ff:7837::3 newrun.cfg overwrite
```

This command copies the newrun.cfg file from the IPv6 TFTP server and overwrites the running configuration file with the contents of newrun.cfg.

> **NOTE**
> To activate this configuration, you must reload (reset) the device.

IPv6 copy command

The **copy** command for IPv6 allows you to do the following:

- Copy a primary or secondary boot image from flash memory to an IPv6 TFTP server.
- Copy the running configuration to an IPv6 TFTP server.
- Copy the startup configuration to an IPv6 TFTP server
- Upload various files from an IPv6 TFTP server.

Copying a primary or secondary boot Image from flash memory to an IPv6 TFTP server

For example, to copy the primary or secondary boot image from the device flash memory to an IPv6 TFTP server, enter a command such as the following.

```
device# copy flash primary tftp 2001:DB8:e0ff:7837::3 primary.img
```

This command copies the primary boot image named primary.img from flash memory to a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3.

Copying the running or startup configuration to an IPv6 TFTP server

For example, to copy a device running or startup configuration to an IPv6 TFTP server, enter a command such as the following.

```
device# copy running-config tftp 2001:DB8:e0ff:7837::3 bakrun.cfg
```

This command copies a device running configuration to a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3 and names the destination file bakrun.cfg.

IPv6 TFTP server file upload

You can upload the following files from an IPv6 TFTP server:

- Primary boot image.
- Secondary boot image.
- Running configuration.
- Startup configuration.

Uploading a primary or secondary boot image from an IPv6 TFTP server

For example, to upload a primary or secondary boot image from an IPv6 TFTP server to a device flash memory, enter a command such as the following.

```
device# copy tftp 2001:DB8:e0ff:7837::3 primary.img flash primary
```

This command uploads the primary boot image named primary.img from a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3 to the device primary storage location in flash memory.

Uploading a running or startup configuration from an IPv6 TFTP server

For example to upload a running or startup configuration from an IPv6 TFTP server to a device, enter a command such as the following.

```
device# copy tftp 2001:DB8:e0ff:7837::3 newrun.cfg running-config
```

This command uploads a file named newrun.cfg from a TFTP server with the IPv6 address of 2001:DB8:e0ff:7837::3 to the device.

Using SNMP to save and load configuration information

You can use a third-party SNMP management application such as HP OpenView to save and load a configuration on a Ruckus device. To save and load configuration information using HP OpenView, use the following procedure.

NOTE
The syntax shown in this section assumes that you have installed HP OpenView in the `/usr` directory.

1. Configure a read-write community string on the device, if one is not already configured. To configure a read-write community string, enter the following command from the global configuration mode of the CLI.

```
device(config)# snmp-server community community_string rw
```

2. On the device, enter the following command from the global configuration mode of the CLI.

```
device(config)# no snmp-server pw-check
```

This command disables password checking for SNMP set requests. If a third-party SNMP management application does not add a password to the password field when it sends SNMP set requests to a device, by default the device rejects the request.

3. From the command prompt in the UNIX shell, enter the following command.

```
unix-shell> /usr/OV/bin/snmpset - rw-community-string device-ip-addr c
1.3.6.1.4.1.1991.1.1.2.1.5.0 a tftp-ip-addr 1.3.6.1.4.1.1991.1.1.2.1.8.0 s
config-file-name 1.3.6.1.4.1.1991.1.1.2.1.9.0 integer command-integer
```

Where

rw-community-string is a read-write community string configured on the Ruckus device.

fdry-ip-addr is the IP address of the Ruckus device.

tftp-ip-addr is the TFTP server IP address.

config-file-name is the configuration file name.

command-integer is one of the following:

- **20** — Upload the startup-config file from the flash memory of the device to the TFTP server.
- **21** — Download a startup-config file from a TFTP server to the flash memory of the Ruckus device.
- **22** — Upload the running-config from the flash memory of the Ruckus device to the TFTP server.
- **23** — Download a configuration file from a TFTP server into the running-config of the Ruckus device.

NOTE
Option **23** adds configuration information to the running-config on the device, and does not replace commands. If you want to replace configuration information in the device, use "no" forms of the configuration commands to remove the configuration information, then use configuration commands to create the configuration information you want. Follow the guidelines in Dynamic configuration loading on page 25.

Erasing image and configuration files

To erase software images or configuration files, use the commands described below. These commands are valid from the privileged exec mode of the CLI:

- **erase flash primary** erases the image stored in primary flash of the system.
- **erase flash secondary** erases the image stored in secondary flash of the system.
- **erase startup-config** erases the configuration stored in the startup configuration file; however, the running configuration remains intact until system reboot.

System reload scheduling

In addition to reloading the system manually, you can configure the Ruckus device to reload itself at a specific time or after a specific amount of time has passed.

NOTE
The scheduled reload feature requires the system clock. Refer to the NTP version 4 documentation at http://doc.ntp.org/4.2.2/release.html.

Reloading at a specific time

To schedule a system reload for a specific time, use the **reload at** command. For example, to schedule a system reload from the primary flash module for 6:00:00 AM, December 1, 2015, enter the following command from the global configuration mode of the CLI.

```
device# reload at 06:00:00 12-01-15
```

Reloading after a specific amount of time

To schedule a system reload to occur after a specific amount of time has passed on the system clock, use **reload after** command. For example, to schedule a system reload from the secondary flash one day and 12 hours later, enter the following command from the global configuration mode of the CLI.

```
device# reload after 01:12:00 secondary
```

Displaying the amount of time remaining before a scheduled reload

To display how much time is remaining before a scheduled system reload, enter the following command from any mode of the CLI.

```
device# show reload
```

Canceling a scheduled reload

To cancel a scheduled system reload using the CLI, enter the following command from the global configuration mode of the CLI.

```
device# reload cancel
```

Diagnostic error codes and remedies for TFTP transfers

This section describes the error messages associated with TFTP transfer of configuration files, software images or flash images to or from a Ruckus device.

Error code	Message	Explanation and action
1	Flash read preparation failed.	A flash error occurred during the download. Retry the download. If it fails again, contact customer support.
2	Flash read failed.	
3	Flash write preparation failed.	
4	Flash write failed.	
5	TFTP session timeout.	TFTP failed because of a time out. Check IP connectivity and make sure the TFTP server is running.

Error code	Message	Explanation and action
6	TFTP out of buffer space.	The file is larger than the amount of room on the device or TFTP server. If you are copying an image file to flash, first copy the other image to your TFTP server, then delete it from flash. (Use the **erase flash** ... CLI command from the privileged exec model to erase the image in the flash.) If you are copying a configuration file to flash, edit the file to remove unnecessary information, then try again.
7	TFTP busy, only one TFTP session can be active.	Another TFTP transfer is active on another CLI session, or Web management session, or network management system. Wait, then retry the transfer.
8	File type check failed.	You accidentally attempted to copy the incorrect image code into the system. For example, you might have tried to copy a Chassis image into a Compact device. Retry the transfer using the correct image.
16	TFTP remote - general error.	The TFTP configuration has an error. The specific error message describes the error. Correct the error, then retry the transfer.
17	TFTP remote - no such file.	
18	TFTP remote - access violation.	
19	TFTP remote - disk full.	
20	TFTP remote - illegal operation.	
21	TFTP remote - unknown transfer ID.	
22	TFTP remote - file already exists.	
23	TFTP remote - no such user.	

This section describes the error messages associated with the TFTP transfer of PoE firmware file to a Ruckus device.

Message	Explanation and action
Firmware TFTP timeout.	TFTP failed because of a time out. Check IP connectivity and make sure the TFTP server is running.
Firmware is not valid for this platform.	Each Power over Ethernet (PoE) firmware file delivered by Ruckus is meant to be used on the specific platform only. If the file is used on a platform for which it is not meant, then this error message will display. Download the correct file, then retry the transfer.
Firmware is not valid for the IEEE 802.3at (PoE-Plus) controller type.	Each PoE firmware file delivered by Ruckus is meant to be used on the specific platform only. If the file is used on a platform for which it is not meant, then this error message will display. Download the correct file, then retry the transfer.
Firmware is not valid for the IEEE 802.3af PoE controller type.	
Firmware type cannot be detected from the firmware content.	Each PoE firmware file delivered by Ruckus is meant to be used on the specific platform and the specific PoE controller on the specified module. If the file is used for a platform for which it is meant, but the PoE controller is not same then this error message will display. Download the correct file, then retry the transfer.
TFTP File not Valid for PoE Controller Type.	

Message	Explanation and action
Firmware TFTP remote file access failed.	The TFTP server needs read access on the PoE firmware file. Check the permissions on the file, then try again.

Network connectivity testing

After you install the network cables, you can test network connectivity to other devices by pinging those devices. You also can observe the LEDs related to network connection and perform trace routes.

For more information about observing LEDs, refer to the appropriate Hardware Installation Guide.

Pinging an IPv4 address

NOTE
This section describes the IPv4 **ping** command. For details about IPv6 **ping** command, refer to the *Ruckus FastIron Layer 3 Routing Configuration Guide*.

To verify that a Ruckus device can reach another device through the network, enter a command such as the following from any mode of the CLI on the Ruckus device:

```
device# ping 10.33.4.7
```

NOTE
If the device is a Ruckus Layer 2 Switch or Layer 3 Switch, you can use the host name only if you have already enabled the Domain Name Server (DNS) resolver feature on the device from which you are sending the ping.

Tracing an IPv4 route

NOTE
This section describes the IPv4 **traceroute** command. For details about IPv6 **traceroute** command, refer to the *Ruckus FastIron Layer 3 Routing Configuration Guide*.

Use the **traceroute** command to determine the path through which a Ruckus device can reach another device. Enter the command from any mode of the CLI.

The CLI displays trace route information for each hop as soon as the information is received. Traceroute requests display all responses to a given TTL. In addition, if there are multiple equal-cost routes to the destination, the Ruckus device displays up to three responses by default.

```
device# traceroute 10.33.4.7
```

IEEE 802.3ah EFM-OAM

The IEEE 802.3ah Ethernet in the First Mile (EFM) standard specifies the protocols and Ethernet interfaces for using Ethernet over access links as a first-mile technology.

Using the Ethernet in the First Mile solution, you will gain broadcast Internet access, in addition to services, such as Layer 2 transparent LAN services, voice services over Ethernet Access networks, and video and multicast applications, reinforced by security and Quality of Service control in order to build a scalable network.

The in-band management specified by IEEE 802.3ah EFM standard defines the operations, administration and maintenance (OAM) mechanism needed for the advanced monitoring and maintenance of Ethernet links in the first mile. The OAM capabilities facilitate network operation and troubleshooting. Basic 802.3 frames convey OAM data between two ends of the physical link. EFM-OAM is optional and can be disabled on each physical port.

When OAM is present, two connected OAM sub-layers exchange protocol data units (OAMPDUs). OAMPDUs are standard-size frames that can be sent at a maximum rate of 10 frames per second. This limitation is necessary for reducing the impact on the usable bandwidth. It is possible to send each frame several times in order to increase the probability of reception. A combination of the destination MAC address, the Ethernet type/length field and subtype allow distinguishing OAMPDU frames from other frames.

OAM functionality is designed to provide reliable service assurance mechanisms for both provider and customer networks.

Network deployment use case

The data-link layer OAM is targeted at last-mile applications, and service providers can use it for demarcation point OAM services.

Ethernet last-mile applications require robust infrastructure that is both passive and active. 802.3ah OAM aims to solve validation and testing problems in such an infrastructure.

Using the Ethernet demarcation, service providers can additionally manage the remote device without utilizing an IP layer. This can be done by using link-layer SNMP counters, request and reply, loopback testing, and other techniques.

EFM-OAM protocol

The functionality of the EFM-OAM can be summarized under the following categories:

- Discovery: Discovery is the mechanism to detect the presence of an OAM sub-layer on the remote device. During the discovery process, information about OAM entities, capabilities, and configurations are exchanged.
- Remote fault detection: Provides a mechanism for an OAM entity to convey error conditions to its peer by way of a flag in the OAMPDUs.
- Remote loopback: This mechanism is used to troubleshoot networks and to isolate problem segments in a large network by sending test segments.

Discovery

Discovery is the first phase of EFM-OAM. At this phase, EFM-OAM identifies network devices along with their OAM capabilities. The Discovery process relies on the Information OAMPDUs. During discovery, the following information is advertised through the TLVs within periodic information OAMPDUs:

- OAM capabilities: Advertises the capabilities of the local OAM entity. Using this information, a peer can determine what functions are supported and accessible (for example, loopback capability).
- OAM mode: The OAM mode is conveyed to the remote OAM entity. The mode can be either active or passive, and can also be used to determine a device's functionality.
- OAMPDU configuration: This configuration includes the maximum OAMPDU size to delivery. In combination with the limited rate of 10 frames per second, this information can be used to limit the bandwidth allocated to OAM traffic.

Timers

Two configurable timers control the protocol, one determining the rate at which OAMPDUs are to be sent, and the second controlling the rate at which OAMPDUs are to be received to maintain the Discovery procedure from resetting.

- The timer should generate PDUs in the range of 1 - 10 PDUs per second. The default value is 1 PDU per second.
- The Hold timer assumes the peer is dead if no packet is received for a period of 1 - 10 seconds. The default value is 5 seconds.

Flags

Included in every OAMPDU is a flags field, which contains, besides other information, the status of the discovery process. There are three possible values for the status:

- Discovering: Discovery is in progress.
- Stable: Discovery is completed. Once aware of this, the remote OAM entity can start sending any type of OAMPDU.
- Unsatisfied: When there are mismatches in the OAM configuration that prevent OAM from completing the discovery, the discovery process is considered unsatisfied and cannot continue.

Process overview

The discovery process allows local Data Terminating Entity (DTE) to detect OAM on a remote DTE. Once OAM support is detected, both ends of the link exchange state and configuration information (such as mode, PDU size, loopback support, and so on). If both DTEs are satisfied with the settings, OAM is enabled on the link. However, the loss of a link or a failure to receive OAMPDUs for five seconds may cause the discovery process the start over again.

DTEs may be in either active or passive mode. Active mode DTEs instigate OAM communications and can issue queries and commands to a remote device. Passive mode DTEs generally wait for the peer device to instigate OAM communications and respond to, but do not instigate, commands and queries. Rules of what DTEs in active or passive mode can do are discussed in the following sections.

Rules for active mode

A DTE in active mode:

- Initiates the OAM Discovery process
- Sends information PDUs
- May send event notification PDUs
- May send variable request or response PDUs
- May send loopback control PDUs

Exceptions

- A DTE in active mode does not respond to variable request PDUs from DTEs in passive mode
- A DTE in active mode does not react to loopback control PDUs from DTEs in passive mode

Rules for passive mode

A DTE in passive mode:

- Waits for the remote device to initiate the Discovery process

- Sends information PDUs
- May send event notification PDUs
- May respond to variable request PDUs
- May react to received loopback control PDUs
- Is not permitted to send variable request or loopback control OAMPDUs

Remote failure indication

Faults in Ethernet that are caused by slowly deteriorating quality are more difficult to detect than completely disconnected links. A flag in the OAMPDU allows an OAM entity to send failure conditions to its peer. The failure conditions are defined as follows:

- Dying gasp: This condition is detected when the receiver goes down. The dying gasp condition is considered as unrecoverable. The conditions for a dying gasp condition include:
  - Reload command (Warm reboot)
  - Boot system flash pri/sec command (Warm reboot)
  - Failure on the box (Cold reboot)
- Critical event: On any critical event, the DTE will set the critical event bit in the information OAMPDU. The device will generate critical event in the following cases:
  - When the temperature of the box breaches the warning/shutdown threshold
  - Fan failure

The battleshort mode allows you to prevent the shutdown of ICX 7450 and ICX 7750 when the temperature of the box breaches the warning or shutdown threshold. This is intended to be used in emergency conditions to allow the switches to function in a hostile environment as long as possible.

To enable the battleshort mode, execute the **ignore-temp-shutdown** command form global configuration mode. This command can also be configured at a unit level. By default, the battleshort mode is disabled.

Remote loopback

An OAM entity can put its remote entity into loopback mode using a loopback control OAMPDU. This helps you ensure quality of links during installation or when troubleshooting. In loopback mode, each frame received is transmitted back on that same port except for OAMPDUs and pause frames. The periodic exchange of OAMPDUs must continue while in the loopback state to maintain the OAM session. The loopback command is acknowledged by responding with an information OAMPDU with the loopback state indicated in the state field.

NOTE
Ruckus recommends to ensure that any higher layer protocol running over the local and remote loopback ports does not block the interfaces in the VLAN on which loopback traffic testing is being performed.

NOTE
Ethernet loopback and EFM-OAM remote loopback cannot be configured on the same interface.

NOTE
If EEE is enabled globally, port ceases to be in the remote loopback mode.

EFM-OAM error disable recovery

The error disable recovery feature enables the device to recover the EFM-OAM interface from the error-disabled state caused by reception of a critical event from the remote device. Enter the **errdisable recovery cause loam-critical-event** command to enable automatic recovery of ports from error-disabled state.

The ports will recover automatically from the error-disabled state upon the expiry of the error disable recovery timeout value.

Configuring EFM-OAM

The EFM-OAM configuration includes the following procedural steps to enable EFM-OAM on an interface or multiple interfaces for advanced monitoring and maintenance of Ethernet network.

1. Enter the **configure terminal** command to enter global configuration mode.

```
device# configure terminal
```

2. Enter the **link-oam** command to enable the EFM-OAM protocol and enter EFM-OAM protocol configuration mode.

```
device(config)# link-oam
device(config-link-oam)#
```

3. Enter the **timeout** command to configure the time in seconds for which the local Data Terminal Equipment (DTE) waits to receive OAM Protocol Data Units (OAM-PDUs) from the remote entity.

```
device(config-link-oam)# timeout 5
```

4. Enter the **pdu-rate** command to configure the number of PDUs to be transmitted per second by the DTE.

```
device(config-link-oam)# pdu-rate 2
```

5. Enter the **ethernet** command to enable EFM-OAM on an interface.

   EFM-OAM can be enabled on more than one interface. You can also specify a range of interfaces to enable EFM-OAM on multiple interfaces.

   You can set the operational mode of EFM-OAM as Active or Passive.

   - Enter the **ethernet** *stackid/slot/port* **active** command to set the EFM-OAM operational mode as active on an interface.

```
device(config-link-oam)# ethernet 1/1/3 active
device(config-link-oam)# ethernet 1/1/4 active
```

   - Enter the **ethernet** *stackid/slot/port* **to** *stackid/slot/port* **active** command to set the EFM-OAM operational mode as active on a range of interfaces.

```
device(config-link-oam)# ethernet 1/1/5 to 1/1/8 active
```

   - Enter the **ethernet** *stackid/slot/port* **passive** command to set the EFM-OAM operational mode as passive on an interface.

```
device(config-link-oam)# ethernet 2/1/1 passive
```

   - Enter the **ethernet** *stackid/slot/port* **to** *stackid/slot/port* **passive** command to set the EFM-OAM operational mode as passive on a range of interfaces.

```
device(config-link-oam)# ethernet 2/1/1 to 2/1/8 passive
```

6. (Optional) Enter the **ethernet** *stackid/slot/port* **allow-loopback** command to enable the interface to respond to a loopback request from the remote device.

```
device(config-link-oam)# ethernet 1/1/3 allow-loopback
```

7. (Optional) Enter the **ethernet** *stackid/slot/port* **remote-failure** command to set the device for the remote-failure action to be taken upon the reception of critical event information on the interface.

```
device(config-link-oam)# ethernet 1/1/3 remote-failure critical-event action block-interface
```

8. (Optional) Enter the **remote-loopback ethernet** *stackid/slot/port* command to start or stop the remote loopback procedure on a remote device.

```
device(config-link-oam)# remote-loopback ethernet 2/1/1 start
device(config-link-oam)# remote-loopback ethernet 2/1/1 stop
```

The following shows an example of EFM-OAM configuration.

```
device# configure terminal
device(config)# link-oam
device(config-link-oam)# timeout 5
device(config-link-oam)# pdu-rate 2
device(config-link-oam)# ethernet 1/1/3 active
device(config-link-oam)# ethernet 1/1/3 allow-loopback
device(config-link-oam)# remote-loopback ethernet 2/1/1 start
device(config-link-oam)# ethernet 1/1/3 remote-failure critical-event action block-interface
```

Displaying OAM information

The following sample output of the **show link-oam info** command displays the OAM information on all OAM-enabled ports.

```
device (config)# show link-oam info
Ethernet Link Status     OAM Status      Mode       Local Stable    Remote Stable
1/1/1      up              up             active     satisfied       satisfied
1/1/2      up              up             passive    satisfied       satisfied
1/1/3      up              up             active     satisfied       satisfied
1/1/4     up              init           passive    unsatisfied     unsatisfied
1/1/5      down            down           passive    unsatisfied     unsatisfied
1/1/6      down            down           passive    unsatisfied     unsatisfied
1/1/7      down            down           passive    unsatisfied     unsatisfied
```

The following sample output of the **show link-oam info detail** command displays detailed OAM information on all OAM-enabled ports.

```
device(config)# show link-oam info detail
OAM information for Ethernet port: 10/1/1
        +link-oam mode:         passive
        +link status:           down
        +oam status:            down
        Local information
                multiplexer action:  forward
                parse action:        forward
                stable:              unsatisfied
                state:               linkFault
                loopback state:      disabled
                dying-gasp:          false
                critical-event:      false
                link-fault:          true
        Remote information
                multiplexer action:  forward
                parse action:        forward
                stable:              unsatisfied
                loopback support:    disabled
                dying-gasp:          false
```

```
                critical-event:      true
                link-fault:          false

    OAM information for Ethernet port: 10/1/3
            +link-oam mode:        active
            +link status:          up
            +oam status:           down
            Local information
                    multiplexer action:  forward
                    parse action:        forward
                    stable:              unsatisfied
                    state:               activeSend
                    loopback state:      disabled
                    dying-gasp:          false
                    critical-event:      false
                    link-fault:          false
            Remote information
                    multiplexer action:  forward
                    parse action:        forward
                    stable:              unsatisfied
                    loopback support:    disabled
                    dying-gasp:          false
                    critical-event:      false
                    link-fault:          false

    OAM information for Ethernet port: 10/1/4
            +link-oam mode:        active
            +link status:          up
            +oam status:           up
            Local information
                    multiplexer action:  forward
                    parse action:        forward
                    stable:              satisfied
                    state:               up
                    loopback state:      disabled
                    dying-gasp:          false
                    critical-event:      false
                    link-fault:          false
            Remote information
                    multiplexer action:  forward
                    parse action:        forward
                    stable:              satisfied
                    loopback support:    disabled
                    dying-gasp:          false
                    critical-event:      true
                    link-fault:          false
```

The following sample output of the **show link-oam info detail ethernet** command displays detailed OAM information on a specific Ethernet port.

```
device(config)# show link-oam info detail ethernet 1/1/3
OAM information for Ethernet port: 1/1/3
        +link-oam mode:        active
        +link status:          up
        +oam status:           up
        Local information
                multiplexer action:  forward
                parse action:        forward
                stable:              satisfied
                state:               up
                loopback state:      disabled
                dying-gasp:          false
                critical-event:      false
                link-fault:          false
        Remote information
                multiplexer action:  forward
                parse action:        forward
                stable:              satisfied
                loopback support:    disabled
                dying-gasp:          false
```

```
                critical-event:      false
                link-fault:          false
```

Displaying OAM statistics

The following sample output of the **show link-oam statistics** command displays the OAM statistics on all OAM-enabled ports.

```
device(config)# show link-oam statistics
Ethernet Tx Pdus         Rx Pdus
10/1/1   377908         377967
10/1/3   400            44
10/1/4   400            385
10/1/5   400            385
10/1/6   400            385
```

The following sample output of the **show link-oam statistics detail** command displays detailed OAM statistics on all OAM-enabled ports.

```
device(config)# show link-oam statistics detail
OAM statistics for Ethernet port: 10/1/1
        Tx statistics
                information OAMPDUs:                    377908
                loopback control OAMPDUs:               0
                variable request OAMPDUs:               0
                variable response OAMPDUs:              0
                unique event notification OAMPDUs:      0
                duplicate event notification OAMPDUs:   0
                organization specific OAMPDUs:          0
                link-fault records:                     0
                critical-event records:                 0
                dying-gasp records:                     0
        Rx statistics
                information OAMPDUs:                    377967
                loopback control OAMPDUs:               0
                loopback control OAMPDUs dropped:       0
                variable request OAMPDUs:               0
                variable response OAMPDUs:              0
                unique event notification OAMPDUs:      0
                duplicate event notification OAMPDUs:   0
                organization specific OAMPDUs:          0
                unsupported OAMPDUs:                    0
                link-fault records:                     0
                critical-event records:                 377395
                dying-gasp records:                     0
                discarded TLVs:                         0
                unrecognized TLVs:                      0

OAM statistics for Ethernet port: 10/1/3
        Tx statistics
                information OAMPDUs:                    427
                loopback control OAMPDUs:               0
                variable request OAMPDUs:               0
                variable response OAMPDUs:              0
                unique event notification OAMPDUs:      0
                duplicate event notification OAMPDUs:   0
                organization specific OAMPDUs:          0
                link-fault records:                     0
                critical-event records:                 0
                dying-gasp records:                     0
        Rx statistics
                information OAMPDUs:                    44
                loopback control OAMPDUs:               0
                loopback control OAMPDUs dropped:       0
                variable request OAMPDUs:               0
                variable response OAMPDUs:              0
                unique event notification OAMPDUs:      0
                duplicate event notification OAMPDUs:   0
                organization specific OAMPDUs:          0
                unsupported OAMPDUs:                    0
```

```
                link-fault records:                   0
                critical-event records:               0
                dying-gasp records:                   0
                discarded TLVs:                       0
                unrecognized TLVs:                    0

OAM statistics for Ethernet port: 10/1/4
        Tx statistics
                information OAMPDUs:                  428
                loopback control OAMPDUs:             0
                variable request OAMPDUs:             0
                variable response OAMPDUs:            0
                unique event notification OAMPDUs:    0
                duplicate event notification OAMPDUs: 0
                organization specific OAMPDUs:        0
                link-fault records:                   0
                critical-event records:               0
                dying-gasp records:                   0
        Rx statistics
                information OAMPDUs:                  413
                loopback control OAMPDUs:             0
                loopback control OAMPDUs dropped:     0
                variable request OAMPDUs:             0
                variable response OAMPDUs:            0
                unique event notification OAMPDUs:    0
                duplicate event notification OAMPDUs: 0
                organization specific OAMPDUs:        0
                unsupported OAMPDUs:                  0
                link-fault records:                   0
                critical-event records:               350
                dying-gasp records:                   0
                discarded TLVs:                       0
                unrecognized TLVs:                    0
```

The following sample output of the **show link-oam statistics detail ethernet** command displays detailed OAM statistics on a specific Ethernet port.

```
device(config)# show link-oam statistics detail ethernet 1/1/3
OAM statistics for Ethernet port: 1/1/3
        Tx statistics
                information OAMPDUs:                  122474
                loopback control OAMPDUs:             0
                variable request OAMPDUs:             0
                variable response OAMPDUs:            0
                unique event notification OAMPDUs:    0
                duplicate event notification OAMPDUs: 0
                organization specific OAMPDUs:        0
                link-fault records:                   0
                critical-event records:               0
                dying-gasp records:                   0
        Rx statistics
                information OAMPDUs:                  94691
                loopback control OAMPDUs:             0
                loopback control OAMPDUs dropped:     0
                variable request OAMPDUs:             0
                variable response OAMPDUs:            0
                unique event notification OAMPDUs:    0
                duplicate event notification OAMPDUs: 0
                organization specific OAMPDUs:        0
                unsupported OAMPDUs:                  0
                link-fault records:                   0
                critical-event records:               0
                dying-gasp records:                   0
                discarded TLVs:                       0
                unrecognized TLVs:                    0
```

EFM-OAM syslog messages

When EFM-OAM is enabled on an interface, the syslog messages in the following table are generated when the link goes up or down, or when loopback mode is entered or cleared on an interface.

TABLE 4 EFM-OAM syslog messages

Event	Syslog output
Port 1 is LOAM logically Up	`Link-OAM: Logical link on interface Ethernet 1/1/1 is up.`
Port 1 is LOAM logically Down	`Link-OAM: Logical link on interface Ethernet 1/1/1 is down.`
Port 1 entered remote Loopback mode	`Link-OAM: Link entered remote loopback on ethernet 1/1/1`
Port 1 cleared remote Loopback mode	`Link-OAM: Link cleared remtote loopback on ethernet 1/1/1`
Port 1 entered local Loopback mode	`Link-OAM: Link entered local loopback on ethernet 1/1/1`
Port 1 cleared local Loopback mode	`Link-OAM: Link cleared local loopback on ethernet 1/1/1`
Dying gasp event on port 1	`Link-OAM: Link received dying-gasp event on ethernet 1/1/1`
Critical event on port 1	`Link-OAM: Link received critical event on ethernet 1/1/1`

Displaying management redundancy information

Enter the following command from any mode of the CLI, to view the redundancy parameter settings and statistics.

```
device(config)# show redundancy
=== MP Redundancy Settings ===
Configured Active Slot = 9
Running-Config Sync Period = (upon "write mem")
=== MP Redundancy Statistics ===
Current Active Session:
Active mgmt slot = 9, Standby mgmt slot = 10 (Absent)
Switchover cause = No Switchover
Start Time       = Jan  1 00:00:09
Sxr Sys Hitless Enable Status = 0
Total number of Switchover/Failovers = 0
L3 slib baseline sync status: 0  [complete]
```

NOTE
Management redundancy is not available for the ICX 7450-24 platform.

Layer 3 hitless route purge

Layer 3 traffic is forwarded seamlessly during a failover, switchover, or OS upgrade when hitless management is enabled.

Some protocols support non-stop routing. On enabling non-stop routing, after switchover the management module quickly re-converge the protocol database. Whereas, some protocols support graceful restart, in which the protocol state is re-established with the help of neighboring devices. Once all the protocols converge the routes which were removed from the network during the convergence period, the routes are deleted from the devices. You can set the route purge timer per VRF instance. Configure the timer to set the duration for which the routes should be preserved after switchover. Once this period elapses, the route purging starts, if by then all other protocols have finished non-stop routing or graceful restart.

When switchover occurs, the route purge timer starts. If non-stop routing or graceful restart is also configured, the route validation and purging starts only when they are complete and the purge timer has elapsed. If for some reason more delay is expected in learning the routes, you can configure a larger period for the purge timer.

Setting the IPv4 hitless purge timer on the defatult VRF

To configure the purge timer, enter the **ip hitless-route-purge-timer** command in global configuration mode.

Example for setting IPv4 hitless purge timer on the default VRF

The following example shows how to set the IPv4 hitless purge timer on the default VRF:

```
device(config)# ip hitless-route-purge-timer 60
```

Setting the IPv4 hitless purge timer on the non-default VRF

1. Enter the VRF configuration mode using the **vrf** command.
2. Configure route distinguisher using the **rd** command.
3. Enter IPv4 address family configuration mode using the **address-family ipv4** command.
4. Configure the router purge timer using the **ip hitless-route-purge-timer** command.

Example for setting the IPv4 hitless purge timer on the non-default VRF

The following example shows how to set the IPv4 purge timer on the non-default VRF:

```
device(config)# vrf blue
device(config-vrf-blue)# rd 10:10
device(config-vrf-blue)# address-family ipv4
device(config-vrf-blue-ipv4)# ip hitless-route-purge-timer 60
```

Setting the IPv6 hitless purge timer on the defatult VRF

To configure the purge timer, enter the **ipv6 hitless-route-purge-timer** command in global configuration mode.

Example for setting the IPv6 hitless purge timer on the default VRF

The following example shows how to set the IPv6 hitless purge timer on the default VRF:

```
device(config)# ipv6 hitless-route-purge-timer 60
```

Setting the IPv4 hitless purge timer on the non-default VRF

Before you begin: Enable IPv6 unicast routing using the ipv6 unicast-routing command in global configuration mode.

1. Enter the VRF configuration mode using the **vrf** command.
2. Configure route distinguisher using the **rd** command.
3. Enter the IPv6 address family configuration mode using the **address-family ipv6** command.

4. Configure the router purge timer using the **ipv6 hitless-route-purge-timer** command.

Example for setting the IPv6 hitless purge timer on the non-default VRF

The following example shows how to set the IPv6 purge timer on the non-default VRF:

```
device(config)# vrf blue
device(config-vrf-blue)# rd 10:10
device(config-vrf-blue)# address-family ipv6
device(config-vrf-blue-ipv4)# ipv6 hitless-route-purge-timer 60
```

Energy Efficient Ethernet

Energy Efficient Ethernet (EEE) regulates and saves power consumed by the active hardware components in the switch and conserves power during idle time.

EEE allows Ruckus devices to conform to green computing standards. This functionality is achieved by moving the data ports to a low-power state when their function is not necessary or when they are in a passive, no traffic condition. The EEE feature in switching platforms reduces overall energy consumption, cooling, noise, and operating costs for energy and cooling. Lower power consumption also means lower heat dissipation and increased system stability, less energy usage, thereby reducing costs and impact on the environment.

EEE is a set of enhancements to the Ethernet specification to address power consumption during periods of low data activity. EEE is specified in IEEE Std 802.3az-2010 which is an amendment to the IEEE Std 802.3-2008 specification. The optional EEE capability combines the IEEE 802.3 Media Access Control (MAC) sublayer with a family of physical layers defined to support operation in the Low Power Idle (LPI) mode. When the LPI mode is enabled, systems on both sides of the link can save power during periods of low link utilization. LPI signaling allows the LPI client to indicate to the PHY, and to the link partner, that a break in the data stream is expected. The LPI client can then use this information to enter power-saving modes that require additional time to resume normal operation. LPI signaling also informs the LPI client when the link partner sends such an indication. The client device connected to the EEE enabled switch port must also support the LPI functionality in order to take advantage of this feature on the switch.

Port support for Energy Efficient Ethernet

- On ICX 7450 devices EEE is supported on 1G copper ports and 10G copper module ports.
- On ICX 7250 devices EEE is supported on 1G copper ports.
- You may notice port flap on the port when EEE is enabled.
- EEE is not supported on 1G fiber ports (ICX7450-48F), 4x10F module ports, and 1x40Q module ports.

EEE feature support on SPX

In addition to standalone and stacking environment, EEE is supported on SPX environment. When ICX7450 and ICX7250 platform is used as PE, the EEE feature can be configured from Control Bridge (CB) unit.

- On ICX7450 product family, EEE feature is supported on 1G Copper ports (PHY BCM54382) and 10G Copper ports (PHY BCM84848).
- On ICX7250 product family, EEE feature is supported on 1G Copper ports (PHY BCM54382).

NOTE
In SPX environment, the EEE feature is supported only on 1G and 10G copper ports and in full-duplex mode. EEE feature is not supported on stacking and on configured SPX ports since any port can act as SPX port.

Initially, the port will flap whenever EEE feature is enabled or disabled on the port to advertise EEE parameters through auto-negotiation.

Enabling Energy Efficient Ethernet

Energy Efficient Ethernet (EEE) is supported on select ICX devices and can be enabled globally or per port.

Follow these steps to enable EEE globally or per port, including SPX environment.

1. Enter global configuration mode.
2. Enter the **eee** command. The following example shows enabling EEE globally.

```
device(config)# eee
EEE Feature Enabled
```

NOTE
The **no** form of the command disables the feature on all supported ports, including those in the PX setup.

3. To enable EEE from the interface mode, enter the **eee** command.

```
device(config)# interface ehternet 1/1/1
device(config-if-e1000-1/1/1)# eee
EEE Feature Enabled on port 1/1/1
```

4. (Optional) Execute the **show spx** command to display EEE statistics.

```
device(config)# show spx
T=5d19h22m38.2: alone: standalone, D: dynamic cfg, S: static
ID          Type         Role       Mac Address       Pri    State     Comment
1       S ICX7750-48XGF standby     748e.f8f9.2800     0     remote     Ready
2       S ICX7750-48XGF active      748e.f8f9.2880    100     local     Ready
17      S ICX7450-24P spx-pe        cc4e.245f.3330    N/A    remote     Ready
18      S ICX7250-48 spx-pe         cc4e.24b4.1ec0    N/A    remote     Ready
…<truncated output>
```

5. (Optional) Execute the **show eee-statistics** command to display EEE statistics on all supported ports.

```
device(config)# show eee-statistics
Port    EEE-State TXEventCount TXDuration RXEventCount RXDuration
17/1/1  Enable      30          3928466        7         3938055
17/1/2  Enable       0           0           0           0
17/1/3  Enable       7          3934552        30        4575090
17/1/4 Enable        0                  0                 0                  0
17/1/5 Enable           0               0                 0                  0
. . . <truncated output>
```

6. (Optional) The **show eee-statistics ethernet** command displays the EEE statistics per port.

```
device(config)# show eee-statistics ethernet 17/1/1
Port    EEE-State TXEventCount  TXDuration RXEventCount  RXDuration
17/1/1  Enable         227       3744088       19         3745412
device(config)#
```

Histogram information overview

The histogram framework feature monitors and records system resource usage information. The main objective of the histogram is to record resource allocation failures and task CPU usage information. The histogram feature keeps track of task execution information, context switch history of tasks, buffer allocation failure and memory allocation failure.

The histogram information is collected and maintained internally, in a cyclical buffer. It can be reviewed to determine if resource allocation failures or task CPU usage may have contributed to an application failure.

NOTE
Histogram information is not maintained across reboot.

Displaying CPU histogram information

The CPU histogram provides information about task CPU usage. The CPU histogram is viewed in the form of buckets (task usage is divided into different interval levels called *buckets*). For example, the task run time is divided into buckets: bucket 1 (0-50 ms), bucket 2 (50-100 ms), bucket 3 (100-150 ms), and so on. The CPU histogram collects the task CPU usage in each bucket. This includes how many times a task run time or hold time falls in each bucket, and the maximum run time and total run time for each bucket. CPU histogram information is measured for the hold-time and wait-time of the task.

- Hold time - The time that the task is holding the CPU without yield.
- Wait time - The time that the task is waiting for execution.

External USB Hotplug

External USB Hotplug support allows you to copy images, cores, logs, and configurations between the external USB and the internal eUSB.

Ruckus device images are stored in the raw partition. Cores, logs and configurations are stored in the ext4 filesystem partition. The introduction of the External USB Hotplug gives you the option to easily copy device images, cores, logs, and configurations between the external USB and the internal flash.

External USB Hotplug considerations

- Only USB drives of up to 128 GB of any vendor type are supported.
- USB 3.0 is not supported.
- You can copy files of less than 2 GB only.
- Make sure the external USB is formatted as a "FAT" filesystem before attempting to use it. Formatting can be done on a PC or on the Ruckus device with the **format disk0** command.
- You should not insert a USB-based disk drive, nor should you insert a USB hub to connect multiple USB disks.
- copy TFTP/SCP to disk0 and disk0 to TFTP/SCP commands are not supported.
- Only an administrator can execute operations on an external USB, similar to TFTP.
- You cannot access the active unit's local external USB from a member unit and vice versa.
- Boot from an external USB is not supported.
- You must run the **unmount disk0** command before unplugging the external USB. The external USB can be mounted using the **mount disk0** command.
- The USB drive is only functional on the active member in a stacked environment.

Using External USB Hotplug

Plug in the External USB to begin using the External USB Hotplug commands. Use the **show files disk0** command to check if the external USB is mounted and ready to use.

You can use the commands in the following table as part of the External USB Hotplug functionality.

TABLE 5 External USB Hotplug commands

Command	Description
show files disk0	Displays the files in the external USB drive.
format disk0	Formats the external USB.
mount disk0	Mounts the filesystem in the external USB drive.
unmount disk0	Unmounts the filesystem of the external USB drive. This command is required to safely plug out the USB, so that files are not lost or corrupted.
copy flash disk0 *primary \ secondary*	Copies the image binary stored in the primary or secondary partition of the flash to a destination file in the external USB.
copy flash disk0 file	Copies any file from a source file in the system flash to an external USB destination file.
copy disk0 license	Copies the license file present in the external USB drive to the system.
copy disk0 running-config	Copies the configuration file present on the external USB drive to the system's running configuration.
copy disk0 startup-config	Copies the configuration file present on the external USB drive to the system's startup configuration file.

Refer to the command reference for details on using the External USB Hotplug commands.

Basic system management

The following sections contain procedures for basic system management tasks.

Viewing system information

You can access software and hardware specifics for a Ruckus Layer 2 switch or Layer 3 switch. For software specifics, refer to the section Software versions installed and running on a device on page 16.

To view the software and hardware details for the system, enter the **show version** command. The following shows example output.

```
device# show version
 Copyright (c) 1996-2015 Ruckus Networks. All rights reserved.
    UNIT 1: compiled on Oct  1 2015 at 11:29:56 labeled as SPR08040q042
      (24018046 bytes) from Secondary SPR08040q042.bin
        SW: Version 08.0.40q042T213
      Compressed Boot-Monitor Image size = 786944, Version:10.1.05T215 (spz10105b008)
       Compiled on Thu Jul 16 06:27:06 2015

  HW: Stackable ICX7450-24
  Internal USB: Serial #: 9900614090900038
      Vendor: ATP Electronics, Total size = 1919 MB
==============================================================================
UNIT 1: SL 1: ICX7450-24 24-port Management Module
      Serial  #:CYT3346K035
      License: ICX7450_L3_SOFT_PACKAGE   (LID: eavIIJLmFIK)
      License Compliance: ICX7450-PREM-LIC-SW is Compliant for next 45 days
      P-ASIC  0: type B548, rev 01  Chip BCM56548_A0
==============================================================================
UNIT 1: SL 2: ICX7400-4X10GF 4-port 40G Module
      Serial  #:CYV3346K07G
==============================================================================
UNIT 1: SL 3: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3346K06F
==============================================================================
UNIT 1: SL 4: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3346K00A
==============================================================================
 1000 MHz ARM processor ARMv7 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
 2048 MB DRAM
STACKID 1  system uptime is 31 day(s) 1 hour(s) 1 minute(s) 5 second(s)
The system : started=cold start
```

The following hardware details are listed in the output of the **show version** command:

- Chassis type
- PROM type (if applicable)
- Chassis serial number
- Management and interface module serial numbers and ASIC types

For a description of the software details in the output of the **show version** command, refer to the section Software versions installed and running on a device on page 16.

Starting with FastIron 8.0.30, you can view the serial number pluggable modules. If there are no pluggable modules on the device, the serial number of the fixed modules on the device is displayed. The following is an example of the **show version** output on an ICX 7750.

```
device# show version
  Copyright (c) 1996-2014 Ruckus Networks. All rights reserved.
    UNIT 1: compiled on Dec 22 2014 at 12:35:56 labeled as SWR08030b1
      (20833985 bytes) from Secondary SWR08030b1.bin
        SW: Version 08.0.30b1T203
    UNIT 2: compiled on Dec 22 2014 at 12:35:56 labeled as SWR08030b1
      (20833985 bytes) from Secondary SWR08030b1.bin
        SW: Version 08.0.30b1T203
      Compressed Boot-Monitor Image size = 1835008, Version:10.1.03T205 (swz10103b003)
```

```
  HW: Stackable ICX7750-26Q
  Internal USB: Serial #: 40D41E003CF90029
      Vendor: UNIGEN, Total size = 1910 MB
==========================================================================
UNIT 1: SL 1: ICX7750-20QXG 20-port Management Module
      Serial  #:CRK2234J00V
      License: ICX7750_L3_SOFT_PACKAGE   (LID: etmHHIJlFFx)
      P-ASIC  0: type B850, rev 03  Chip BCM56850_A2
==========================================================================
UNIT 1: SL 2: ICX7750-QSFP 6-port QSFP 240G Module
==========================================================================
UNIT 1: SL 3: ICX7750-6Q 6-port QSFP 240G Module
      Serial  #:PR320400290
==========================================================================
UNIT 2: SL 1: ICX7750-48XGF 48-port Management Module
      Serial  #:CRH2234J00M
      License: ICX7750_L3_SOFT_PACKAGE  (LID: etjHHIJlFFo)
==========================================================================
UNIT 2: SL 2: ICX7750-QSFP 6-port QSFP 240G Module
==========================================================================
UNIT 2: SL 3: ICX7750-6Q 6-port QSFP 240G Module
      Serial  #:PR320400289
==========================================================================
 1500 MHz Power PC processor (version 8023/0022) 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
  256 MB DRAM
STACKID 1  system uptime is 14 minute(s) 30 second(s)
STACKID 2  system uptime is 14 minute(s) 6 second(s)
The system: started=warm start  reloaded=by "reload"
```

Starting with FastIron 8.0.40, there is a **show version** command option that specifies the version running on a single unit. The following is an example of the **show version unit** *1* command output on an ICX 7750.

```
device# show version unit 1
  Copyright (c) 1996-2015 Ruckus Networks. All rights
reserv
       ed.
    UNIT 1: compiled on Aug 31 2015 at 04:41:12 labeled as SWS08040q017
      (19409630 bytes) from Secondary SWS08040q017.bin
        SW: Version 08.0.40q017T201
      Compressed Boot-Monitor Image size = 1835008, Version:10.1.01T205 (swz10101)
       Compiled on Thu Apr 10 01:01:43 2014

  HW: Stackable ICX7750-26Q
  Internal USB: Serial #: 40E41502FFFD02B7
      Vendor: UB90QBK, Total size = 1910 MB
==========================================================================
UNIT 1: SL 1: ICX7750-20QXG 20-port Management Module
      Serial  #:CRK3327K00Y
      License: BASE_SOFT_PACKAGE   (LID: etmIIHMmFFa)
      P-ASIC  0: type B850, rev 03  Chip BCM56850_A2
==========================================================================
UNIT 1: SL 2: ICX7750-QSFP 6-port QSFP 240G Module
==========================================================================
 1500 MHz Power PC processor (version 8023/0022) 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
 3840 MB DRAM
STACKID 1  system uptime is 3 day(s) 3 hour(s) 30 minute(s) 0 second(s)
The system : started=warm start   reloaded=by "reload"
```

Viewing configuration information

You can view a variety of configuration details and statistics with the **show** option. The **show** command provides a convenient way to check configuration changes before saving them to flash.

The available show commands vary for Layer 2 and Layer 3 switches and by configuration mode.

To determine the available show commands for the system or a specific mode of the CLI, enter the following command.

```
device# show ?
```

You can also enter **show** at the command prompt, then press the TAB key.

Enabling the display of the elapsed timestamp for port statistics reset

Whenever the port statistics of a device are cleared globally or on an interface, the counter values of the received and transmitted packets on the device are reset for all the ports or for an interface, respectively.

The elapsed time after the most recent reset of the port statistics counters can be displayed in the output of the **show statistics** command by configuring the **port-statistics-reset-timestamp enable** command. By default, the display of the elapsed timestamp information is disabled.

The elapsed time is calculated as the time between the most recent reset of the port statistics counters and the time when the **show statistics** command is executed.

The following list provides details of the conditions under which the port statistics counters are reset and also explains the elapsed time calculation considerations.

- When the port statistics are cleared individually using the **clear statistics ethernet** command. The elapsed time is calculated and displayed only for that particular interface.
- When the port statistics are cleared globally using the **clear statistics** command. The port statistics counters for all the ports, including management ports, are cleared and the elapsed time is calculated and displayed for each of the interfaces.
- When the management interface is cleared using the **clear statistics management** command. The port statistics counters specific to management ports are cleared. The elapsed time is calculated and displayed for the management interface.
- If the system is reloaded (hard reboot or soft reboot), the port statistics on the device are cleared automatically. In this case, the time when the ports are cleared during the reload is considered as the most recent reset time.
- In a stacking device, the Elapsed Timestamp information is applicable for other unit's ports. In case of a switchover, all the port statistics are cleared and the elapsed time is calculated and displayed for all ports.
- If hitless failover is enabled and if any unit is reloaded, the statistics of the reloading device's interfaces are cleared. In this case, the time when the ports are cleared during the reload is considered as the most recent reset time.
- The elapsed time is not impacted when the Network Time Protocol (NTP) syncs up with a different time other than the recorded time.

Viewing port statistics

Port statistics are polled by default every 10 seconds.

You can view statistics for ports by entering the following **show** commands:

- **show interfaces**
- **show configuration**
- **show statistics**

The Elapsed Timestamp information is displayed in the output of the following **show** commands:

- **show statistics**

- **show statistics brief**
- **show statistics ethernet**
- **show statistics management**

NOTE
The **port-statistics-reset-timestamp enable** command must be configured to have the Elapsed Timestamp information displayed in the output.

To display the statistics, enter a command such as the following.

```
device# show statistics ethernet 1/1/13
   Port       Link    State   Dupl Speed Trunk Tag Pvid Pri   MAC             Name
   1/1/13     Up      Forward Full 1G    None  No  1      0   748e.f893.065c

 Port 1/1/13 Counters:
 *Last time counter reset (Elapsed Timestamp): 1 hour(s) 21 minute(s) 12 second(s)
  InOctets          50218819740          OutOctets          50216689676
  InPkts               63180119            OutPkts             63428168
  InBroadcastPkts             5    OutBroadcastPkts                3
  InMulticastPkts      63180114    OutMulticastPkts             63428165
  InUnicastPkts                      OutUnicastPkts
  InBadPkts
  InFragments
  InDiscards                              OutErrors
  CRC                                    Collisions
  InErrors                             LateCollisions
  InGiantPkts                0
  InShortPkts
  InJabber
  InFlowCtrlPkts                     OutFlowCtrlPkts
  InBitsPerSec         97441855        OutBitsPerSec             97432612
  InPktsPerSec           153280        OutPktsPerSec               153972
  InUtilization          100.00%      OutUtilization              100.00%
```

Viewing STP statistics

You can view a summary of STP statistics for Layer 2 and Layer 3 switches. STP statistics are by default polled every 10 seconds.

To view STP statistics, enter the **show span** command. To view STP statistics for a VLAN, enter the **span vlan** command.

Clearing statistics

You can clear statistics for many parameters using the **clear** command.

To determine the available **clear** commands for the system, enter the **clear** command from the privileged exec mode of the CLI.

```
device# clear ?
```

You also can enter **clear** at the command prompt, then press the TAB key.

Viewing egress queue counters on ICX 7750 devices

Viewing egress queue counters on ICX 7750 devices.

For a port, the **show interface** command displays the number of packets that were queued for each QoS priority (traffic class) and dropped because of congestion. The egress queue counters are displayed at the end of the **show interface** command output as shown in the following example.

NOTE

This command output displays the total of unicast and multicast counters for any particular QOS priority.

```
device# show interface ethernet 1/1/1
 10GigabitEthernet 1/1/1 is down, line protocol is down
  Port down for 16 hours 16 minutes 48 seconds
  Hardware is   10GigabitEthernet , address is 748e.f8f9.6280 (bia 748e.f8f9.6280)
  Interface type is 40Gig Fiber
  Configured speed 40Gbit, actual unknown, configured duplex fdx, actual unknown
  Configured mdi mode AUTO, actual unknown
  Member of L2 VLAN ID 1, port is untagged, port state is BLOCKING
  BPDU guard is Disabled, ROOT protect is Disabled, Designated protect is Disabled
  Link Error Dampening is Disabled
  STP configured to ON, priority is level0, mac-learning is enabled
  Flow Control is enabled
  Mirror disabled, Monitor disabled
  Mac-notification is disabled
  Not member of any active trunks
  Not member of any configured trunks
  No port name
  IPG MII 96 bits-time, IPG GMII 96 bits-time
  MTU 1500 bytes
  300 second input rate: 0 bits/sec, 0 packets/sec, 0.00% utilization
  300 second output rate: 0 bits/sec, 0 packets/sec, 0.00% utilization
  0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 multicasts, 0 unicasts
  0 input errors, 0 CRC, 0 frame, 0 ignored
  0 runts, 0 giants
  0 packets output, 0 bytes, 0 underruns
  Transmitted 0 broadcasts, 0 multicasts, 0 unicasts
  0 output errors, 0 collisions
  Relay Agent Information option: Disabled

Egress queues:
Queue counters    Queued packets    Dropped Packets
         0                  0                  0
         1                  0                  0
         2                  0                  0
         3                  0                  0
         4                  0                  0
         5                  0                  0
         6                  0                  0
         7                  0                  0
```

Clearing the egress queue counters

You can clear egress queue statistics (reset them to zero), using the **clear statistics** and **clear statistics ethernet** command.

Link Fault Signaling for 10Gbps Ethernet devices

Link Fault Signaling (LFS) is a physical layer protocol that enables communication on a link between two 10 Gbps Ethernet devices. When configured on a Ruckus 10 Gbps Ethernet port, the port can detect and report fault conditions on transmit and receive ports.

When LFS is enabled on an interface, the following Syslog messages are generated when the link goes up or down, or when the TX or RX fiber is removed from one or both sides of the link that has LFS enabled.

```
Interface ethernet 1/1/1, state down - link down
Interface ethernet 1/1/1, state up
```

When a link fault occurs, the Link and Activity LEDs turn OFF.

The Link and Activity LEDs turn ON when there is traffic traversing the link after the fiber is installed.

On Ruckus FastIron devices, RX LFS is always enabled by default and cannot be disabled. The **[no] link-fault-signal** command only applies to enabling or disabling TX LFS.

Enabling Link Fault Signaling

To enable Link Fault Signaling (LFS) between two 10 Gbps Ethernet devices, enter commands such as the following on both ends of the link.

```
device(config)# interface ethernet 1/1/1
device(config-if-e1000-1/1/1)# link-fault-signal
```

Viewing the status of LFS-enabled links

The status of an LFS-enabled link is shown in the output of the **show interface** and **show interface brief** commands, as shown in the following examples.

```
device# show interface ethernet 1/1/10
10GigabitEthernet1/1/10 is down (remote fault), line protocol is down
  Hardware is 10GigabitEthernet, address is 0000.0027.79d8 (bia 0000.0027.79d8)
  Configured speed 10Gbit, actual unknown, configured duplex fdx, actual unknown
  Member of L2 VLAN ID 1, port is untagged, port state is BLOCKING
  BPDU guard is Disabled, ROOT protect is Disabled
  Link Fault Signaling is Enabled,  Link Error Dampening is Disabled
  STP configured to ON, priority is level0
  Flow Control is disabled
  mirror disabled, monitor disabled
<Truncated for brevity...>
```

The above output shows that the LFS-enabled link (port 1/1/10) is down because of an error on the remote port.

```
device# show interfaces brief
Port  Link     State   Dupl  Speed Trunk Tag Pvid Pri MAC            Name
1/1/10  Err-LFS
  None    None  None  None  No  1    0   0000.0027.79d8
```

The above output indicates that there is an error on the LFS-enabled link on port 1/1/10 and the link is down.

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Virtual cable testing

Virtual Cable Tester (VCT) is a cable diagnostic feature in the physical layer (PHY) used for fault detection and advanced cable performance monitoring.

VCT technology enables the diagnosis of a conductor (wire or cable) by sending a pulsed signal into the conductor, then examining the reflection of that pulse. This method of cable analysis is referred to as Time Domain Reflectometry (TDR). By examining the reflection, the Ruckus device can detect and report cable statistics such as local and remote link pair, cable length, and link status.

VCT configuration notes

VCT is not an IEEE standard. VCT uses TDR (Time Domain Reflectometry) to send a signal to a remote partner that loops back to the same port. Different vendors and remote partners may have different techniques, terms, and implementations.

The VCT can be performed when the link partner is autonegotiating. VCT has to be run in autonegotiation and full duplex mode.

VCT supports:

- Copper ports with 2.5G/10G for Aquantia PHY and 1G for Broadcom PHY.
- Link UP ports only. Link DOWN ports are not used.
- 4 pairs per interface, per cable.
- Most types of RJ45 cables including Cat 3, 4, 5, 6 and 7.
- Only on-demand CLI runs for diagnostics. You must trigger the test for a port connected with the cable.

NOTE
Autonegotiation is where common transmission parameters between devices, such as speed, duplex mode, and flow control are chosen. The devices share their parameter capabilities and then choose the highest performance transmission mode they both support.

VCT restrictions

- The port where the cable is connected must be enabled when you issue the command to diagnose the cable. If the port is disabled, the command is rejected.
- VCT cannot be executed when port speed downshift is configured on the port to downgrade speeds at 10M and 100M. VCT can only be run at default auto speed of the port.
- The length of cable measurement could be different due to different PHY used across the ICX products. The VCT feature must not be used for accurately measuring the length of the cable.
- The Ethernet port speed must be configured to Auto; VCT does not work on ports with fixed speeds.

- If the remote pair is set to forced 100 Mbps, any change in MDI/MDIX may cause the device to interpret the Multilevel Threshold-3 (MLT-3) as a reflected pulse, in this case, the device will report a faulty condition.

  NOTE
  In this scenario, we recommend that you run the TDR test a few times, clearing the registers before each test.

- You should not run VCT commands in a live network environment. VCT commands may impact port up, down, and network performance.
- Cat 3 or 4 with 2 or 3 pairs may fail in 1 or 2 pairs.
- We do not recommend that you run VCT commands when adjacent ports are up.
- Fiber ports and 1G transmit media are not supported.
- Link DOWN ports are not used.
- VCT commands do not apply to the management port
- There is no support for configuration.
- No trunk and system-wide support.

Crosstalk between ports

A maximum PGA gain setting and a disabled echo canceler are required for cable diagnostics but the side effect is a high sensitivity to crosstalk. Reducing the gain and disabling the echo canceler remove the crosstalk sensitivity, but it breaks the cable test, which leads to invalid TDR results.

When there is crosstalk between the ports, running VCT on the port will provide invalid results. These can be detected by running the **show cable tdr** command.

NOTE
The 1/1/48 port has 2 devices, the first has 24 ports (1/1/1 to 1/1/24) and the next has 24 ports (1/1/25 to 1/1/48).

```
device# show cable tdr 1/1/48

Port   Speed Local pair Pair Length Remote pair Pair status
--------- -------- ------------ --------------- ------------
1/1/48 1000M     Pair A    Unknown                  Invalid
                 Pair B    Unknown                  Invalid
                 Pair C    Unknown                  Invalid
                 Pair D    Unknown                  Invalid
```

To avoid crosstalk and to run the VCT successfully with consistent results, we recommend disabling the adjacent port and that you stop the traffic on the port where line rate traffic is passed.

In the following example, when you disable port 1/1/47 and stop traffic on port 1/1/48 you get the following results:

```
device# show cable tdr 1/1/48
Port   Speed Local pair Pair Length Remote pair  Pair status
--------- -------- ------------ --------------- -------------
1/1/48 1000M     Pair A        <50M      Pair B   terminated
                 Pair B        <50M      Pair A   terminated
                 Pair C        <50M      Pair D   terminated
                 Pair D        <50M      Pair C   terminated
```

The pair status "terminated" indicates an active port.

In some cases, the Power over Ethernet (PoE) port in ICX 7450 and ICX 7250 devices encounter crosstalk in single ports. An example when crosstalk is seen in single port shows the following:

```
device# show cable tdr 1/1/13
Port   Speed Local pair Pair Length Remote pair Pair status
```

```
--------- -------- ------------ --------------- ------------
1/1/13 1000M    Pair A         <50M     Pair B   terminated
                Pair B         <50M     Pair A   terminated
                Pair C         <=5M               crosstalk
                Pair D         <=5M               crosstalk
```

Mismatch in status results

When a Ruckus ICX 7450 port is connected to a Ruckus ICX7750, the VCT displays "Terminated" at the ICX 7450 end and "ImpedanMis" (impedance mismatch) at the ICX 7750. This is caused by the ICX 7750 sending high current/voltage while the remote side ICX 7450 is running at a low current/voltage.

NOTE
Electrical impedance is the measure of the opposition that a circuit presents to an applied electrical current.

VCT command syntax

To diagnose a cable using TDR, enter commands such as the following while in the privileged exec mode of the CLI.

```
device# phy cable-diagnostics tdr 1/1/1
```

NOTE
When you issue the **phy cable-diagnostics** command, the command brings the port down for a second or two, and then immediately brings the port back up.

The **clear cable-diagnostics tdr** command clears results of any previous TDR test from test registers on the specified port. It is recommended that you clear the TDR test registers before each test.

The command in the following example clears the results of any previous TDR test from the test registers on port 1/1/1.

```
device# clear cable-diagnostics tdr 1/1/1
```

Viewing the results of the cable analysis

To display the results of the cable analysis, enter the **show cable-diagnostics** command while in the privileged exec mode.

In the first example, the command displays TDR test results for port 1, slot 1 on device 1 in the stack. The results indicate that the port is down or the cable is not connected.

```
device# show cable-diagnostics tdr 1/1/1
Port      Speed Local pair Pair Length Remote pair Pair status
--------- ----- ---------- ----------- ----------- -----------
01        UNKWN Pair A     <=3 M                   Open
                Pair B     <=3 M                   Open
                Pair C     <=3 M                   Open
                Pair D     <=3 M                   Open
```

In the second test example, the TDR test results for the same port show details for an active port.

```
device# show cable-diagnostics tdr 1/1/1
Port      Speed Local pair Pair Length Remote pair Pair status
--------- ----- ---------- ----------- ----------- -----------
01        1000M Pair A     <50M        Pair B      Terminated
                Pair B     <50M        Pair A      Terminated
                Pair C     <50M        Pair D      Terminated
                Pair D     <50M        Pair C      Terminated
```

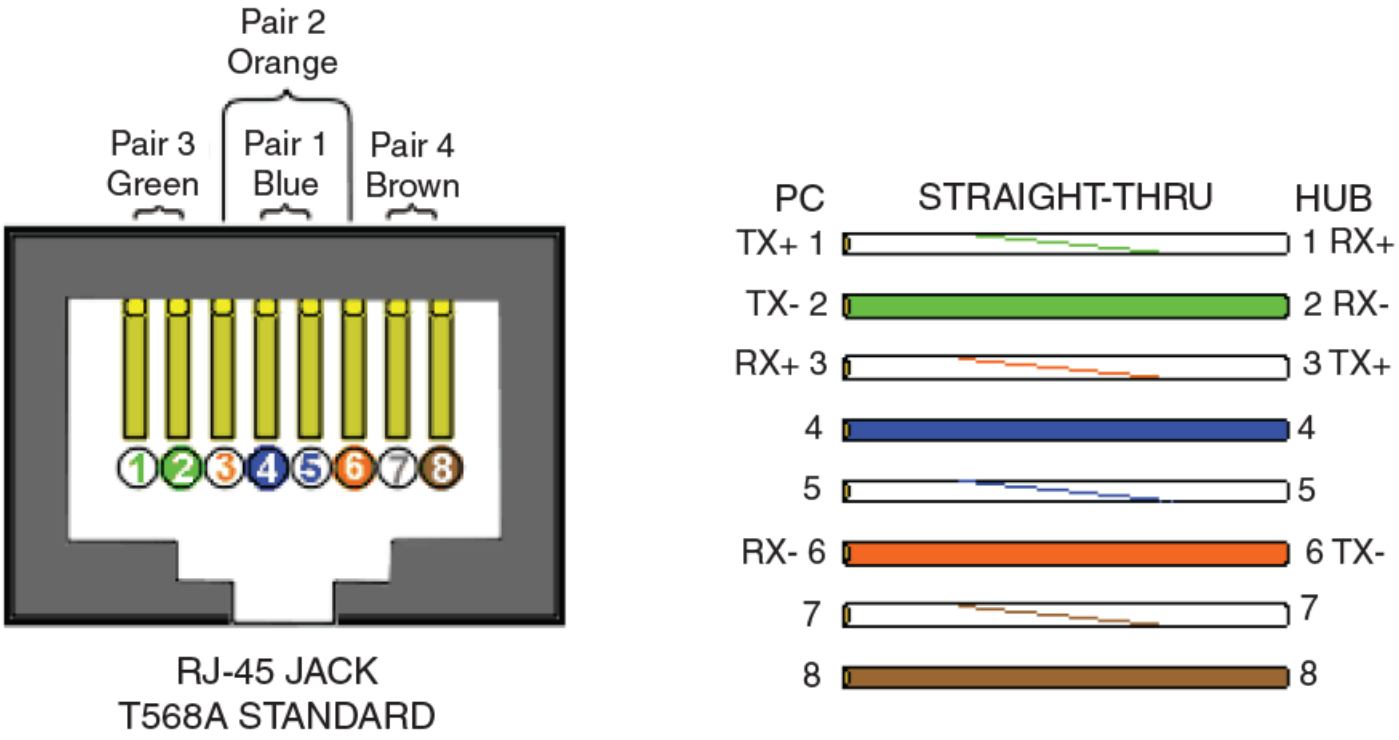
Local pair indicates the assignment of wire pairs from left to right, where Pair A is the left-most pair. The following table shows the Local pair mapping to the T568A pin/pair and color assignment from the TIA/EIA-568-B standard.

TABLE 6 Local pair definition

Local pair	T568A pair and color assignment
Pair A	Pair 3 (green)
Pair B	Pair 2 (orange)
Pair C	Pair 1 (blue)
Pair D	Pair 4 (brown)

The following figure illustrates the T568A pin/pair assignment.

FIGURE 1 T568A pin/pair assignment



Digital Optical Monitoring

Digital optical monitoring (DOM) provides a diagnostic monitoring interface for SFP and SFP+ optics used in the ICX7150 platform. DOM supports monitoring of optical output power, optical input power, temperature, laser bias current, and transceiver voltage.

You can configure your Ruckus device to monitor optical transceivers in the system, either globally or by specified ports. When DOM is enabled, the system monitors the temperature and signal power levels for the optical transceivers in the specified ports. Console messages and syslog messages are sent when optical operating conditions fall below or rise above the SFP, SFP+, and QSFP+ manufacturer-recommended thresholds.

NOTE
DOM is supported only on Ruckus Optics. DOM is supported on all the ICX switches.

Supported media types

- The following media types are supported:
  - 1G Direct Attach Active 1M
  - 1G Direct Attach Active 5M
  - 10GE USR SFP+
  - 10GE LR SFP+
  - 10GE SR SFP+
  - 10GE ER SFP+
  - 10GE ZR SFP+
  - 10GBase-BXD 10GE Bidi
  - 10GBase-BXU 10GE Bidi
  - 10GE USR SFP+ TAA
  - 10GE SR SFP+ TAA
  - 10GE SR SFP+ Low Temp
  - 10GE LR SFP+ TAA
  - 10GE LR SFP+ Low Temp
  - 10G 1m Twinax Passive copper cable
  - 10G 3m Twinax Passive copper cable
  - 10G 5m Twinax Passive copper cable
  - 1000Base-SX
  - 1000Base-LX

NOTE
LRM adapter supports only LRM optics with 10G speed. No other SFP+ optics are supported.

DOM show and configuration commands

The following commands are associated with DOM:

- **show media** — Displays information about the media devices installed per device, per slot, and per port.
- **show optic** — Displays the optical monitoring information.
- **show optic thresholds** — Displays the thresholds for a qualified optical transceiver in a particular port.
- **show optic-timer** — Displays the current DOM time interval setting.
- **optical-monitor** — Allows users to configure all ports (system-wide), a range of ports, or a single port for monitoring.
- **show lrm_adapter ethernet**— Allows users to display the LRM adapter parameters.

NOTE
The **show media** and DOM features are supported on LRM adapters. Command output remains the same as regular optics. For more information on LRM adapter, please refer the hardware installation guide for the respective product family.

Enabling DOM

Complete the following steps to enable DOM.

1. Enable optical monitor and specify the polling and alarm interval.
   - Enable optical monitoring and specify an alarm interval:

     ```
     device(config)# optical-monitor 18
     Enable optical monitoring and set alarm/warn interval to 18 minute(s)
     ```

   - Enable optical monitoring and allow the alarm interval to be set to the default (on an ICX 7450 device):

     ```
     device(config)# optical-monitor
     Enable optical monitoring and set alarm/warn interval to default(8 minutes)
     ```

     RESTRICTION
     ICX 7750 and ICX 7450 devices have an 8 minute default and minimum timer. The ICX 7250 and 7150 devices has a default and minimum timer of 3 minute.

2. Enable optical monitoring for specific ports.
   a) To enable optical monitoring on a specific port with the default polling interval, use the following command.

      ```
      device(config)# interface ethernet 1/1/1
      device(config-if-e10000-1/1/1)# optical-monitor
      ```

   b) To enable optical monitoring on a range of ports with the default polling interval, use the following command.

      ```
      device(config)# interface ethernet 1/1/1 to 1/1/2
      device(config-mif-e10000-1/1/1-1/1/2)# optical-monitor
      ```

3. Verify the alarm and warning interval.

   ```
   device(config)# show optic-timer 1/1/4
   Optical monitoring timer Interval for Port 1/1/4 is 8 mins
   ```

4. Verify media device configuration.
   a) Display information about the media devices installed per device, per stack, and per port.

```
device(config)# show media
Port 1/1/1:     Type : 1G M-C (Gig-Copper)
Port 1/1/2:     Type : 1G M-C (Gig-Copper)
Port 1/1/3:     Type : 1G M-C (Gig-Copper)
Port 1/1/4:     Type : 1G M-C (Gig-Copper)
Port 1/1/5:     Type : 1G M-C (Gig-Copper)
Port 1/1/6:     Type : 1G M-C (Gig-Copper)
Port 1/1/7:     Type : 1G M-C (Gig-Copper)
Port 1/1/8:     Type : 1G M-C (Gig-Copper)
Port 1/1/9:     Type : 1G M-C (Gig-Copper)
…
Port 1/2/1:     Type : 10GE SR 300m (SFP +)
Port 1/2/2:     Type : EMPTY
Port 1/2/3:     Type : 1G Twinax 1m (SFP)
Port 1/2/4:     Type : 1G Twinax 1m (SFP)
```

   b) Display information about the media device installed in a port.

```
device(config)# show media ethernet 1/1/17
Port 1/1/17: Type : 1GE M-SX(SFP)
            Vendor: Ruckus Networks. Version: A
            Part# : 33210-100 Serial#: TAA11106M3GV
```

   c) Verify if your optics are official Ruckus optics or another brand.

```
ICX7150-48 Router#sh media validation ethernet 1/3/3

Port       Supported   Vendor
Type
-------------------------------------------------------------
1/3/3       Yes       Ruckus       Type  : 10GE LR 10km (SFP+)
```

   DOM is supported only on Ruckus optics.

5. As a test, check the optical statistics for any enabled port.

```
device(config)# show optic 2/1/1
 Port   Temperature     Tx Power      Rx Power       Tx Bias Current
+-----+-------------+-------------+--------------+---------------------+
2/1/1   32.2578 C    -002.5157 dBm  -002.8091 dBm    5.966 mA
        Normal       Normal         Normal           Normal
```

6. Verify the optic warning and alarm thresholds for any enabled port.

```
device(config)# show optic threshold 2/1/1
```

Configuration example

The following example shows a complete configuration and verification of digital optical monitoring.

```
device(config)# optical-monitor 8 >>>>> Global
Enable optical monitoring and set alarm/warn interval to 8 minute(s)

device(config)# interface ethernet 1/2/1 >>>>> For a specific port
device(config-if-e10000-1/2/1)# optical-monitor

device(config)# show optic-timer 1/1/4
Optical monitoring timer Interval for Port 1/1/4 is 8 mins

device(config)# show media >>>>>>> Global
Port 1/1/1:     Type : 1G M-C (Gig-Copper)
Port 1/1/2:     Type : 1G M-C (Gig-Copper)
```

```
Port 1/1/3:     Type : 1G M-C (Gig-Copper)
…
Port 1/2/1:     Type : 10GE SR 300m (SFP +)
Port 1/2/2:     Type : 10GE     Twinax 1m (SFP +)
Port 1/2/3:     Type : 1G Twinax 1m (SFP)
Port 1/2/4:     Type : 1G Twinax 1m (SFP)

device(config)# show media ethernet 1/2/1 >>>>> For a specific port
Port 1/2/1: Type : 1GE M-SX(SFP)
            Vendor: Ruckus Networks. Version: A
            Part# : 33210-100 Serial#: TAA11106M3GV

device(config)# show media validation
Port     Supported         Vendor                              Type
-------------------------------------------------------------
1/2/1     Yes                        FINISAR CORP.     1GE M-SX(SFP)
1/2/2     Yes                        Ruckus                              10GE     Twinax 1m (SFP +)
2/2/1     Yes                        Ruckus                              10GE     SR 300m (SFP +)
2/2/3     Yes                     Ruckus                              10GE     SR 300m (SFP +

device(config)# show optic 2/1/1
 Port   Temperature     Tx Power      Rx Power       Tx Bias Current
+-----+-------------+-------------+--------------+------------------+
2/1/1   32.2578 C    -002.5157 dBm  -002.8091 dBm    5.966 mA
        Normal       Normal         Normal           Normal

device(config)# show optic threshold 1/3/1
Port 1/3/1 sfp monitor thresholds:
Temperature High alarm             5d00     93.0000 C
Temperature Low alarm              f300    -13.0000 C
Temperature High warning           5800     88.0000 C
Temperature Low warning            f800     -8.0000 C
Supply Voltage High alarm          9088      3.7000 Volts
Supply Voltage Low alarm           7148      2.9000 Volts
Supply Voltage High warning        8ca0      3.6000 Volts
Supply Voltage Low warning         7530      3.0000 Volts
TX Bias High alarm                 170c     11.0800 mA
TX Bias Low alarm                  07d0      4.0000 mA
TX Bias High warning               1518     10.0800 mA
TX Bias Low warning                09c4      5.0000 mA
TX Power High alarm                207e   -000.7998 dBm
TX Power Low alarm                 09d0   -005.9998 dBm
TX Power High warning              19cf   -001.7999 dBm
TX Power Low warning               0c5a   -005.0003 dBm
RX Power High alarm                2710    000.0000 dBm
RX Power Low alarm                 0064   -020.0000 dBm
RX Power High warning              1f07   -001.0001 dBm
RX Power Low warning               009e   -018.0134 dBm
```

Syslog messages for optical transceivers

The system generates Syslog messages for optical transceivers in the following circumstances:

- The temperature, supply voltage, TX Bias, TX power, or TX power value goes above or below the high or low warning or alarm threshold set by the manufacturer.
- The optical transceiver does not support digital optical monitoring.
- The optical transceiver is not qualified, and therefore not supported by Ruckus.

For details about the above Syslog messages, refer to Syslog messages for optical transceivers.

FastIron Fiber-optic Transceivers

The fiber-optic transceivers listed in the following table are supported on all FastIron devices.

TABLE 7 FastIron fiber-optic transceivers

Label	Type	Ruckus part number	Supports Digital Optical Monitoring?
10G-SFPP-ER	10GBase-ER SFP+, 40 km	57-0000085-01	Yes
10G-SFPP-LR	10GE LR SFP+	57-0000076-01	Yes
10G-SFPP-LRM	10GBase-LRM SFP+	57-0000084-01	Yes
10G-SFPP-SR	10GE SR SFP+	57-0000075-01	Yes
10G-SFPP-TWX-0101	FCoE 1M Active Cable	58-1000026-01	No
10G-SFPP-TWX-0301	FCoE 3M Active Cable	58-1000027-01	No
10G-SFPP-TWX-0501	FCoE 5M Active Cable	58-1000023-01	No
10G-SFPP-USR	10GE Ultra Short Reach (USR) SFP+ 100m on OM3 MMF	57-1000130-01	Yes
10GE ZR SFPP	10GE ZR 80km (SFP+) 1550.0 nm	57-1000180-01	Yes
40G-QSFP-C-0101[1]	40GE QSFP Direct Attached Copper Cable, 1m	58-0000033-01	No
40G-QSFP-C-0501 [1]	40GE QSFP Direct Attached Copper Cable, 5m)	58-0000035-01	No
40GBASE-ESR4 QSFP+[1]	40GE-ESR4 300m (QSFP+)	57-1000296-01	Yes
40GBase-LM4 QSFP+[1]	40GE-LM4 140m (QSFP+ LC)	57-1000325-01	Yes
40GE QSFP to QSFP cable - 10m AOC	40GE Active Copper 10m (QSFP +)	57-1000306-01	No
40GE QSFP+ 5m cable[1]	40GE Active Copper 4m (QSFP+)	57-0000035-01	No
40GE-LR4 [1]	40GE-LR4 10km (QSFP + LC)	57-1000263-01	Yes
40GE-SR4 [1]	100m (QSFP+)	57-1000128-1	Yes
E1MG-100FX-IR-OM	100Base-FX-IR, 15 km	33225-100	Yes
E1MG-100FX-LR-OM	100Base-FX-LR, 40 km	33226-100	Yes
E1MG-100FX-OM	100Base-FX	33224-100	Yes
E1MG-BXD	1000Base-BXD	33005-000	No
E1MG-BXU	1000Base-BXU	33006-000	No
E1MG-LHA-OM	1000Base-LHA	57-0000194-01	Yes
E1MG-LHB	1000Base-LHB	33004-000	No
E1MG-LX-OM	1000Base-LX	33211-100	Yes
E1MG-SX-OM	1000Base-SX	33210-100	Yes
E1MG-TX	1000Base-T Copper	33002-100	No

Port Mirroring and Monitoring

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Port mirroring and monitoring overview

Port mirroring is a method of monitoring network traffic that forwards a copy of each incoming or outgoing packet from one port on a network switch to another port where the packet can be analyzed. Port mirroring can be used as a diagnostic tool or debugging feature, especially for preventing attacks. Port mirroring can be managed locally or remotely.

You can configure port mirroring, by assigning a port (known as the Monitor port), from which the packets are copied and sent to a destination port (known as the Mirror port). All packets received on the Monitor port or issued from it, are forwarded to the second port. You next attach a protocol analyzer on the mirror port to monitor each segment separately. The analyzer captures and evaluates the data without affecting the client on the original port.

The mirror port may be a port on the same switch with an attached RMON probe, a port on a different switch in the same hub, or the switch processor.

Port mirroring and monitoring configuration

To configure port monitoring, first specify the mirror port, then enable monitoring on the monitored port.

The *mirror port* is the port to which the monitored traffic is copied. Attach your protocol analyzer to the mirror port. The monitored port is the port with the traffic you want to monitor.

The following table lists the number of mirror and monitor ports supported on the Ruckus devices.

TABLE 8 Number of mirror and monitor ports supported

Maximum number supported	
Port Type	**ICX** (7450, 7250, 7750)
Ingress mirror ports	1 per port region
Egress mirror ports	1 per port region
Ingress monitored ports	No limit
Egress monitored ports	8

NOTE
You can configure more than eight egress ports, although only the first eight are operational. This is also true for mirrored VLANs - more than eight can be configured, but only the first eight are operational.

Configuration notes for port mirroring and monitoring

Refer to the following guidelines when configuring port mirroring and monitoring:

- If you configure both ACL mirroring and ACL-based rate limiting on the same port, then all packets that match are mirrored, including the packets that exceed the rate limit.
- ICX Series devices support sFlow and port monitoring together on the same port.
- You can configure a mirror port specifically as an ingress port, an egress port, or both.
- Mirror ports can run at any speed and are not related to the speed of the ingress or egress monitored ports.
- The same port cannot be both a monitored port and the mirror port.
- The same port can be monitored by one mirror port for ingress traffic and another mirror port for egress traffic.
- The mirror port cannot be a trunk port.
- The monitored port and its mirror port do not need to belong to the same port-based VLAN:
  - If the mirror port is in a *different* VLAN from the monitored port, the packets are tagged with the monitor port VLAN ID.
  - If the mirror port is in the *same* VLAN as the monitored port, the packets are tagged or untagged, depending on the mirror port configuration.
- More than one monitored port can be assigned to the same mirror port.
- If the LAG virtual interface is enabled for monitoring, the entire LAG is monitored. You can also enable an individual member ports of a LAG for monitoring using the **monitor** command from the LAG configuration mode.
- For *stacked* devices, if the ingress and egress analyzer ports are always network ports on the local device, each device may configure the ingress and egress analyzer port independently. However, if you need to mirror to a remote port, then only one ingress and one egress analyzer port are supported for the enitre system.
- For ingress ACL mirroring, the ingress rule for stacked devices also applies. The analyzer port setting command **acl-mirror-port** must be specified for each port, even though the hardware only supports one port per device. This applies whether the analyzer port is on the local device or on a remote device. For example, when port mirroring is set to a remote device, any mirroring-enabled ports (ACL, MAC address filter, or VLAN) enabled ports are set globally to a single analyzer port, as shown in the following example.

```
device(config)# mirror ethernet 1/1/24
device(config)# mirror ethernet 2/1/48
device(config)# interface ethernet 1/1/1
device(config-if-e1000-1/1/1)# monitor ethernet 2/1/48 both
```

The analyzer port (2/1/48) is set to all devices in the system.

```
device(config)# interface ethernet 1/1/2
device(config-if-e1000-1/1/2)# ip access-group 101 in
device(config-if-e1000-1/1/2)# interface ethernet 1/1/1
device(config-if-e1000-1/1/1)# acl-mirror-port ethernet 2/1/48
```

The previous command is required even though the analyzer port is already set globally by the port mirroring command.

```
device(config)# interface ethernet 1/1/3
device(config-if-e1000-1/1/3)# ip access-group 101 in
device(config-if-e1000-1/1/3)# acl-mirror-port ethernet 2/1/48
device(config-if-e1000-1/1/3)# ip access-group 102 in
```

Commands for port mirroring and monitoring

This section describes how to configure port mirroring and monitoring.

Monitoring a port

To configure port monitoring on an individual port on a Ruckus device, enter commands similar to the following.

```
device(config)# mirror-port ethernet 1/2/4
device(config)# interface ethernet 1/2/11
device(config-if-e1000-11)# monitor ethernet 1/2/4 both
```

To display the port monitoring configuration, use the **show monitor** and **show mirror** commands.

Monitoring an individual LAG port

You can monitor the traffic on an individual port of a static LAG group, and on an individual port of an LACP LAG group.

By default, when you monitor the LAG virtual interface, aggregated traffic for all the ports in the LAG is copied to the mirror port. You can configure the device to monitor individual ports in a LAG as well.

To configure port monitoring on an individual port in a LAG, enter commands such as the following.

```
device(config)# lag automation static id 1
device(config-lag-automation)# ports ethernet 1/1/2 to 1/1/9
device(config-lag-automation)# exit
device(config)# mirror-port ethernet 1/1/1
device(config)# lag automation
device(config-lag-automation)# monitor ethe-port-monitored 1/1/2 ethernet 1/1/1 both

device# show mirror
Mirror port 1/1/1
  Input monitoring      : (U1/M1)   1
  Output monitoring     : (U1/M1)   1

device# show mirror ethernet 1/1/1
Mirror port 1/1/1
  Input monitoring      : (U1/M1)   1
  Output monitoring     : (U1/M1)   1

device# show running-config | i mirror
mirror-port ethernet 1/1/1

device# show running-config | i monitor ethernet
monitor ethe-port-monitored 1/1/2 ethe 1/1/1 both
```

Traffic on LAG port e 1/1/2 is monitored, and the monitored traffic is copied to port e 1/1/1, the mirror port.

Mirroring configuration on a traditional stack

You can configure mirroring on a Ruckus traditional stack. A traditional stack consists of up to twelve FastIron devices of the same type. The stack operates as a chassis. The following examples show how to configure mirroring for ports that are on different members of a stack, and for ports that are on the same stack member as the mirror port.

Configuration notes for traditional stack mirroring

The following mirroring configuration information applies to FastIron devices connected in a traditional stack topology:

- The input or output mirroring port can be on different ports.
- All FastIron devices can have one mirroring port that monitors multiple ports, but cannot have multiple mirror ports for one monitored port.
- If the mirror port and the monitored ports are on different stack units, only one active mirror port is allowed for the entire traditional stack.

- If the mirror port and the monitored ports are on the same port region, multiple active mirror ports are allowed for the entire traditional stack. Devices in a traditional stack support 24 ports per port region.
- The maximum number of monitored VLANs on a traditional stack is 8.

Configuring mirroring for ports on different members in a traditional stack example

In this example, although two ports are configured as active ports, only one active mirror port (port 1/1/24) is allowed for the entire stack because the mirror ports and the monitored ports are on different stack members.

```
device(config)# mirror-port ethernet 1/1/24
device(config)# mirror-port ethernet 2/1/24
device(config)# interface ethernet 1/1/1
device(config-if-e1000-1/1/1)# monitor ethernet 1/1/24 both
device(config-if-e1000-1/1/1)# exit
device(config)# interface ethernet 2/1/1
device(config-if-e1000-2/1/1)# monitor ethernet 1/1/24 both
device(config-if-e1000-2/1/1)# exit
device(config)# interface ethernet 4/1/1
device(config-if-e1000-4/1/1)# monitor ethernet 1/1/24 both
```

Configuring mirroring for ports on the same stack member in a traditional stack example

In this example, the mirror ports are assigned to different monitor ports.

```
device(config)# mirror-port ethernet 1/1/24
device(config)# mirror-port ethernet 2/1/24
device(config)# mirror-port ethernet 3/1/24
device(config)# mirror-port ethernet 4/1/24
device(config)# interface ethernet 1/1/1
device(config-if-e1000-1/1/1)# monitor ethernet 1/1/24 both
device(config)# exit
device(config)# interface ethernet 2/1/1
device(config-if-e1000-2/1/1)# monitor ethernet 2/1/24 both
device(config)# exit
device(config)# interface ethernet 4/1/1
device(config-if-e1000-4/1/1)# monitor ethernet 4/1/24 both
```

Mirroring in a Campus Fabric domain

In a Campus Fabric domain, you can mirror ports in an ICX 7450 PE unit, an ICX 7250 PE unit, or an ICX 7750 CB unit. Campus Fabric supports port mirroring, VLAN mirroring, and ACL mirroring with a mirror clause.

Campus Fabric mirroring limitations

- Only one mirror port can be configured on a PE unit for port mirroring.
- When an SPX LAG is mirrored, all traffic is monitored. It is not possible to limit monitoring to an individual LAG port.
- Due to a hardware limitation, a PE mirror port cannot mirror egress flooding, for example, from broadcast, unknown unicast, or multicast traffic.
- A VLAN must have at least one port member configured before monitoring can be configured.
- All incoming traffic (tagged and untagged) in the VLAN is mirrored. Mirroring is not affected by the configuration of the mirror port itself.

Supported Campus Fabric mirroring scenarios

The following mirroring scenarios are possible in a Campus Fabric domain :

- Mirroring a port on any CB unit, monitoring from any CB port on any CB unit
- Mirroring a CB port, monitoring from a PE port (supported for port-based mirroring; not supported for ACL mirroring)

  NOTE
  If you are monitoring a CB port from a PE port, the monitoring port is configured as a virtual PE port on the CB, and traffic is transmitted to and from the virtual port with an E-tag addressed to the port. Packets are copied out to the mirroring port with the E-tag intact. As a result, the monitoring device receive packets containing the E-tag.

- Mirroring a port on a PE unit, monitoring from another port on the same PE unit
- Mirroring of a CB port, monitoring from a PE port when VLAN mirroring is enabled.

Unsupported Campus Fabric mirroring configurations

The following scenarios are not supported in a Campus Fabric domain:

- Mirroring a port on one PE unit, monitoring a port from a different PE unit

  NOTE
  If the CB determines the mirror port is configured on a PE port, and the monitoring port is on a different PE, the system blocks the configuration and displays a warning similar to the following message:
  `Mirror port 17/1/1 and monitor port 18/1/2 are not on the same PE. Either move mirror port to a CB port, or change mirror and monitor port to the same PE.`

- With ACL mirroring, PE to CB or CB to PE monitoring
- With VLAN mirroring, PE cannot be used as a mirror port
- Monitoring an individual SPX LAG member

Sample configuration for Campus Fabric mirroring

The following example configures port 1/1/7 on the CB as a mirror port that monitors inbound traffic on PE port 17/1/1.

```
device# configure terminal
device(config)# mirror-port ethernet 1/1/17
device(config)# interface ethernet 17/1/1
device(config-if-pe-e1000-17/1/1)# monitor ethernet 1/1/17 in
```

Displaying Campus Fabric mirroring information

The **show mirror** command can be used to display information on mirroring activity for the device. The following example displays information on mirroring on CB units 1 and 2. PE units 17 and 18 are being monitored.

```
device# show mirror
Mirror port 1/1/17
  Input monitoring      : (U17/M1)   1   2   3  11
  Input monitoring      : (U17/M2)   1
  Output monitoring     : (U17/M1)   1   2   3  11
  Output monitoring     : (U17/M2)   1
Mirror port 2/1/20
  Input monitoring      : (U17/M1)  10
```

```
Input monitoring      : (U18/M1)   1
Output monitoring     : (U17/M1)  10
Output monitoring     : (U18/M1)   1
```

ACL-based inbound mirroring

This section describes ACL-based inbound mirroring for FastIron devices.

NOTE
ACL-based mirroring is not supported in an 802.1br SPX domain.

Creating an ACL-based inbound mirror clause

The following example shows how to configure an ACL-based inbound mirror clause.

1. Configure the mirror port.

```
device(config)# mirror-port ethernet 1/1/2
```

2. Configure the ACL-based inbound mirror clause.

```
device(config)# access-list 101 permit ip any any mirror
```

3. Apply the ACL-based inbound clause to the monitor port.

```
device(config)# interface ethernet 1/1/5
device(config-if-e1000-1/1/5)# ip access-group 101 in
```

4. Create the ACL mirror port.

```
device(config-if-e1000-1/1/5)# acl-mirror-port ethernet 1/1/2
```

To verify ACL mirror settings, enter the **show access-list all** command.

```
device# show access-list all
Extended IP access list 101
permit ip any any mirror
```

Destination mirror port

You can specify physical ports or a trunk to mirror traffic. If you complete the rest of the configuration but do not specify a destination mirror port, the port-mirroring ACL is non-operational. This can be useful if you want to be able to mirror traffic by a set criteria on demand. With this configuration, you configure a destination mirror port whenever you want the port-mirroring ACL to become operational.

The following sections describe how to specify a destination port for a port or a trunk, as well as the special considerations required when mirroring traffic from a virtual interface.

Specifying the destination mirror port for physical ports

When you want traffic that has been selected by ACL-based inbound mirroring to be mirrored, you must configure a destination mirror port. This configuration is performed from the interface configuration mode of the port with the traffic you are mirroring. The destination port must be the same for all ports in a port region as described in Ports from a port region must be mirrored to the same destination mirror port.

In the following example, ACL mirroring traffic from port 1/1/1 is mirrored to port 1/1/3.

```
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1)# acl-mirror-port ethernet 1/1/3
```

Ports from a port region must be mirrored to the same destination mirror port

Port regions are important when defining a destination mirror port. This is because all traffic mirrored from any single port in a port region is mirrored to the same destination mirror port as traffic mirrored from any other port in the same port region. For example, ports 1/1/1 to 1/1/2 are in the same port region. If you configure ports 1/1/1 and 1/1/2 to mirror their traffic, they should use the same destination mirror port as shown in the following configuration.

```
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1/1)# acl-mirror-port ethernet 1/2/3
device(config)# interface ethernet 1/1/2
device(config-if-e10000-1/1/2)# acl-mirror-port ethernet 1/2/3
```

If ports within the same port region are mirrored to different destination ports, the configuration is disallowed, and an error message is generated, as shown in the following example.

```
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1/1)# acl-mirror-port ethernet 1/4/3
device(config)#interface ethernet 1/1/2
device(config-if-e10000-1/1/2)# acl-mirror-port ethernet 1/4/7
Error - Inbound Mirror port 1/4/3 already configured for port region 1/1/1 - 1/1/12
```

When a destination port is configured for any port within a port region, traffic from any ACL with a mirroring clause assigned to any port in that port region is mirrored to that destination port. This will occur even if a destination port is not explicitly configured for the port with the ACL configured. In the following example, an ACL with a mirroring clause (101) is applied to a port (1/1/1). Another port in the same region (1/1/3) has a destination port set (1/4/3). In this example, traffic generated from operation of ACL 101 is mirrored to port 1/4/3 even though a destination port has not explicitly been defined for traffic from port 1/1/1.

```
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1/1)# ip access-group 101 in
device(config)# interface ethernet 1/1/3
device(config-if-e10000-1/1/3)# acl-mirror-port ethernet 1/4/3
```

NOTE
If a destination mirror port is not configured for any ports within the port region where the port-mirroring ACL is configured, the ACL does not mirror the traffic but the ACL is applied to traffic on the port.

Specifying the destination mirror port for LAG ports

You can mirror the traffic that has been selected by ACL-based inbound mirroring from a LAG by configuring a destination port for the LAG virtual interface within the LAG configuration, as shown in the following example.

```
device(config)# lag blue static id 1
device(config-lag-blue)# ports ethernet 1/1/1 to 1/1/4
device(config)# interface lag 1
device(config-lag-if-lg1)# acl-mirror-port ethernet 1/1/8
```

Using this configuration, all LAG traffic is mirrored to port 1/1/8.

Limitations when configuring ACL-based mirroring with LAGs

The **config-trunk-ind** command cannot operate with ACL-based mirroring:

- If a LAG is configured with the **config-trunk-ind** command, ACL-based mirroring will not be allowed.

- If the **config-trunk-ind** command is added to a LAG, any ports that are configured for ACL-based mirroring will have monitoring removed and the following message is displayed.

```
Trunk port monitoring, if any, has been removed.
```

If an individual port is configured for ACL-based mirroring, you cannot add it to a LAG. If you try to add a port that is configured for ACL-based mirroring to a LAG, the following message appears.

```
Note - ACL-mirror-port configuration is removed from port 2 in new trunk.
```

NOTE
If you want to add a port configured for ACL-based mirroring to a LAG, you must first remove the **acl-mirror-port** command from the port configuration. You can then add the port to a LAG that can then be configured for ACL-based LAG mirroring.

Behavior of ACL-based mirroring when deleting LAGs

If you delete a LAG that has ACL-based mirroring configured, the ACL-based mirroring configuration is configured on the individual ports that made up the LAG.

For example, if a LAG is configured as shown in the following example and is then deleted from the configuration as shown, each of the ports that were previously contained in the LAG is configured for ACL-based mirroring.

```
device(config)# lag test static id 111
device(config-lag-test)# ports ethernet 1/1/1 to 1/1/2
device(config-lag-test)# exit
device(config)# interface lag 111
device(config-lag-if-lg111)# acl-mirror-port ethernet 1/1/38
```

To delete the LAG, enter the following command.

```
device(config)# no lag test
```

Configuring ACL-based mirroring for ACLs bound to virtual interfaces

For configurations that have an ACL configured for ACL-based mirroring bound to a virtual interface, you must use the **ACL-mirror-port** command on a physical port that is a member of the same VLAN as the virtual interface. Additionally, only traffic that arrives at ports that belong to the same port group as the physical port where the **ACL-mirror-port** command has been used is mirrored. This follows the same rules described in Ports from a port region must be mirrored to the same destination mirror port on page 71.

For example, in the following configuration, ports 1/4/1, 1/4/2, and 1/5/3 are in VLAN 10 with ve 10. Ports 1/4/1 and 1/4/2 belong to the same port group, while port 1/5/3 belongs to another port group.

```
device(config)# vlan 10
device(config-vlan-10)# tagged ethernet 1/4/1 to 1/4/2
device(config-vlan-10)# tagged ethernet 1/5/3
device(config-vlan-10)# router-interface ve 10
device(config)# interface ethernet 1/4/1
device(config-if-e10000-1/4/1)# ACL-mirror-port ethernet 1/5/1
device(config)# interface ve 10
device(config-vif-10)# ip address 10.10.10.254/24
device(config-vif-10)# ip access-group 102 in
device(config)# access-list 102 permit ip any any mirror
```

In this configuration, the **ACL-mirror-port** command is applied to port 1/4/1, which is a member of ve 10. Because of this, ACL-based mirroring will only apply to VLAN 10 traffic that arrives on ports 1/4/1 and 1/4/2. It will not apply to VLAN 10 traffic that arrives on port 1/5/3 because that port belongs to a port group different from ports 1/4/1 and 1/4/2. This is because if you apply

ACL-based mirroring on an entire VE, and enable mirroring in only one port region, traffic that is in the same VE but on a port in a different port region will not be mirrored.

To make the configuration apply ACL-based mirroring to VLAN 10 traffic arriving on port 1/5/3, you must add the following commands to the configuration.

```
device(config)# interface ethernet 1/5/3
device(config-if-e10000-1/5/3)# ACL-mirror-port ethernet 1/5/1
```

If a port is in both mirrored and non-mirrored VLANs, only traffic on the port from the mirrored VLAN is mirrored. For example, the following configuration adds VLAN 20 to the previous configuration. In this example, ports 1/4/1 and 1/4/2 are in both VLAN 10 and VLAN 20. ACL-based mirroring is only applied to VLAN 10. Consequently, traffic that is on ports 1/4/1 and 1/4/2 that belongs to VLAN 20 will not be mirrored.

```
device(config)# vlan 10
device(config-vlan-10)# tagged ethernet 1/4/1 to 1/4/2
device(config-vlan-10)# tagged ethernet 1/5/3
device(config-vlan-10)# router-interface ve 10
device(config)# vlan 20
device(config-vlan-20)# tagged ethernet 1/4/1 to 1/4/2
device(config)# interface ethernet 1/4/1
device(config-if-e10000-1/4/1)# ACL-mirror-port ethernet 1/5/1
device(config)# interface ve 10
device(config-vif-10)# ip address 10.10.10.254/24
device(config-vif-10)# ip access-group 102 in
device(config)# access-list 102 permit ip any any mirror
```

MAC address filter-based mirroring

This feature allows traffic entering an ingress port to be monitored from a mirror port connected to a data analyzer, based on specific source and destination MAC addresses. This feature supports mirroring of inbound traffic only. Outbound mirroring is not supported.

MAC-filter-based mirroring allows a user to specify a particular stream of data for mirroring using a filter. This eliminates the need to analyze all incoming data to the monitored port. To configure MAC-filter-based mirroring, the user must perform three steps:

1. Define a mirror port
2. Create a MAC address filter with a mirroring clause
3. Apply the MAC address filter to an interface

MAC address filter-based mirroring configuration notes

- If there is no input mirror port configured, MAC-filter based mirroring does not take effect. It remains in the configuration, but is not activated.
- MAC-filter-based mirroring can be enabled on a port at the same time as either port-based mirroring or VLAN-based mirroring. When port-based mirroring and MAC-filter-based mirroring are enabled on a port at the same time, the preference order is port-based mirroring followed by MAC-based filtering. When VLAN-based mirroring and MAC-filter-based mirroring are enabled on a port at the same time, the preference order is VLAN-based mirroring and MAC-filter-based mirroring.
- Port-based mirroring and VLAN-based mirroring can not be enabled on a port at the same time.

Configuring MAC address filter-based mirroring

1. Enter configuration mode.

```
device# configure terminal
```

2. Activate mirroring on the port by using the **mirror** command.

```
device(config)# mirror ethernet 1/1/14
```

3. Add the **mirror** keyword.

```
device(config)# mac filter 1 permit 0000.0011.2222 ffff.ffff.ffff 0000.0022.3333 ffff.ffff.ffff
mirror
```

   The keyword is added to MAC address filter clauses to direct desired traffic to the mirror port. In the following example, the MAC address filter directs traffic to a mirror port. In this example, any flow matching the source address (SA) 0000.0011.2222 and the destination address (DA) 0000.0022.3333 is mirrored. Other flows are not mirrored.

4. Apply the MAC address filter to the interface.

```
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1/1)# mac filter-group 1
```

5. Configure the monitor port to use the mirror port.

```
device(config)# interface ethernet 1/1/5
device(config-if-e10000-1/1/5)# acl-mirror-port ethernet 1/1/14
```

VLAN-based mirroring

NOTE
VLAN-based mirroring is supported on ICX 7750, ICX 7450 and ICX 7250 devices.

The VLAN-based mirroring feature allows users to monitor all incoming traffic in one or more VLANs by sending a mirror image of that traffic to a configured mirror port. This feature meets the requirements of CALEA (Communications Assistance for Law Enforcement Act of 1994).

Configuration notes for VLAN-based mirroring

The following guidelines apply to VLAN-based mirroring configurations:

- A VLAN must have at least one port member configured before monitoring can be configured.
- Multiple VLANs can have monitoring enabled at the same time, and the maximum number of monitor-configured VLANs is 8.
- The mirror port is subject to the same scheduling and bandwidth management as the other ports in the system. If the amount of traffic being sent to the mirror port exceeds the available bandwidth, some of that traffic may be dropped.
- All incoming traffic (tagged and untagged) in the VLAN is mirrored. mirroring is "as-is", and is not affected by the configuration of the mirror port itself. Incoming tagged traffic is sent out tagged and incoming untagged traffic is sent out untagged, regardless of which VLANs the mirror port belongs to, and whether the mirror port is tagged or untagged.
- VLAN-based mirroring is supported on Layer 2 and Layer 3 images.

Configuring VLAN-based mirroring

Configure VLAN-based mirroring using the **monitor ethernet** command in VLAN configuration mode. For example, to enable mirroring on VLANs 10 and 20, to mirror port e 1/1/21, enter the following commands.

```
device(config)# mirror-port ethernet 1/1/21 input
device(config)# vlan 10
device(config-VLAN-10)# monitor ethernet 1/1/21
device(config-VLAN-10)# exit
device(config)# vlan 20
device(config-VLAN-20)# monitor ethernet 1/1/21
device(config-VLAN-20)# end
```

To disable mirroring on VLAN 20, enter the following commands.

```
device(config)# vlan 20
device(config-VLAN-20)# no monitor ethernet 1/1/21
device(config-VLAN-20)# end
```

Displaying VLAN-based mirroring status

The **show vlan** command displays the VLAN-based mirroring status.

```
device# show vlan
Total PORT-VLAN entries: 4
Maximum PORT-VLAN entries: 4060
Legend: [Stk=Stack-Unit, S=Slot]
PORT-VLAN 1, Name DEFAULT-VLAN, Priority level0, Spanning tree On
 Untagged Ports: (Stk0/S1)    3    4    5    6    7    8    9   10   11   12   13   14
 Untagged Ports: (Stk0/S1)   15   16   17   18   19   20   21   22   23   24   25   26
 Untagged Ports: (Stk0/S1)   27   28   29   30   31   32   33   34   35   36   37   38
 Untagged Ports: (Stk0/S1)   39   40   41   42   43   44   45   46   47   48
 Untagged Ports: (Stk0/S2)    1    2
   Tagged Ports: None
   Uplink Ports: None
 DualMode Ports: None
 Mac-Vlan Ports: None
     Monitoring: Disabled
PORT-VLAN 10, Name [None], Priority level0, Spanning tree On
 Untagged Ports: (Stk0/S1)    1
   Tagged Ports: None
   Uplink Ports: None
 DualMode Ports: None
 Mac-Vlan Ports: None
     Monitoring: Enabled
PORT-VLAN 20, Name [None], Priority level0, Spanning tree On
 Untagged Ports: (Stk0/S1)    2
   Tagged Ports: None
   Uplink Ports: None
 DualMode Ports: None
 Mac-Vlan Ports: None
     Monitoring: Disabled
```

Encapsulated Remote Switched Port Analyzer (ERSPAN)

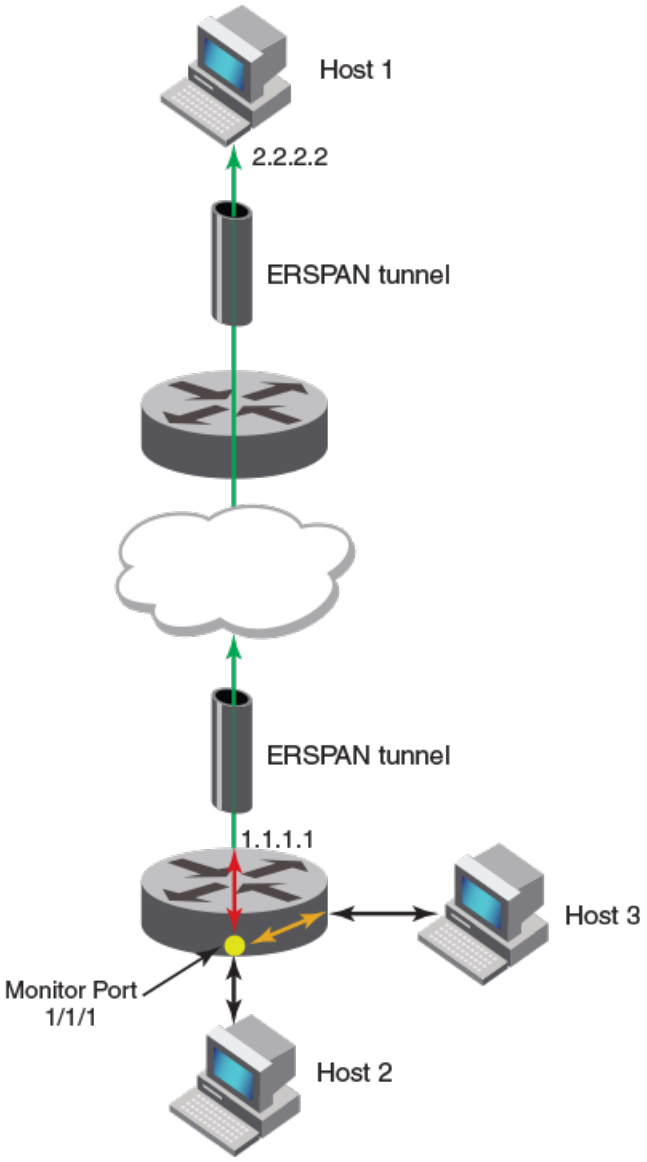
ERSPAN allows mirroring of packets across a Layer 3 network. Using ERSPAN, you can encapsulate monitored traffic and send it to an analysis station not directly connected to the switch.

ERSPAN encapsulates mirrored packets using GRE with IP delivery. After a packet has been encapsulated, it is forwarded throughout the Layer 3-routed network across a special Layer 3 tunnel. The data section contains the original mirrored packet.

With ERSPAN, port mirroring, from any port to any port, is enabled regardless of the port type and the modularity of the device.

The following figure shows a typical ERSPAN data flow. In the figure, traffic going into and out of the monitor port (in this case, traffic between Host 2 and Host 3) is also sent to Host 1, across the ERSPAN tunnel.

FIGURE 2 ERSPAN data flow



The monitored traffic can be configured to all possible directions of the monitor port. You can configure ingress traffic only, egress traffic only, or both ingress and egress traffic.

ERSPAN is available only in Layer 3.

ERSPAN configuration steps

You must complete the following tasks to enable ERSPAN:

- Configure the ERSPAN profile.
- Configure the monitor port.

ERSPAN feature limitations

- The maximum number of mirroring sessions per device is four.
- VLAN mirroring is not supported.
- In some cases, speed mismatches may prevent mirroring of all traffic.
- You cannot terminate the Generic Routing Encapsulation (GRE) tunnel on an ICX switch. ERSPAN must be terminated on the host/analyzer.
- ERSPAN has not been tested against implementations by other vendors.

Configuring an ERSPAN profile

An ERSPAN profile defines a tunnel over a Layer 3 network from a router to a remote host. Mirrored packets can then be sent to this remote host.

The router must have a configured IP on at least one of the interfaces.

1. Enter global configuration mode.

   ```
   device# configure terminal
   ```

2. Create an ERSPAN profile and assign it a number.

   ```
   device(config)# monitor-profile 1 type erspan
   ```

   This command puts you in monitor-profile mode.

3. Enter the IP address of the source router.

   ```
   device(config-monitor-profile 1)# source-ip 10.1.1.1
   ```

   The IP address can be any IP on the router.

4. Enter the IP address of the destination host.

   ```
   device(config-monitor-profile 1)# destination-ip 1.1.1.1
   ```

   The IP address is for the host that is collecting the mirrored traffic, not the device.

5. Exit monitor-profile mode.

   ```
   device(config-monitor-profile 1)# exit
   ```

6. Verify the configuration.

```
device(config)# show erspan profile 1
Profile 1
Type             ERSPAN
Mirror destination reachable.*/Error condition - Mirror destination Not reachable/*
Destination IP   10.1.1.100
Destination MAC  0000.0000.0000
Source IP        10.1.1.1
Source MAC       cc4e.0000.0000
Ports monitored:
  Input monitoring      : (U1/M1)   1
  Output monitoring     : (U1/M1)   1
HW destination id for each device:
stack_id/device:dest_id
```

If `Mirror destination Not reachable.` appears in the output, see the section Troubleshooting ERSPAN reachability errors on page 78.

ERSPAN profile configuration example

```
device# configure terminal
device(config)# monitor-profile 1 type erspan
device(config-monitor-profile 1)# source-ip 10.1.1.1
device(config-monitor-profile 1)# destination-ip 10.1.1.100
device(config-monitor-profile 1)# exit
device(config)# show erspan profile 1
```

Next, you need to configure the monitor port.

Troubleshooting ERSPAN reachability errors

Follow these examples to troubleshoot and resolve ERSPAN destination not reachable errors.

```
device(config)# show erspan profile 1
Profile 1
Type             ERSPAN
Mirror destination Not reachable.
Reason: ***********
Destination IP   10.1.1.100
Destination MAC  0000.0000.0000
Source IP        10.1.1.1
Source MAC       cc4e.0000.0000
Ports monitored:
  Input monitoring      : (U1/M1)   1
  Output monitoring     : (U1/M1)   1
HW destination id for each device:
stack_id/device:dest_id
```

There are seven reasons why a `Mirror destination Not reachable` error occurs.

Case	Reason
1	ARP is not resolved.
2	Route does not exist.
3	Outgoing port is a management port.
4	Outgoing port is a loopback port.
5	Outgoing port is a GRE IP tunnel port.
6	Outgoing port is not known.
7	Outgoing port is a sink port.

Follow these examples to resolve the errors.

Case 1: Problem `ARP not resolved`

```
device(config-vif-66)# show erspan

Profile 1
Mirror destination Not reachable.
Reason: ARP not resolved
Destination IP   10.10.10.4
Destination MAC  0000.0000.0000
Source IP        10.10.10.1
Source MAC       0000.0000.0000
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

Solution - Configure ARP

```
device(config-vif-66)# show arp

Total number of ARP entries: 1
Entries in default routing instance:
No.   IP Address       MAC Address    Type     Age Port   Status
1     10.10.10.4             None     Dynamic  1    v66   Pend

device(config-vif-66)# arp 10.10.10.4 aa.bb.cc ethernet 1/1/5

ADD static arp 10.10.10.4 -> 00aa.00bb.00cc -> 1/1/5 (VRF: 0)

device(config-vif-66)# show erspan profile all

Profile 1
Type             ERSPAN
Mirror destination Reachable.
Destination IP   10.10.10.4
Destination MAC  00aa.00bb.00cc
Source IP        10.10.10.1
Source MAC       748e.f8f9.6d80
Outgoing port    1/1/5
Outgoing VLAN    66
Outgoing VE      66
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

NOTE
The ARP can also be obtained by using a **ping 10.10.10.4** command.

Case 2: Problem `Route not exist`

```
device(config-vif-66)# show ip route

Total number of IP routes: 1
Type Codes - B:BGP D:Connected O:OSPF R:RIP S:Static; Cost - Dist/Metric
BGP  Codes - i:iBGP e:eBGP
OSPF Codes - i:Inter Area 1:External Type 1 2:External Type 2
        Destination      Gateway       Port        Cost    Type Uptime
1       10.10.10.0/24    DIRECT        ve 66       0/0     D    0m48s

device(config-vif-66)# disable
SYSLOG: <14> Jan  1 00:02:40 SWDR_8 System: Interface ve 66, state down

device(config-vif-66)# show erspan profile all

Profile 1
Type             ERSPAN
```

```
Mirror destination Not reachable.
Reason: Route not exist
Destination IP   10.10.10.4
Destination MAC  0000.0000.0000
Source IP        10.10.10.1
Source MAC       748e.f8f9.6d80
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

Solution - Enable the interface (VIF)

```
device(config-vif-66)# enable

SYSLOG: <14> Jan  1 00:03:07 SWDR_8 System: Interface ve 66, state up

device(config-vif-66)# show erspan profile all

Profile 1
Type             ERSPAN
Mirror destination Reachable.
Destination IP   10.10.10.4
Destination MAC  00aa.00bb.00cc
Source IP        10.10.10.1
Source MAC       748e.f8f9.6d80
Outgoing port    1/1/5
Outgoing VLAN    66
Outgoing VE      66
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

Case 3: Problem `Outgoing port is management port`

```
device(config-vif-66)# show erspan profile 1

Profile 1
Type             ERSPAN
Mirror destination Not reachable.
Reason: Outgoing port is management port
Destination IP   10.10.10.4
Destination MAC  0000.0000.0000
Source IP        10.10.10.1
Source MAC       748e.f8f9.6d80
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id

device(config-vif-66)# show ip route

Total number of IP routes: 2
Type Codes - B:BGP D:Connected O:OSPF R:RIP S:Static; Cost - Dist/Metric
BGP  Codes - i:iBGP e:eBGP
OSPF Codes - i:Inter Area 1:External Type 1 2:External Type 2
        Destination      Gateway       Port        Cost    Type Uptime
1       10.10.10.0/24    DIRECT        e mgmt1     0/0     D    0m2s
2       40.40.40.0/24    DIRECT        e mgmt1     0/0     D    0m2s
```

The router for an ERSPAN destination IP can be learned by routing protocols (RIP, OSPF, etc.) or you can configure it statistically using **ip route** command. The commands **disable** or **enable** when run on the port is one way to add or remove routes.

Solution

There is no solution to this problem if you continue to use a management port as the outgoing port. You cannot use an IP address reachable through a management port as an ERSPAN destination.

Case 4: Problem `Outgoing port is loopback port`

```
device# show erspan profile 1

Profile 1
Type             ERSPAN
Mirror destination Not reachable.
Reason: Outgoing port is loopback port
Destination IP   10.10.10.4
Destination MAC  0000.0000.0000
Source IP        10.10.10.1
Source MAC       0000.0000.0000
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id

device# show ip route

Total number of IP routes: 1
Type Codes - B:BGP D:Connected O:OSPF R:RIP S:Static; Cost - Dist/Metric
BGP  Codes - i:iBGP e:eBGP
OSPF Codes - i:Inter Area 1:External Type 1 2:External Type 2
        Destination      Gateway       Port        Cost    Type Uptime
1       10.10.10.0/24    DIRECT        loopback 1  0/0     D    0m39s
```

Solution

There is no solution to this problem if you continue to use an IP address reachable through a loop back interface. You cannot use an IP address reachable through a loop back interface as an ERSPAN destination.

Case 5: Problem `Outgoing port is GRE IP tunnel port`

.

```
device# show erspan profile 1

Profile 1
Type             ERSPAN
Mirror destination Not reachable.
Reason: Outgoing port is GRE IP tunnel port
Destination IP   11.1.1.2
Destination MAC  0000.0000.0000
Source IP        33.33.33.2
Source MAC       0000.0000.0000
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id

device(config)# show running-config | begin erspan

monitor-profile 1 type erspan
destination-ip 11.1.1.2
source-ip 33.33.33.2

device# show ip in
Interface     IP-Address      OK?  Method    Status    Protocol   VRF
Eth mgmt1     10.37.78.91     YES  NVRAM     up        up         default-vrf
Ve 33         33.33.33.2      YES  NVRAM     down      down       default-vrf
Ve 44         10.10.10.1      YES  manual    up        up         default-vrf
Tunnel 1      11.1.1.1        YES  manual    up        up         default-vrf
```

Solution

There is no solution to this problem if you continue to use an IP address reachable through a tunnel interface. You cannot use an IP address reachable through a tunnel interface as an ERSPAN destination.

Case 6: Problem `Outgoing port is not known.`

```
device# show erspan profile 1

Profile 1
Type             ERSPAN
Mirror destination Not reachable.
Reason: Outgoing port is not known
Destination IP   11.1.1.2
Destination MAC  0000.0000.0000
Source IP        33.33.33.2
Source MAC       0000.0000.0000
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

Solution - The same as with Case 2: `Route not exist`

Case 7: Problem `Outgoing port is a sink port`

```
device# show erspan profile 1

Profile 1
Type             ERSPAN

Mirror destination Not reachable.
Reason: Outgoing port is a sink port
Destination IP   11.1.1.2
Destination MAC  0000.0000.0000
Source IP        33.33.33.2
Source MAC       0000.0000.0000
Ports monitored:
HW destination id for each device:
stack_id/device:dest_id
```

Solution - The same as with Case 2: `Route not exist`.

Configuring a monitor port for ERSPAN

An ERSPAN monitor port is the port on which traffic is captured and sent to a remote destination over a Layer 3 network.

Before you configure the monitor port, you must configure an ERSPAN profile.

1. Enter global configuration mode.

```
device# configure terminal
```

2. Enter interface configuration mode.

```
device(config)# interface ethernet 1/2/3
```

3. Configure the mirror port for ERSPAN.

```
device(config-if-e1000-1/2/3)# monitor profile 1 both
```

4. Verify the configuration.

```
device(config-if-e1000-1/2/3)# show erspan profile 1
Profile 1
Type              ERSPAN
Mirror destination Reachable.
Destination IP    10.1.1.100
Destination MAC   cc4e.0000.0001
Source IP         10.1.1.1
Source MAC        cc4e.0000.0000
Outgoing port     1/2/3
Outgoing VLAN     101
Outgoing VE       101
Ports monitored:
  Input monitoring      : (U1/M1)   1
  Output monitoring     : (U1/M1)   1
HW destination id for each device:
stack_id/device:dest_id   1/1:3c000000
```

Port mirroring is now enabled between the monitor port and the destination that was specified in the ERSPAN profile.

ERSPAN monitor port configuration example

```
device# configure terminal
device(config)# interface ethernet 1/2/3
device(config-if-e1000-1/2/3)# monitor profile 1 both
device(config-if-e1000-1/2/3)# show erspan profile 1
```

RMON - Remote Network Monitoring

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RMON support

The Ruckus RMON agent supports the following groups. The group numbers come from the RMON specification (RFC 1757):

NOTE
RFC 1757 is obsolete and is replaced by RFC 2819 for the Ruckus ICX devices.

- Statistics (RMON Group 1)
- History (RMON Group 2)
- Alarms (RMON Group 3)
- Events (RMON Group 9)

The CLI allows you to make configuration changes to the control data for these groups, but you need a separate RMON application to view and display the data graphically.

Maximum number of entries allowed in the RMON control table

You can specify the maximum number of entries allowed in the RMON control table, including alarms, history, and events. The maximum number of RMON entries supported is 32768.

To set the maximum number of allowable entries to 3000 in the RMON history table, enter commands such as the following.

```
device(config)# system-max rmon-entries 3000
device(config)# write mem
device(config)# exit
device# reload
```

NOTE
You must save the change to the startup-config file and reload or reboot. The change does not take effect until you reload or reboot.

Statistics (RMON group 1)

Count information on multicast and broadcast packets, total packets sent, undersized and oversized packets, CRC alignment errors, jabbers, collision, fragments and dropped events is collected for each port on a Ruckus Layer 2 Switch or Layer 3 Switch.

The statistics group collects statistics on promiscuous traffic across an interface. The interface group collects statistics on total traffic into and out of the agent interface.

No configuration is required to activate collection of statistics for the Layer 2 Switch or Layer 3 Switch. This activity is by default automatically activated at system start-up.

You can view a textual summary of the statistics for all ports by entering the following command.

```
device# show rmon statistics
Ethernet statistics 1 is active, owned by monitor
 Interface 1/1/1 (ifIndex 1) counters
```

```
                Octets          0
           Drop events          0                  Packets          0
         Broadcast pkts         0            Multicast pkts         0
  CRC alignment errors          0            Undersize pkts         0
         Oversize pkts          0                 Fragments         0
               Jabbers          0               Collisions         0
          64 octets pkts        0     65 to 127 octets pkts         0
 128 to 255 octets pkts         0    256 to 511 octets pkts         0
512 to 1023 octets pkts         0  1024 to 1518 octets pkts         0
```

NOTE
Though 48GC modules receive oversized packets and jabbers, they do not support count information for oversized packets and jabbers and the output of the **show rmon statistics** command reports 0 for both of these counters.
The SNMP numbers of the ports start at 1 and increase sequentially. For example, if you are using a Chassis device and slot 1 contains an 8-port module, the SNMP number of the first port in slot 2 is 9. The physical port number of the same port is 1/2/1.

History (RMON group 2)

By default all active ports generate two history control data entries per active Layer 2 Switch port or Layer 3 Switch interface. An active port is defined as one with a link up. If the link goes down the two entries are automatically deleted.

Two history entries are generated for each device:

- A sampling of statistics every 30 seconds
- A sampling of statistics every 30 minutes

The history data can be accessed and displayed using any of the popular RMON applications

A sample RMON history command is shown below.

```
device(config)# rmon history 1 interface 1 buckets 10 interval 10 owner nyc02
```

You can modify the sampling interval and the bucket (number of entries saved before overwrite) using the CLI. In the above example, owner refers to the RMON station that requests the information.

NOTE
To review the control data entry for each port or interface, enter the **show rmon history** command.

Alarm (RMON group 3)

Alarm is designed to monitor configured thresholds for any SNMP integer, time tick, gauge or counter MIB object. Using the CLI, you can define what MIB objects are monitored, the type of thresholds that are monitored (falling, rising or both), the value of those thresholds, and the sample type (absolute or delta).

An alarm event is reported each time that a threshold is exceeded. The alarm entry also indicates the action (event) to be taken if the threshold be exceeded.

A sample CLI alarm entry is shown below.

```
device(config)# rmon alarm 1 ifInOctets.6 10 delta rising-threshold 100 1 falling threshold 50 1 owner nyc02
```

Event (RMON group 9)

There are two elements to the Event Group--the event control table and the event log table .

The event control table defines the action to be taken when an alarm is reported. Defined events can be found by entering the CLI command, show event. The Event Log Table collects and stores reported events for retrieval by an RMON application.

A sample entry of the event control table is shown below.

```
device(config)# rmon event 1 description 'testing a longer string' trap public owner nyc02
```

NOTE
FastIron devices currently support only the **trap** option.

Utilization list for an uplink port

You can configure uplink utilization lists that display the percentage of a given uplink port bandwidth that is used by a specific list of downlink ports. The percentages are based on 30-second intervals of RMON packet statistics for the ports. Both transmit and receive traffic is counted in each percentage.

NOTE
This feature is intended for ISP or collocation environments in which downlink ports are dedicated to various customers' traffic and are isolated from one another. If traffic regularly passes between the downlink ports, the information displayed by the utilization lists does not provide a clear depiction of traffic exchanged by the downlink ports and the uplink port.

Each uplink utilization list consists of the following:

- Utilization list number (1, 2, 3, or 4)
- One or more uplink ports
- One or more downlink ports

Each list displays the uplink port and the percentage of that port bandwidth that was utilized by the downlink ports over the most recent 30-second interval.

You can configure up to four bandwidth utilization lists.

Utilization list for an uplink port command syntax

To configure an uplink utilization list, enter commands such as the following. The commands in this example configure a link utilization list with port 1/1/1 as the uplink port and ports 1/1/2 and 1/1/3 as the downlink ports.

```
device(config)# relative-utilization 1 uplink ethernet 1/1/1 downlink ethernet 1/1/2 to 1/1/3
device(config)# write memory
```

Displaying utilization percentages for an uplink

After you configure an uplink utilization list, you can display the list to observe the percentage of the uplink bandwidth that each of the downlink ports used during the most recent 30-second port statistics interval. The number of packets sent and received between the two ports is listed, as well as the ratio of each individual downlink port packets relative to the total number of packets on the uplink.

To display an uplink utilization list, enter a command such as the following from any mode of the CLI.

```
device# show relative-utilization 1
uplink: ethe 1
30-sec total uplink packet count = 3011
```

```
packet count ratio (%)
  1/1/2:60   1/1/3:40
```

In this example, ports 1/1/2 and 1/1/3 are sending traffic to port 1/1/1. Port 1/1/2 and port 1/1/3 are isolated (not shared by multiple clients) and typically do not exchange traffic with other ports except for the uplink port, 1/1/1.

NOTE
The example above represents a pure configuration in which traffic is exchanged only by ports 1/1/2 and 1/1/1, and by ports 1/1/3 and 1/1/1. For this reason, the percentages for the two downlink ports equal 100%. In some cases, the percentages do not always equal 100%. This is true in cases where the ports exchange some traffic with other ports in the system or when the downlink ports are configured together in a port-based VLAN.

In the following example, ports 1/1/2 and 1/1/3 are in the same port-based VLAN.

```
device# show relative-utilization 1
uplink: ethe 1
30-sec total uplink packet count = 3011
packet count ratio (%)
  1/1/2:100   1/1/3:100
```

Here is another example showing different data for the same link utilization list. In this example, port 1/1/2 is connected to a hub and is sending traffic to port 1/1/1. Port 1/1/3 is unconnected.

```
device# show relative-utilization 1
uplink: ethe 1
30-sec total uplink packet count = 2996
packet count ratio (%)
  1/1/2:100   1/1/3:---
```

sFlow

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sFlow overview

sFlow is a standards-based protocol that allows network traffic to be sampled at a user-defined rate for the purpose of monitoring traffic flow patterns and identifying packet transfer rates on user-specified interfaces.

Ruckus devices support sFlow version 5 by default. When sFlow is enabled on a Layer 2 or Layer 3 switch, the system performs the following sFlow-related tasks:

- Samples traffic flows by copying packet header information
- Identifies ingress and egress interfaces for the sampled flows
- Combines sFlow samples into UDP packets and forwards them to the sFlow collectors for analysis
- Forwards byte and packet count data, or counter samples, to sFlow collectors

sFlow is described in RFC 3176, "InMon Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks".

On FastIron devices, you can use QoS queue 1 for priority traffic, even when sFlow is enabled on the port.

sFlow version 5

sFlow version 5 enhances and modifies the format of the data sent to the sFlow collector. sFlow version 5 introduces several new sFlow features and also defines a new datagram syntax used by the sFlow agent to report flow samples and interface counters to the sFlow collector.

sFlow version 5 adds support for the following:

- sFlow version 5 datagrams
- Sub-agent support
- Configurable sFlow export packet size
- Support for the new data field and sample type length in flow samples
- Configurable interval for exporting Ruckus-specific data structure

sFlow version 5 is backward-compatible with sFlow version 2. By default, the sFlow agent exports sFlow version 5 flow samples by default, but you can configure the device to export the data in sFlow version 2 format. You can switch between sFlow version 2 and sFlow version 5 formats. The sFlow collector automatically parses each incoming sample and decodes it based on the version number.

The configuration procedures for sFlow version 5 are the same as for sFlow version 2, except where explicitly noted. Configuration procedures for sFlow are in the section Configuring and enabling sFlow on page 93. The features and CLI commands that are specific to sFlow version 5 are described in the section sFlow version 5 feature configuration on page 97.

sFlow support for IPv6 packets

The Ruckus implementation of sFlow features support IPv6 packets. This support includes extended router information and extended gateway information in the sampled packet. Note that sFlow support for IPv6 packets exists only on devices running software that supports IPv6.

The configuration procedures for this feature are the same as for IPv4, except where the collector is a link-local address on a Layer 3 switch. For details refer to Specifying the collector on page 93.

Extended router information

IPv6 sFlow sampled packets include the following extended router information:

- IP address of the next hop router
- Outgoing VLAN ID
- Source IP address prefix length
- Destination IP address prefix length

Note that in IPv6 devices, the prefix lengths of the source and destination IP addresses are collected if BGP is configured and the route lookup is completed. In IPv4 devices, this information is collected only if BGP is configured on the devices.

Extended gateway information

If BGP is enabled, extended gateway information is included in IPv6 sFlow sampled packets, including the following BGP information about a packet destination route:

- The Autonomous System number for the router
- The source IP Autonomous System of the route
- The source peer Autonomous System for the route
- The Autonomous System patch to the destination

NOTE
Autonomous System communities and local preferences are not included in the sampled packets.

To obtain extended gateway information, use "struct extended_gateway" as described in RFC 3176.

IPv6 packet sampling

IPv6 sampling is performed by the packet processor. The system uses the sampling rate setting to selectively mark the monitoring bit in the header of an incoming packet. Marked packets tell the CPU that the packets are subject to sFlow sampling.

sFlow configuration considerations

This section lists the sFlow configuration considerations on Ruckus devices.

On ICX Series devices, you can use QoS queue 1 for priority traffic, even when sFlow is enabled on the port.

If ICX stacks are rebooted, sFlow is disabled on standby and member units until the configuration is synchronized between the Active and Standby Controllers.

sFlow is not supported on PE ports on 802.1br-enabled Ruckus devices.

sFlow and hardware support

- Ruckus devices support sFlow packet sampling of inbound traffic only. These devices do not sample outbound packets. However, Ruckus devices support byte and packet count statistics for both traffic directions.
- sFlow is supported on all Ethernet ports (10/100, Gbps, and 10 Gbps)

sFlow and CPU utilization

Enabling sFlow may cause a slight and noticeable increase of up to 20% in CPU utilization. In typical scenarios, this is normal behavior for sFlow, and does not affect the functionality of other features on the switch.

sFlow and agent address

The sampled sFlow data sent to the collectors includes an agent_address field. This field identifies the IP address of the device that sent the data:

- On a Layer 2 switch, agent_address is the Layer 2 switch management IP address. You must configure the management IP address in order to export sFlow data from the device. If the switch has both an IPv4 and IPv6 address, the agent_address is the IPv4 address. If the switch has an IPv6 address only, the agent_address is the global IPv6 address.
- On a Layer 3 switch with IPv6 interfaces only, sFlow looks for an IPv6 address in the following order, and uses the first address found:
  - The first IPv6 address on the lowest-numbered loopback interface
  - The first IPv6 address on the lowest-numbered VE interface
  - The first IPv6 address on any interface
- On a Layer 3 switch with both IPv4 and IPv6 interfaces, or with IPv4 interfaces only, sFlow looks for an IP address in the following order, and uses the first address found:
  - The IPv4 router ID configured by the **ip router-id** command
  - The first IPv4 address on the lowest-numbered loopback interface
  - The first IPv4 address on the lowest-numbered virtual interface
  - The first IPv4 address on any interface

NOTE
The device uses the router ID only if the device also has an IP interface with the same address. Router ID is not supported on IPv6 devices.

NOTE
If an IP address is not already configured when you enable sFlow, the feature uses the source address 0.0.0.0. To display the agent_address, enable sFlow, then enter the **show sflow** command. Refer to Enabling sFlow forwarding on page 96 and Displaying sFlow information on page 101.

NOTE
In sFlow version 5, you can set an arbitrary IPv4 or IPv6 address as the sFlow agent IP address. Refer to Specifying the sFlow agent IP address on page 98.

sFlow and source IP address

When the sFlow packet is sent to the sFlow collector, by default, the IP address of the outgoing interface is used in the sFlow datagram.

However, you can specify the source interface, from which the IP address is selected for the sFlow datagram, using the **sflow source** command. The Ethernet, VE, or loopback interface can be configured as the source interface for both IPv4 and IPv6 addresses.

sFlow source IP address configuration notes

- The first IP address in the interface IP address list is considered the source IP address.
- If the sFlow destination is IPv6, and the sFlow source is configured for an IPv6 address, then an IPv6 address is selected from the configured interface.
- If the sFlow destination is IPv4, and the sFlow source is configured for IPv4 address, then an IPv4 address is selected from the configured interface.
- At any point of time, only one source of the Ethernet, VE, or loopback interface can be specified as the source interface.
- Upon configuring another source for an IPv4 or IPv6 address, any previously configured source for the IPv4 or IPv6 address is deleted.
- If the source IP address is not configured, by default, the IP address of the outgoing interface is used in the sFlow datagram.
- You can configure IPv4 and IPv6 source interfaces independently.
- LAG virtual interface or any member ports of the LAG cannot be configured as sFlow source.
- The sFlow source IP configuration is supported on sFlow version 2 and sFlow version 5 and is valid only for the router build.
- Addition and deletion of IPv4 and IPv6 addresses on an sFlow source interface triggers the following events:
  - If the added IP address is the first IP address in the table, then it is considered as the source IP address.
  - If the added IP address is positioned on top of the IP table (due to IP address sequence order), then it is reassigned as the source IP address.
  - If the IP address that is used as the source IP is deleted, the next IP address on the same interface is considered as the source IP address.
  - If all the IP addresses are deleted from the source interface, the IP address of the outgoing interface is used in the sFlow datagram.

sFlow and source port

By default, sFlow sends data to the collector out of UDP source port 8888, but you can specify a different source port. For more information, refer to Changing the sFlow source port on page 96.

sFlow and sampling rate

The *sampling rate* is the average ratio of the number of packets incoming on an sFlow enabled port, to the number of flow samples taken from those packets. sFlow sampling can affect performance in some configurations.

Note that on the FastIron devices, the configured sampling rate and the actual rate are the same. The software does not adjust the configured sampling rate as on other Ruckus devices.

NOTE
The value range for sampling rate is from 256 through 1073741823 on Ruckus ICX 7750, ICX 7450, and ICX 7250 devices. The default value is 4096 for all devices.

sFlow and port monitoring

ICX series devices support sFlow and port monitoring together on the same port.

Configuring and enabling sFlow

NOTE
The commands in this section apply to sFlow version 2 and sFlow version 5. CLI commands that are specific to sFlow version 5 are documented in sFlow version 5 feature configuration on page 97.

To configure sFlow, perform the following tasks:

- Optional - If your device supports sFlow version 5, change the version used for exporting sFlow data
- Specify collector information. The collector is the external device to which you are exporting the sFlow data. You can specify up to four collectors.
- Optional - Change the polling interval
- Optional - Change the sampling mode to include dropped packets
- Optional - Change the sampling rate
- Optional - Change the sFlow source IP address
- Optional - Change the sFlow source port
- Enable sFlow globally
- Enable sFlow forwarding on individual interfaces
- Enable sFlow forwarding on individual trunk ports
- If your device supports sFlow version 5, configure sFlow version 5 features

Specifying the collector

sFlow exports traffic statistics to an external collector. You can specify up to four collectors. You can specify more than one collector with the same IP address if the UDP port numbers are unique. You can have up to four unique combinations of IP addresses and UDP port numbers.

Specifying an sFlow collector on IPv4 devices

To specify an sFlow collector on an IPv4 device, enter a command such as the following.

```
device(config)# sflow destination 10.10.10.1
```

This command specifies a collector with IPv4 address 10.10.10.1, listening for sFlow data on UDP port 6343.

Specifying an sFlow collector on IPv6 devices

To specify an sFlow collector on an IPv6 device, enter a command such as the following.

```
device(config)# sflow destination ipv6 2001:DB8:0::0b:02a
```

This command specifies a collector with IPv6 address 2001:DB8::0b:02a, listening for sFlow data on UDP port 6343.

Changing the polling interval

The polling interval defines how often sFlow byte and packet counter data for a port are sent to the sFlow collectors. If multiple ports are enabled for sFlow, the Ruckus device staggers transmission of the counter data to smooth performance. For example, if sFlow is enabled on two ports and the polling interval is 20 seconds, the Ruckus device sends counter data every ten seconds. The counter data for one of the ports are sent after ten seconds, and counter data for the other port are sent after an additional ten seconds. Ten seconds later, new counter data for the first port are sent. Similarly, if sFlow is enabled on five ports and the polling interval is 20 seconds, the Ruckus device sends counter data every four seconds.

The default polling interval is 20 seconds. You can change the interval to a value from 0 to 4294967295 seconds. The interval value applies to all interfaces on which sFlow is enabled. If you set the polling interval to 0, counter data sampling is disabled.

To change the polling interval, enter a command such as the following from the global configuration mode of the CLI.

```
device(config)# sflow polling-interval 30
```

Changing the sampling rate

The sampling rate is the average ratio of the number of packets incoming on an sFlow-enabled port, to the number of flow samples taken from those packets.

You can change the default (global) sampling rate. You also can change the rate on an individual port, overriding the default sampling rate of 4096. With a sampling rate of 4096, on average, one in every 4096 packets forwarded on an interface is sampled.

Configuration considerations

The sampling rate is a fraction in the form 1/N, meaning that, on average, one out of every N packets is sampled. The **sflow sample** command from the global configuration mode or port mode specifies N, the denominator of the fraction. Thus a higher number for the denominator means a lower sampling rate since fewer packets are sampled. Likewise, a lower number for the denominator means a higher sampling rate because more packets are sampled. For example, if you change the denominator from 512 to 128, the sampling rate increases because four times as many packets are sampled.

> **NOTE**
> Ruckus recommends that you do not change the denominator to a value lower than the default. Sampling requires CPU resources. Using a low denominator for the sampling rate can cause high CPU utilization.

On Ruckus ICX 7750, ICX 7450, and ICX 7250, the CPU-bound sFlow sample packets are rate-limited to 50 samples per second to avoid high CPU utilization.

If the input traffic rate is more on the interface, the sampling rate must be configured to a higher value to keep the number of sample packets within the CPU rate limit. Else, the excess sample packets are dropped by the CPU.

The following examples show the ideal sample rate configurations for various input rates that keep the sample packets within the CPU rate limit.

- If the input traffic rate is 200,000 packets/sec, the interface sample rate must be set to 4096. (200000/4096 = less than 50 samples)
- If the input traffic rate is 400,000 packets/sec, the interface sample rate must be set to 8192. (400000/8192 = less than 50 samples)

As the sample packets are generated within the CPU rate limit (50 samples/sec) in the above example, the packets are forwarded to the sFlow collector.

Configured rate and actual rate — When you enter a sampling rate value, this value is the configured rate as well as the actual sampling rate.

Change to global rate — If you change the global sampling rate, the change is applied to all sFlow-enabled ports except those ports on which you have already explicitly set the sampling rate. For example, suppose that sFlow is enabled on ports 1/1/1, 1/1/2, and 1/5/1. If you configure the sampling rate on port 1/1/1 but leave the other two ports using the default rate, then a change to the global sampling rate applies to ports 1/1/2 and 1/5/1 but not port 1/1/1. sFlow assumes that you want to continue using the sampling rate you explicitly configured on an individual port even if you globally change the sampling rate for the other ports.

Module rate – While different ports on a module may be configured to have different sampling rates, the hardware for the module is programmed to take samples at a single rate (the module sampling rate). The module sampling rate is the highest sampling rate (that is, the lowest number) configured for any of the ports on the module.

When ports on a given module are configured with different sampling rates, the CPU discards some of the samples supplied by the hardware for ports with configured sampling rates that are lower than the module sampling rate. This is referred to as subsampling, and the ratio between the port sampling rate and the module sampling rate is known as the subsampling factor. For example, if the module in slot 4 has sFlow enabled on ports 1/4/2 and 1/4/8, and port 1/4/2 is using the default sampling rate of 512, and port 1/4/8 is configured explicitly for a rate of 2048, then the module sampling rate is 512 because this is this highest port sampling rate (lowest number). The subsampling factor for port 1/4/2 is 1, meaning that every sample taken by the hardware is exported, while the subsampling factor for port 1/4/8 is 4, meaning that one out of every four samples taken by the hardware is exported. Whether the port sampling rate is configured explicitly, or whether it uses the global default setting, has no effect on the calculations.

You do not need to perform any of these calculations to change a sampling rate. You can display the rates you entered for the default sampling rate, module rates, and all sFlow-enabled ports by entering the **show sflow** command. Refer to Displaying sFlow information on page 101.

Sampling rate for new ports — When you enable sFlow on a port, the port's sampling rate is set to the global default sampling rate. This also applies to ports on which you disable and then re-enable sFlow. The port does not retain the sampling rate it had when you disabled sFlow on the port, even if you had explicitly set the sampling rate on the port.

Changing the default sampling rate

To change the default (global) sampling rate, enter a command such as the following at the global CONFIG level of the CLI.

```
device(config)# sflow sample 2048
```

Changing the sampling rate of a module

You cannot change a module sampling rate directly. You can change a module sampling rate only by changing the sampling rate of a port on that module.

Changing the sampling rate on a port

You can configure an individual port to use a different sampling rate than the global default sampling rate. This is useful in cases where ports have different bandwidths. For example, if you are using sFlow on 10/100 ports and Gbps Ethernet ports, you might want to configure the Gbps ports to use a higher sampling rate (and thus gather fewer samples per number of packets) than the 10/100 ports.

To change the sampling rate on an individual port, enter a command such as the following from the configuration mode for the port.

```
device(config-if-1/1/1)# sflow sample 8192
```

Changing the sampling rate for a trunk port

You can configure an individual static trunk port to use a different sampling rate than the global default sampling rate. This feature is also supported on LACP trunk ports. This feature is useful in cases where ports have different bandwidths. For example, if you are using sFlow on 10/100 ports and Gbps Ethernet ports, you might want to configure the Gbps ports to use a higher sampling rate (and thus gather fewer samples per number of packets) than the 10/100 ports.

To configure a static trunk port to use a different sampling rate than the global default sampling rate, enter commands such as the following:

```
device(config)# lag test dynamic id 1
device(config-lag-blue)# ports ethernet 1/1/1 to 1/1/4
device(config-lag-blue)# sflow sample 8192
```

Changing the sFlow source port

By default, sFlow sends data to the collector using UDP source port 8888, but you can change the source UDP port to any port number in the range 1025-65535.

To change the source UDP port, enter a command such as the following:

```
device(config)# sflow source-port 8000
```

Enabling sFlow forwarding

sFlow exports data only for the interfaces on which you enable sFlow forwarding. You can enable sFlow forwarding on Ethernet interfaces.

NOTE
When management port is used, sFlow can be received only from active units in a stack (not from all units). However, if you use management VLAN with data port, sFlow is received normally. To receive sFlow from all units in a stack, you must use a data port.

To enable sFlow forwarding, perform the following:

- Globally enable the sFlow feature
- Enable sFlow forwarding on individual interfaces
- Enable sFlow forwarding on individual trunk ports

NOTE
Before you enable sFlow, make sure the device has an IP address that sFlow can use as its source address. Refer to sFlow and agent address on page 91 for the source address requirements.

NOTE
When you enable sFlow forwarding on an 802.1X-enabled interface, the samples taken from the interface include the username used to obtain access to either or both the inbound and outbound ports, if that information is available. For information about 802.1X, refer to "Flexible Authentication" chapter in the *Ruckus FastIron Security Configuration Guide*

Commands for enabling sFlow forwarding

This section shows how to enable sFlow forwarding.

Globally enabling sFlow forwarding

To enable sFlow forwarding, you must first enable it on a global basis, then on individual interfaces or trunk ports, or both.

To globally enable sFlow forwarding, enter the following command.

```
device(config)# sflow enable
```

You can now enable sFlow forwarding on individual ports as described in the next two sections.

Enabling sFlow forwarding on individual interfaces

To enable sFlow forwarding enter commands such as the following.

```
device(config)# sflow enable
device(config)# interface ethernet 1/1/1 to 1/1/8
device(config-mif-1/1/1-1/1/8)# sflow forwarding
```

These commands globally enable sFlow, then enable sFlow forwarding on Ethernet ports 1/1/1 - 1/1/8. You must use both the **sflow enable** and **sflow forwarding** commands to enable the feature.

Enabling sFlow forwarding on LAG ports

This feature is supported on ports of a static LAG group. It is also supported on LACP LAG ports.

To enable sFlow forwarding on a LAG port, enter commands such as the following.

```
device(config)# sflow enable
device(config)# lag test static id 111
device(config-lag-test)# ports ethernet 1/4/1 to 1/4/8
device(config-lag-test)# sflow forwarding
```

These commands globally enable sFlow, then enable sFlow forwarding on LAG ports. You must use both the **sflow enable** and **sflow forwarding** commands to enable the feature.

sFlow version 5 feature configuration

NOTE
The commands in this section are supported when sFlow version 5 is enabled on the device. These commands are not supported with sFlow version 2. sFlow version 5 also supports all of the sFlow configuration commands in Configuring and enabling sFlow on page 93.

When sFlow version 5 is enabled on the device, you can do the following:

- Specify the sFlow version (version 2 or version 5)

- Specify the sFlow agent IP address
- Specify the maximum flow sample size
- Export CPU and memory usage Information to the sFlow collector
- Specify the polling interval for exporting CPU and memory usage information to the sFlow collector
- Export CPU-directed data (management traffic) to the sFlow collector

Egress interface ID for sampled broadcast and multicast packets

For broadcast and multicast traffic, the egress interface ID for sampled traffic is always 0x80000000. When broadcast and multicast packets are sampled, they are usually forwarded to more than one port. However, the output port field in an sFlow datagram supports the display of one egress interface ID only. Therefore, the sFlow version 5 agent always sets the output port ID to 0x80000000 for broadcast and multicast packets that are sampled.

Specifying the sFlow version format

If your device supports sFlow version 5, you can optionally specify the version used for exporting sFlow data. Refer Specifying the sFlow agent IP address on page 98.

Specifying the sFlow agent IP address

The sampled sFlow data sent to the collectors includes an agent_address field. This field identifies the device (the sFlow agent) that sent the data. By default, the device automatically selects the sFlow agent IP address based on the configuration, as described in the section sFlow and agent address on page 91. Alternatively, you can configure the device to instead use an arbitrary IPv4 or IPv6 address as the sFlow agent IP address.

To specify an IPv4 address as the sFlow agent IP address, enter a command such as the following

```
device(config)# sflow agent-ip 10.10.10.1
```

To specify an IPv6 address as the sFlow agent IP address, enter a command such as the following.

```
device(config)# sflow agent-ip FE80::240:D0FF:FE48:4672
```

Specifying the version used for exporting sFlow data

By default, when sFlow is enabled globally on the Ruckus device, the sFlow agent exports sFlow data in version 5 format. You can change this setting so that the sFlow agent exports data in version 2 format. You can switch between versions without rebooting the device or disabling sFlow.

NOTE
When the sFlow version number is changed, the system resets the sFlow counters and flow sample sequence numbers.

To specify the sFlow version used for exporting sFlow data, enter the following command.

```
device(config)# sflow version 2
```

The default is 5.

Specifying the maximum flow sample size

With sFlow version 5, you can specify the maximum size of the flow sample sent to the sFlow collector. If a packet is larger than the specified maximum size, only the data of the packet up to the specified maximum number of bytes is exported. If the size of the packet is smaller than the specified maximum, then the entire packet is exported.

For example, to specify 1024 bytes as the maximum flow sample size, enter the following command.

```
device(config)# sflow max-packet-size 1024
```

The following sample list provides information about the sFlow sample size sent to the sFlow collector, when the max-packet-size is configured with different values.

TABLE 9 sFlow sample size sent to the sFlow collector with varying max-packet-size values

Maximum packet size	Size of the sFlow sample sent to the sFlow collector
0 bytes	Only the information about the packet is captured and no data from the packet is sent to the sFlow collector.
1 byte	1 byte from the packet is sent to the sFlow collector. However, it is padded with zero to make it 4 bytes.
2 bytes	2 bytes from the packet is sent to the sFlow collector. However, it is padded with zero to make it 4 bytes.
100 bytes	100 bytes from packet is sent to the sFlow collector.
200 bytes	200 bytes from packet is sent to the sFlow collector.
1200 bytes	1200 bytes from the packet is sent to the sFlow collector.

Exporting CPU and memory usage information to the sFlow collector

With sFlow version 5, you can optionally configure the sFlow agent on the Ruckus device to export information about CPU and memory usage to the sFlow collector.

To export CPU usage and memory usage information, enter the following command.

```
device(config)# sflow export system-info
```

By default, CPU usage information and memory usage information are not exported.

Specifying the polling interval for exporting CPU and memory usage information to the sFlow collector

The polling interval defines how often sFlow data for a port is sent to the sFlow collector. With sFlow version 5, you can optionally set the polling interval used for exporting CPU and memory usage information.

For example, to set the polling interval for exporting CPU and memory usage information to 30 seconds, enter the following command.

```
device(config)# sflow export system-info 30
```

You can specify a polling interval from 5 seconds to 1,800 seconds (30 minutes). The default polling interval for exporting CPU and memory usage information is 300 seconds (5 minutes).

Exporting CPU-directed data (management traffic) to the sFlow collector

You can select which and how often data destined to the CPU (for example, Telnet sessions) is sent to the sFlow collector.

CLI commands allow you to do the following:

- Enable the sFlow agent to export CPU-directed data
- Specify the sampling rate for exported CPU-directed data

Enabling the sFlow agent to export CPU-directed data

To enable the sFlow agent on a Ruckus device to export data destined to the CPU to the sFlow collector, enter the following command.

```
device(config)# sflow export cpu-traffic
```

By default, this feature is disabled. The sFlow agent does not send data destined to the CPU to the sFlow collector.

Specifying the sampling rate for exported CPU-directed data

The sampling rate is the average ratio of the number of packets incoming on an sFlow-enabled port, to the number of flow samples taken from those packets. You can optionally set the sampling rate for CPU-directed data exported to the sFlow collector. For example, to set this sampling rate to 2048, enter the following command.

```
device(config)# sflow export cpu-traffic 2048
```

The default sampling rate depends on the Ruckus device being configured. Refer to Changing the sampling rate on page 94 for the default sampling rate for each kind of Ruckus device.

Configuring sFlow with Multi-VRFs

sFlow is a traffic monitoring protocol that supports VRFs. sFlow provides traffic sampling on configured ports based on sample rate and port information to a collector. By default, sFlow uses the management VRF to send the samples to the collector.

Collectors can be added and per VRF so that collectors can be spread out across different VRFs. The sFlow forwarding port can belong to a non-default VRF, and captured sFlow packets will have correct sample routing next hop information.

sFlow forwarding ports can come from ports belonging to any VRF. The port does not have to be in the same VRF as the collector. sFlow collects packets from all sFlow forwarding ports, even if they do not belong to a VRF, compiles the packets into the sFlow samples, and sends the samples to the particular collector with no filtering for VRF membership. For counter samples, sample statistics from each port are sent to each collector specified, even if the port and collector do not belong to a VRF instance.

To distinguish collected packets from different VRFs, refer to the **in vlan** and **out vlan** data fields for each captured ingress packet. For example, when two collected packets are from different VRFs but have the same source/destination IP and the same incoming/outgoing port, the VLAN field differs in the two samples. A VLAN/VE can only belong to one VRF. The collector does not have any VRF knowledge, but, based on the VLAN fields, the collector can distinguish which packet came from which VLAN/VRF.

To configure an sFlow collector and specify a VRF, enter the following command.

```
device(config)# sflow destination 10.10.10.vrf customer1
```

To disable the management VRF in sFlow, enter the following command.

```
device(config)# sflow management-vrf disable
```

To display sFlow configuration and statistics, enter the following command.

```
device(config)# show sflow
sFlow version: 5
sFlow services are enabled.
sFlow management VRF is disabled.
sFlow agent IP address: 10.37.230.21
Collector IP 10.37.224.233, UDP 6343, Configured VRF: green
UDP source port: 8888 (Default)
Polling interval is 20 seconds.
Configured default sampling rate: 1 per 500 packets.
Actual default sampling rate: 1 per 500 packets.
The maximum sFlow sample size: 128.
sFlow exporting cpu-traffic is disabled.
100 UDP packets exported
80 sFlow flow samples collected.
sFlow ports: ethe 4/1/5
Module Sampling Rates
---------------------
Port Sampling Rates
-------------------
Port=4/1/5, configured rate=500, actual rate=500
```

Displaying sFlow information

To display sFlow configuration information and statistics, enter the following command from any mode of the CLI.

```
device# show sflow
sFlow version:5
sFlow services are enabled.
sFlow agent IP address: 10.123.123.1
sFlow source IP address: 5.5.5.5
sFlow source IPv6 address: 4545::2
4 collector destinations configured:
Collector IP 192.168.4.204, UDP 6343
Collector IP 192.168.4.200, UDP 6333
Collector IP 192.168.4.202, UDP 6355
Collector IP 192.168.4.203, UDP 6565
Configured UDP source port: 33333
Polling interval is 0 seconds.
Configured default sampling rate: 1 per 512 packets
Actual default sampling rate: 1 per 512 packets
Sample mode: Non-dropped packets
The maximum sFlow sample size:512
exporting cpu-traffic is enabled
exporting cpu-traffic sample rate:16
exporting system-info is enabled
exporting system-info polling interval:20 seconds
10552 UDP packets exported
24127 sFlow samples collected.
sFlow ports: ethe 1/1/2 to 1/1/12 ethe 1/1/15 ethe 1/1/25 to 1/1/26 ethe 1/4/1 ethe 1/5/10 to
1/5/20 ethe 1/8/1 ethe 1/8/4
Module Sampling Rates
---------------------
Slot  1 configured rate=512, actual rate=512
Slot  3 configured rate=0, actual rate=0
Slot  4 configured rate=10000, actual rate=32768
Slot  5 configured rate=512, actual rate=512
Slot  7 configured rate=0, actual rate=0
Slot  8 configured rate=512, actual rate=512
Port Sampling Rates
-------------------
Port 1/8/4, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/8/1, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/5/20, configured rate=3000, actual rate=8192, Subsampling factor=16
Port 1/5/19, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/5/18, configured rate=512, actual rate=512, Subsampling factor=1
```

```
Port 1/5/17, configured rate=1500, actual rate=2048, Subsampling factor=4
...Output truncated...
```

Clearing sFlow statistics

To clear the UDP packet and sFlow sample counters in the **show sflow** display, enter the following command.

```
device# clear statistics
```

NOTE
This command also clears the statistics counters used by other features.

System Monitoring

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Overview of system monitoring

System monitoring (sysmon) is a utility that runs as a background process and monitors connections and components of the device for specific errors and logs them. It has a default policy that controls the parameters that are monitored and actions to be taken if a fault is detected. These policies include the type of errors, the threshold for errors to be logged, and the frequency of checking for errors. You can use the CLI commands to configure these policies.

The sysmon utility monitors the hardware error registers to identify errors and failures. You can configure the sysmon timer to define how frequently the sysmon utility queries the hardware error registers. The data generated by the sysmon utility is written to either the sysmon internal log or to the syslog.

Sysmon starts the timer based on the specified timer setting, with the default value as three minutes. After the interval specified by the timer, the utility checks the hardware error registers. If the sysmon utility detects an error in a hardware error register, it increments the relevant error count by 1. Otherwise, it restarts the timer and waits for the given interval. Hardware error registers are cleared when read, so after Sysmon reads the value, they are reset to zero.

Sysmon checks the value of the error counters it maintains and the values specified in the sysmon threshold. If the value of the error counters exceeds the matching threshold, it takes the action specified (logs internally or to the syslog). Otherwise, it restarts the timer and waits for the specified interval before checking for errors again.

To ensure that logging repeating errors does not cause the logs to overflow, you can specify a back-off value that allows the utility to skip the specified number of error instances before logging again. If the error count is smaller than the specified log back-off value, the utility logs the error to the internal log or syslog, restarts the timer and waits for the specified interval before checking for errors again.

Configuration notes and feature limitations

On ICX devices, the sysmon utility monitors the following errors:

- Link errors.
- ECC errors.

By default, system monitoring starts on system boot up and runs in the background every three minutes. You can configure, disable, or enable, the time interval through the CLI. If you define the system monitoring interval at the global configuration mode, this value overrides the individual settings.

You can define a system monitoring threshold that is defined as N/W, where N is the number of error events in a specified window (W) of consecutive polling periods. When the threshold is reached, the action that is defined is performed. The threshold enables the sysmon utility to ignore random errors that occur because of corrupted data coming in to the device, and perform the action only for errors generated because of device failure. A threshold of 1/W means no threshold.

You can choose the log action as either to the internal sysmon buffer or to the syslog. If you choose the internal sysmon buffer, logs that are written beyond the limit of the sysmon buffer rolls over. If you choose logging to syslog, messages are sent to the configured syslog servers.

Configure system monitoring

You can use the following commands from the privileged exec mode to globally configure the sysmon utility:

- disable system-monitoring all
- enable system-monitoring all
- sysmon timer

In addition, you can enable or disable system monitoring for each event type from the CLI, with each event type having separate threshold and log back off values using the following commands:

- sysmon log-backoff
- sysmon threshold

disable system-monitoring all

Disables system monitoring at the global level for all monitoring types.

disable system-monitoring all

Privileged exec mode.

Disabling sysmon at the global level disables any individually configured and enabled sysmon tasks as well. However, any sysmon configuration that is made, including global and event-specific configuration are retained.

The following example disables system monitoring:

```
device# disable system-monitoring all
```

enable system-monitoring all

Enables system monitoring at the global level for all event types.

enable system-monitoring all

Privileged exec mode.

This command enables system monitoring globally, and covers all event-specific system monitoring configuration as well. If specific configuration is not made for different types, default values defined at the global level are used.

The following example enables all system monitoring tasks at the global level:

```
device# enable system-monitoring all
```

sysmon timer

Configures the global system monitoring timer.

sysmon timer minutes

minutes Specifies the system monitoring timer in minutes. The range of values is 1 through 60. The default value is 3.

Global configuration mode.

The following example sets the system monitoring timer to five minutes:

```
device(config)# sysmon timer 5
```

sysmon log-backoff

Defines the number of times to skip logging an event before logging again at the global level. The **no** form of this command resets the parameter to default value.

sysmon log-backoff number

no sysmon log-backoff

number Specifies the number of times to skip an event logging before logging again.

Global configuration mode.

Logging every error may not provide any new information, but adds significantly to the number of error entries that need to be analyzed. You can configure the system monitoring utility to ignore a certain number of errors (within a stream of consecutive errors) before writing the entry to the log again.

This option helps you further isolate issues that randomly occur from issues because of device failure. The sysmon utility keeps a counter of the number of times the threshold value is exceed. If the number exceeds the back-off value, the error is logged as specified by the action option.

The following example sets the number of times to skip logging to 20.

```
device(config)# sysmon log-backoff 20
```

sysmon threshold

Defines the threshold for errors at the global level. The no form of this command resets the threshold configuration to default values.

sysmon threshold events polling-interval

no sysmon threshold

events Specifies the threshold in terms of the number of events. Valid values are 1 through 10. When expressed in the command, the default value is 2.

polling-interval Specifies the number of polling windows. The device polls the internal registers at the interval specified by the sysmon timer value. Valid values 1-32. However, the polling window number must be equal or greater than the number of events. When expressed in the command, the default value is 10.

Global configuration mode.

The type-specific threshold values that you define overrides the global threshold value for each event. However, if you define the global value later, the latest value prevails. The threshold is defined as N/W, where N is the number of events, and W is the number of consecutive polling periods. When the threshold is reached, actions configured for this event type will take place. Note that a threshold of 1/W implies that there is no threshold, and the action will always be triggered.

The following example sets the threshold to 3 events over 7 consecutive polling periods:

```
device(config)# sysmon threshold 3 7
```

System monitoring on ICX devices

On ICX devices the system monitors for error correction code (ECC) and link errors.

ECC and link errors are monitored on a stack unit basis.

Use the following commands configure and display the status of system monitoring on fabric adaptors:

- sysmon ecc-error
- sysmon link-error

sysmon ecc-error

Configures how sysmon handles ECC errors. The **no** version of this command disables system monitoring on internal ECC errors.

sysmon ecc-error -count { **threshold** *events polling-interval* | **log-backoff** *value* | **action** { **none** | **syslog** } }

no sysmon fa error-count

threshold Defines the threshold for errors. The threshold is defined as N/W, where N is the number of events, and W is the number of consecutive polling periods. When the threshold is reached, actions configured for this event type take place.

NOTE
A threshold of 1/W implies that there is no threshold, and the action is always triggered.

events Specifies the threshold in terms of the number of events. Valid values are 1 through 10.

polling-interval Specifies the number of polling windows. The device polls the internal registers at the interval specified by the sysmon timer value. Valid values 1-32. However, the polling window number must be equal or greater than the number of events.

log-backoff If an error condition persists, it is continuously logged (internally and/or externally to syslog as defined by the action). The log back-off count skips configured number of logs before logging again.

action Specifies the action to take when error count exceeds the specified threshold and log back-off values.

none The error is logged in the internal sysmon logs. This is the default value.

syslog The error is logged to Syslog.

Global configuration mode.

The following example configures system monitoring for fabric adaptor errors:

```
device(config)# sysmon ecc-error threshold 3 7
device(config)# sysmon ecc-error action syslog
device(config)# sysmon ecc-error log-backoff 15
```

sysmon link-error

Configures how sysmon handles link errors. The **no** version of this command disables system monitoring on link errors.

sysmon link-error { **threshold** *events polling-interval* | **log-backoff** *value* | **action** { **none** | **syslog** } }

no sysmon link-error

threshold Defines the threshold for errors. The threshold is defined as N/W, where N is the number of events, and W is the number of consecutive polling periods. When the threshold is reached, actions configured for this event type take place.

NOTE
A threshold of 1/W implies that there is no threshold, and the action is always triggered.

events Specifies the threshold in terms of the number of events. Valid values are 1 through 10.

polling-interval Specifies the number of polling windows. The device polls the internal registers at the interval specified by the sysmon timer value. Valid values 1-32. However, the polling window number must be equal or greater than the number of events.

log-backoff If an error condition persists, it is continuously logged (internally and/or externally to syslog as defined by the action). The log back-off count skips configured number of logs before logging again.

action Specifies the action to take when the error count exceeds the specified threshold and log back-off values.

none The error is logged in the internal sysmon logs. This is the default value.

syslog The error is logged to syslog.

Global configuration mode.

The following example configures system monitoring for fabric adaptor errors:

```
device(config)# sysmon link-error threshold 3 7
device(config)# sysmon link-error action syslog
device(config)# sysmon link-error log-backoff 15
```

System monitoring for Packet Processors

On ICX devices, errors typically detected in packet processors include:

- Parity errors
- Error Checking Code (ECC) errors
- ConfigTable0 errors
- TCAM error
- TCAM action parity errors
- Token bucket priority parity errors
- State variable parity errors
- Link list RAM ECC errors
- FBUF RAM ECC errors
- Egress VLAN parity errors
- Ingress VLAN parity errors
- Layer 2 port isolation parity errors
- Layer 3 port isolation parity errors
- VIDX parity errors

Use the following commands to configure and display the statistics of cross bar or switch fabric module:

- show sysmon logs
- show sysmon counters
- show sysmon config

clear sysmon counters

Clears sysmon counters for all or specific event types.

clear sysmon counters all

clear sysmon counters pp error { **all** | **decimal** }

clear sysmon counters { **ecc-error** | **link-error** }

all	Clears all sysmon counters.	
error	Clears the fabric adaptor error counters. You can specify all or a fabric adaptor, identified by the index.	
pp error	Clears packet processor sysmon counters. You can specify all or a packet processor identified by the index.	
ecc-error	Clears the ECC error count on ICX devices.	
	stack-unit	Specifies the stack unit on which errors to be cleared.
	all	Specifies that all stack units are cleared of errors.
link-error	Clears the link error count on ICX devices.	
	stack-unit	Specifies the stack unit on which errors to be cleared.
	all	Specifies that all stack units are cleared of errors.

Privileged exec mode

The following example clears the ECC sysmon counters.

```
device(config)# clear sysmon counters ecc-error
```

show sysmon logs

Displays the entries written to syslog for all event types if the action specified is to log them into syslog.

show sysmon logs

Privileged EXEC mode

If the action specified is **none**, the sysmon logs display nothing.

The following example displays the syslog entries that were made by sysmon if the action specified either at the global level or type level was to log the events to syslog.

```
device# show sysmon logs

Aug  3 03:59:22:C:Sysmon:Link ERROR: SLOT9/Link0 -- HG.Link error
Aug  3 03:59:34:W:Sysmon:ECC ERROR: SLOT1  error occurred
```

The following table describes the output of this command:

TABLE 10 show sysmon log s command output fields

Field	Description
Date and time	Aug 3 03:59:22
Critical or Warning	A 'C' indicates a critical error and a 'W' indicates a warning.
Sysmon	Message coming from Sysmon
Event type	Possible values are FA ERROR, FA Link, XBAR ERROR, XBAR LINK, or PP ERROR
Component identifier	Identifies the component of the system where the error was detected
Error	A brief description of the error

show sysmon counters

Displays sysmon counters for all or specific event types.

show sysmon counters type { **error** | **link** }

show sysmon counters { **ecc-error** | **link-error** }

type The event type for which sysmon counters are displayed. For ICX devices, the options are ecc-error and link-error. The default value is all.

- **error** Displays the error counter for the specified event type.
- **link** Displays the link error counters. You can specify either all or specific links.

ecc-error Displays the ECC error count on ICX devices.

- ***stack-unit*** Specifies the stack unit on which errors to be displayed.
- **all** Displays errors for all stack units.

link-error Displays the link error count on ICX devices.

- ***stack-unit*** Specifies the stack unit on which errors to be displayed.
- **all** Displays errors for all stack units.

Privileged exec mode

The following example displays all error counter data on an ICX device:

```
device(config)# show sysmon counters all
Sysmon error detected on: Stacking Unit 1 (number of times)
****Stacking unit 1 (ICX) Link error detect
Port 24
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 25
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 26
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 27
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
==========================
Sysmon error detected on: Stacking Unit 2 (number of times)
****Stacking unit 2 (ICX) Link error detect
Port 24
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 25
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 26
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 27
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
==========================
Sysmon error detected on: Stacking Unit 3 (number of times)
****Stacking unit 3 (ICX) Link error detect
Port 24
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 25
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 26
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 27
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
==========================
Sysmon error detected on: Stacking Unit 4 (number of times)
****Stacking unit 4 (ICX) Link error detect
Port 24
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 25
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 26
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 27
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
==========================
Sysmon error detected on: Stacking Unit 5 (number of times)
****Stacking unit 5 (ICX) Link error detect
Port 24
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 25
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 26
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
Port 27
 Link error detect = 0 remote fault detect = 0 lane error detect = 0
==========================
Sysmon ECC error detected on: Stacking Unit 1 (number of times)
****Stacking unit 1 (ICX) ecc error detect
ECC one-time error detect = 0 ECC two-time error detect = 0
==========================
Sysmon ECC error detected on: Stacking Unit 2 (number of times)
****Stacking unit 2 (ICX) ecc error detect
ECC one-time error detect = 0 ECC two-time error detect = 0
==========================
Sysmon ECC error detected on: Stacking Unit 3 (number of times)
****Stacking unit 3 (ICX) ecc error detect
ECC one-time error detect = 0 ECC two-time error detect = 0
==========================
Sysmon ECC error detected on: Stacking Unit 4 (number of times)
```

```
****Stacking unit 4 (ICX) ecc error detect
ECC one-time error detect = 0 ECC two-time error detect = 0
==========================
Sysmon ECC error detected on: Stacking Unit 5 (number of times)
****Stacking unit 5 (ICX) ecc error detect
ECC one-time error detect = 0 ECC two-time error detect = 0
==========================
```

show sysmon config

Displays the complete sysmon configuration, including the global configuration and the event-specific configuration.

show sysmon config

User exec mode

Privileged exec mode

The following example displays the sysmon configuration on an ICX device:

```
device(config)# show sysmon config
=====================================
System Monitoring (Sysmon) is: enabled
Sysmon timer = 3 minutes
=====================================
Threshold: Times error detected / Consecutive times event polling.
Log Backoff Numner: Number of times skip log before log again.
=====================================
Sysmon Event: LINK_STATUS (Enabled)
Threshold:          2/10
Log Backoff Number: 10
Action: log(internal) /syslog
Sysmon Event: ECC_STATS (Enabled)
Threshold:          2/10
Log Backoff Number: 10
Action: log(internal) /syslog
```

Syslog

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About Syslog messages

Ruckus software can write syslog messages to provide information at the following severity levels:

- Emergencies
- Alerts
- Critical
- Errors
- Warnings
- Notifications
- Informational
- Debugging

The device writes the messages to a local buffer.

You also can specify the IP address or host name of up to six Syslog servers. When you specify a Syslog server, the Ruckus device writes the messages both to the system log and to the Syslog server.

Using a Syslog server ensures that the messages remain available even after a system reload. The Ruckus local Syslog buffer is cleared during a system reload or reboot, but the Syslog messages sent to the Syslog server remain on the server.

> **NOTE**
> To enable the Ruckus device to retain Syslog messages after a soft reboot (**reload** command). Refer to Retaining Syslog messages after a soft reboot on page 123.

The Syslog service on a Syslog server receives logging messages from applications on the local host or from devices such as a Layer 2 Switch or Layer 3 Switch. Syslog adds a time stamp to each received message and directs messages to a log file. Most Unix workstations come with Syslog configured. Some third party vendor products also provide Syslog running on NT.

Syslog uses UDP port 514 and each Syslog message thus is sent with destination port 514. Each Syslog message is one line with Syslog message format. The message is embedded in the text portion of the Syslog format. There are several subfields in the format. Keywords are used to identify each subfield, and commas are delimiters. The subfield order is insensitive except that the text subfield should be the last field in the message. All the subfields are optional.

Displaying Syslog messages

To display the Syslog messages in the device local buffer, enter the **show logging** command from any CLI mode. The following shows an example display output.

```
device# show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 9 overruns)
    Buffer logging: level ACDMEINW, 50 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
```

```
                I=informational N=notification W=warning

Static Log Buffer:
Jan  1 00:00:56:I:System: Stack unit 1   Power supply 2  is up

Dynamic Log Buffer (50 lines):
Feb  5 01:22:17:D:DHCPC: TFTP unable to download running-configuration
Feb  5 01:22:16:D:DHCPC: sending TFTP request for bootfile name ruckus.cfg
Feb  5 01:22:15:D:DHCPC: sending TFTP request for bootfile name icx7450.cfg
Feb  5 01:22:14:D:DHCPC: sending TFTP request for bootfile name ICX7450-24-
Route
      r.cfg
Feb  5 01:22:13:D:DHCPC: sending TFTP request for bootfile name ICX7450-24-
Route
      rcc4e.248b.b068.cfg
Feb  5 01:22:12:I:DHCPC: ICX7450-24 Router configured with ip-address 10.10.10.10; subnet mask
255.255.255.0 on port mgmt1
Feb  5 01:22:12:D:DHCPC: sending TFTP request for bootfile name ICX7450-24-
Route
      rcc4e.248b.b068-config.cfg
Feb  5 01:22:12:I:DHCPC: Setting boot-image download to secondary
Feb  5 01:22:12:E:DHCPC: Failed to configure default gatewa
Feb  5 01:22:12:I:PORT: mgmt1, added ip address 10.10.10.10 by un-
authenticate
             d user from console session
Feb  5 01:22:12:I:PORT: mgmt1, removed ip address 10.10.10.10 by un-
authentica
           ted user from console session
Feb  4 01:19:59:D:DHCPC: TFTP unable to download running-configuration
Feb  4 01:19:58:D:DHCPC: sending TFTP request for bootfile name ruckus.cfg
Feb  4 01:19:57:D:DHCPC: sending TFTP request for bootfile name icx7450.cfg
...
```

For information about the Syslog configuration information, time stamps, and dynamic and static buffers, refer to Displaying the Syslog configuration on page 117.

Enabling real-time display of Syslog messages

By default, to view Syslog messages generated by a Ruckus device, you need to display the Syslog buffer or the log on a Syslog server used by the Ruckus device.

You can enable real-time display of Syslog messages on the management console. When you enable this feature, the software displays a Syslog message on the management console when the message is generated. However, to enable display of real-time Syslog messages in Telnet or SSH sessions, you also must enable display within the individual sessions.

To enable real-time display of Syslog messages, enter the following command from the CLI global config mode.

```
device(config)# logging console
```

This command enables the real-time display of Syslog messages on the serial console. You can enter this command from the serial console or a Telnet or SSH session.

Enabling real-time display for a Telnet or SSH session

To enable the real-time display for a Telnet or SSH session, enter the following command from the Privileged exec mode of the session.

```
telnet@device#terminal monitor
Syslog trace was turned ON
```

Notice that the CLI displays a message to indicate the status change for the feature. To disable the feature in the management session, enter the **terminal monitor** command again. The command toggles the feature on and off.

```
telnet@device#terminal monitor
Syslog trace was turned OFF
```

The following example shows how the Syslog messages are displayed.

```
telnet@device#terminal monitor
Syslog trace was turned ON
SYSLOG: <9>device, Power supply 2, power supply on left connector, failed
SYSLOG: <14>device, Interface ethernet 6, state down
SYSLOG: <14>device, Interface ethernet 2, state up
```

Broadcast, unknown unicast, and multicast suppression Syslog and SNMP notification

Rate limiting broadcast, unknown unicast, and multicast (BUM) traffic protects a switch, router node, or network from Denial of Service (DoS) attacks or unintentional traffic configurations. When an incoming packet exceeds the maximum number of bytes that you set with rate limiting, a Syslog notification is generated.

Restrictions and limitations

- All of the restrictions that are applicable while configuring ACLs on an interface apply to this feature. Refer to the *Ruckus FastIron Security Configuration Guide* for the restrictions that apply to ACLs. The main restrictions are:
  - You cannot change the ports VLAN membership.
  - You cannot apply another ACL or MAC-filter to the interface.
- By default, the Syslog logs once a minute; however, you can configure Syslog notifications so that they log at a maximum interval of every 10 minutes.

Enabling BUM suppression logging

Follow these steps to enable logging.

Rate limiting must be enabled.

1. Enter configuration mode.

   ```
   device# configure terminal
   ```

2. Enter Ethernet configuration mode.

   ```
   device(config)# interface ethernet 1/1/1
   ```

3. Enable rate limiting.

   ```
   device(config-if-e10000-1/1/1)# broadcast limit 8388607 kbps
   ```

   Broadcast is used in ths example, multicast and unknown unicast are the same with the command name switched to either **multicast** or **unknown-unicast**.

4. Enable logging when the limit exceeds kbps.

   ```
   device(config-if-e10000-1/1/1)# broadcast limit 100 kbps log
   ```

   Broadcast is used in ths example, multicast and unknown unicast are the same with the command name switched to either **multicast** or **unknown-unicast**.

5. Globally configure the log interval.

```
device(config)# rate-limit-log 6
device(config)# exit
```

6. Verify the logging interval.

```
device(config)# show running-config | include rate-limit-log
 rate-limit-log 6
```

7. Verify the configuration.

```
device# show logging | include 1/1/1
Jan 13 12:02:12:I:Security: Interface ethernet 1/1/1 reached the Broadcast traffic limit and 1434 kB
are dropped
```

Enabling BUM suppression logging configuration example

```
device# configure terminal
device(config)# interface ethernet 1/1/1
device(config-if-e10000-1/1/1)# broadcast limit 8388607
device(config-if-e10000-1/1/1)# broadcast limit 100 kbps log
device(config)# rate-limit-log 6
device(config)# show running-config | include rate-limit-log
device(config)# exit
device# show logging | include 1/1/1
```

Viewing BUM suppression Syslog notifications

Use these commands to display BUM suppression syslog notification information.

Use the **show logging** command to view the BUM suppression Syslog notifications for all interfaces.

```
device# show logging
Jan 13 12:02:12:I:Security: Interface ethernet 1/1/1 reached the Broadcast traffic limit and 11620 kB are
dropped
Jan 13 12:14:23:I:Security: Interface ethernet 1/3/12 reached the Multicast traffic limit and 870 kB are
dropped
Jan 13 12:45:38:I:Security: Interface ethernet 3/2/14 reached the Unknown-Unicast traffic limit and 2321 kB
are dropped
```

The first section of the output is `mmm dd hh:mm:ss:Info:System`.

To view the BUM suppression Syslog notifications for a specific interface use the following command.

```
device# show logging | include 1/1/1
Jan 13 12:02:12:I:Security: Interface ethernet 1/1/1 reached the Broadcast traffic limit and 11620 kB are
dropped
```

Displaying real-time Syslog messages

Any terminal logged in to a Ruckus switch can receive real-time Syslog messages when the **terminal monitor** command is issued.

Syslog service configuration

Complete the following procedures to configure the Syslog:

- Specify a Syslog server. You can configure the Ruckus device to use up to six Syslog servers. (Use of a Syslog server is optional. The system can hold up to 1000 Syslog messages in an internal buffer.)
- Change the level of messages the system logs.
- Change the number of messages the local Syslog buffer can hold.
- Display the Syslog configuration.
- Clear the local Syslog buffer.

Logging is enabled by default, with the following settings:

- Messages of all severity levels (Emergencies - Debugging) are logged.
- By default, up to 50 messages are retained in the local Syslog buffer. This can be changed.
- No Syslog server is specified.

Displaying the Syslog configuration

To display the Syslog parameters currently in effect on a Ruckus device, enter the following command from any CLI mode.

```
device# show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 3 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
                I=informational N=notification W=warning
Static Log Buffer:
Dec 15 19:04:14:A:Fan 1, fan on right connector, failed
Dynamic Log Buffer (50 entries):
Dec 15 18:46:17:I:Interface ethernet 1/1/4, state up
Dec 15 18:45:21:I:Bridge topology change, vlan 4095, interface 4, changed
state to forwarding
Dec 15 18:45:15:I:Warm start
```

Static and dynamic buffers

The software provides two buffers:

- Static: Logs power supply failures, fan failures, and temperature warning or shutdown messages
- Dynamic: Logs all other message types

In the static log, new messages replace older ones, so only the most recent message is displayed. For example, only the most recent temperature warning message will be present in the log. If multiple temperature warning messages are sent to the log, the latest one replaces the previous one. The static buffer is not configurable.

The message types that appear in the static buffer do not appear in the dynamic buffer. The dynamic buffer contains up to the maximum number of messages configured for the buffer (50 by default), and then begins removing the oldest messages (at the bottom of the log) to make room for new ones.

The static and dynamic buffers are both displayed when you display the log.

```
device# show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 3 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
          I=informational N=notification W=warning
Static Log Buffer:
Dec 15 19:04:14:A:Fan 1, fan on right connector, failed
```

```
Dec 15 19:00:14:A:Fan 2, fan on left connector, failed
Dynamic Log Buffer (50 entries):
Dec 15 18:46:17:I:Interface ethernet 4, state up
Dec 15 18:45:21:I:Bridge topology change, vlan 4095, interface 4, changed
state to forwarding
Dec 15 18:45:15:I:Warm start
```

Notice that the static buffer contains two separate messages for fan failures. Each message of each type has its own buffer. Thus, if you replace fan 1, but that fan also fails, the software replaces the first message about the failure of fan 1 with the newer message. The software does not overwrite the message for fan 2, unless the software sends a newer message for fan 2.

Clearing log entries

When you clear log entries, you can selectively clear the static or dynamic buffer, or you can clear both. For example, to clear only the dynamic buffer, enter the following command from the Privileged exec mode.

```
device# clear logging dynamic-buffer
```

You can specify **dynamic-buffer** to clear the dynamic buffer or **static-buffer** to clear the static buffer. If you do not specify a buffer, both buffers are cleared.

Timestamps

The contents of the timestamp differ depending on whether you have set the time and date on the onboard system clock.

If you have set the time and date on the onboard system clock, the date and time are shown in the following format:

mmm dd hh:mm:ss

The format takes the following form:

- *mmm*: Three-letter abbreviation for the name of the month
- *dd*: Day of the month
- *hh*: Hours
- *mm*: Minutes
- *ss*: Seconds

For example, "Oct 15 17:38:03" means October 15 at 5:38 PM and 3 seconds.

Example of Syslog messages on a device with the onboard clock set

The following example shows the format of messages on a device where the onboard system clock is set. Each timestamp shows the month, the day, and the time of the system clock when the message was generated. For example, the system time when the most recent message (the one at the top) was generated was October 15 at 5:38 PM and 3 seconds.

```
device# show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 38 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
                I=informational N=notification W=warning
Static Log Buffer:
Dec 15 19:04:14:A:Fan 1, fan on right connector, failed
Dec 15 19:00:14:A:Fan 2, fan on left connector, failed
Dynamic Log Buffer (50 entries):
Oct 15 17:38:03:warning:list 101 denied tcp 10.157.22.191(0)(Ethernet 18
0000.001f.77ed) -> 10.99.4.69(http), 1 event(s)
Oct 15 07:03:30:warning:list 101 denied tcp 10.157.22.26(0)(Ethernet 18
0000.001f.77ed) -> 10.99.4.69(http), 1 event(s)
```

```
Oct 15 06:58:30:warning:list 101 denied tcp 10.157.22.198(0)(Ethernet 18
0000.001f.77ed) -> 10.99.4.69(http), 1 event(s)
```

Generating the Syslog specific to RFC 5424

By default, Syslog is generated in accordance with RFC 3164. To provide the maximum amount of information in every Syslog in a structured format, you can enable Syslog logging specific to RFC 5424.

The Syslog that conforms to RFC 5424 has an enhanced Syslog header that helps to identify the type of Syslog, filter the Syslog message, identify the Syslog generation time with year and milliseconds with respect to the time zone, and other enhancements. The Syslog specific to RFC 5424 can be enabled using the **logging enable rfc5424** command. Logging buffer must be cleared before enabling Syslog specific to RFC 5424, otherwise the system displays an error.

NOTE
If the **logging cli-command** command is present in the running configuration, switching between Syslog functionality that follows the default RFC 3164 standard and Syslog specific to RFC 5424 standard is not supported.

The following table provides a comparison of the syslog header information available in the RFC 3164 and RFC 5424 Syslog logging.

TABLE 11 Syslog headers available for RFC 3164 and RFC 5424

Syslog RFC 3164	Syslog RFC 5424
PRIORITY	PRIORITY
	VERSION
TIMESTAMP	TIMESTAMP
HOSTNAME	HOSTNAME
	APP-NAME
	PROCID
	MSGID
	STRUCTURED-DATA
MSG	MSG

RFC 5424 provides the following Syslog headers:

- PRIORITY — This represents both Facility and Severity of the messages as described in RFC 3164.
- VERSION — This field denotes the version of the Syslog protocol specification.
- TIMESTAMP — This is a formalized timestamp. TIMESTAMP denotes the date and time when the event is logged and includes the syslog generation time with the year and milliseconds with respect to the time zone.

  The following examples show the date and time format in RFC 5424.

  NOTE
  The suffix "Z", when applied to a time, denotes a Coordinated Universal Time (UTC) offset of 00:00.

  For example, 2015-08-13T22:14:15.003Z represents August 13, 2015 at 10:14:15pm, 3 milliseconds into the next second. The timestamp is in UTC. The timestamp provides millisecond resolution.
- HOSTNAME — It identifies the machine that originally sent the Syslog message. The order of preference for the contents of the HOSTNAME field is as follows and may have one of the following values:
  - FQDN
  - Hostname

  - NILVALUE — A field used when the Syslog application is incapable of obtaining its host name.
- APP-NAME — This identifies the device or application from which the message is originated. The APP-NAME is intended for filtering messages on a relay or collector. The NILVALUE is used when the Syslog application is incapable of obtaining its APP-NAME.
- PROCID — This field is often used to provide the process name or process ID associated with a Syslog system. The NILVALUE is present when a process ID is not available.
- MSGID — It identifies the type of message. The NILVALUE is used when the Syslog application does not, or cannot, provide any value.
- STRUCTURED-DATA — This provides a mechanism to express information in a well-defined and interpretable data format as per RFC 5424. STRUCTURED-DATA can contain zero, one, or multiple SD elements. In case of zero structured data elements, the STRUCTURED-DATA field uses NILVALUE.
- MSG — It contains a free-form message that provides information about the event.

Displaying syslog messages generated as per RFC 5424

If Syslog logging specific to RFC 5424 is enabled, the **show logging** command displays the Syslog messages generated in the format as per RFC 5424.

```
device# show logging
Syslog logging: enabled (RFC: 5424, 0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 22 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
                I=informational N=notification W=warning

Static Log Buffer:
Dec 19 01:36:18:I: ruckus - - - [meta sequenceId=8] BOMSystem: Stack unit 1   Power supply 1  is up
Dec 19 01:36:24:I: ruckus - - - [meta sequenceId=17] BOMSystem: Stack unit 3 POE  Power supply 1  with
748000 mwatts capacity is up
Dec 19 01:36:24:A: ruckus - - - [meta sequenceId=19] BOMSystem: Stack unit 3 POE  Power supply 2  is down

Dynamic Log Buffer (50 lines):
2012-12-19T01:36:40.798Z:I: ruckus - - - [meta sequenceId=23] BOMSystem: Interface ethernet 3/1/23, state up
2012-12-19T01:36:40.797Z:I: ruckus - - - [meta sequenceId=22] BOMSystem: Interface ethernet 3/1/13, state up
2012-12-19T01:36:40.796Z:I: ruckus - - - [meta sequenceId=21] BOMSystem: Interface ethernet 3/1/1, state up
2012-12-19T01:36:24.591Z:A: ruckus - - - [meta sequenceId=20] BOMStack unit 3 Power supply 2 is down
2012-12-19T01:36:24.591Z:I: ruckus - - - [meta sequenceId=18] BOMSystem: Stack unit 3 Power supply 1 with
748000 mwatts capacity is up
2012-12-19T01:36:23.406Z:I: ruckus - - - [meta sequenceId=16] BOMSystem: Interface ethernet 3/3/1, state up
2012-12-19T01:36:22.526Z:I: ruckus - - - [meta sequenceId=15] BOMStack: Stack unit 1 has been elected as
ACTIVE unit of the stack system
2012-12-19T01:36:21.297Z:I: ruckus - - - [meta sequenceId=14] BOMSystem: Interface ethernet 1/4/1, state up
2012-12-19T01:36:20.858Z:I: ruckus - - - [meta sequenceId=13] BOMStack: Stack unit 1 has been elected as
ACTIVE unit of the stack system
2012-12-19T01:36:20.822Z:I: ruckus - - - [meta sequenceId=12] BOMStack: Stack unit 3 has been added to the
stack system
2012-12-19T01:36:20.500Z:I: ruckus - - - [meta sequenceId=11] BOMSystem: Interface ethernet 1/4/1, state
down
2012-12-19T01:36:19.695Z:I: ruckus - - - [meta sequenceId=10] BOMSystem: Interface ethernet 1/4/1, state up
2012-12-19T01:36:18.509Z:I: ruckus - - - [meta sequenceId=9] BOMSystem: Stack unit 1 Power supply 1  is u
2012-12-19T01:36:17.865Z:I: ruckus - - - [meta sequenceId=7] BOMSystem: Interface ethernet 1/3/1, state up
2012-12-19T01:36:16.466Z:I: ruckus - - - [meta sequenceId=6] BOMSystem: Interface ethernet mgmt1, state up
2012-12-19T01:36:16.447Z:I: ruckus - - - [meta sequenceId=5] BOMSystem: Warm start
2012-12-19T01:36:16.260Z:D: ruckus - - - [meta sequenceId=4] BOMDHCPC: starting dhcp client service on 57
port(s)
2012-12-19T01:36:16.259Z:D: ruckus - - - [meta sequenceId=3] BOMDHCPC: Found static IP address 10.20.15.15
subnet mask 255.255.255.0 on port mgmt1
2012-12-19T01:36:16.259Z:D: ruckus - - - [meta sequenceId=2] BOMDHCPC: Found static IP address 20.20.20.3
subnet mask 255.255.255.0 on port 1/1/3
2012-12-19T01:36:16.259Z:D: ruckus - - - [meta sequenceId=1] BOMDHCPC: Found static IP address 10.10.10.2
subnet mask 255.255.255.0 on port 1/1/1
```

Disabling or re-enabling Syslog

Syslog is enabled by default. To disable it, enter the **logging on** command from the global config mode.

```
device(config)# no logging on
```

To re-enable logging, re-enter the **logging on** command.

```
device(config)# logging on
```

This command enables local Syslog logging with the following defaults:

- Messages of all severity levels (Emergencies - Debugging) are logged.
- Up to 50 messages are retained in the local Syslog buffer.
- No Syslog server is specified.

Specifying a Syslog server

To specify a Syslog server, enter the **logging host** command.

```
device(config)# logging host 10.0.0.99
```

Specifying an additional Syslog server

To specify an additional Syslog server, enter the **logging host** command again.

```
device(config)# logging host 10.0.0.99
```

You can specify up to six Syslog servers.

Disabling logging of a message level

To change the message level, disable logging of specific message levels. You must disable the message levels on an individual basis.

For example, to disable logging of debugging and informational messages, enter the following commands.

```
device(config)# no logging buffered debugging
device(config)# no logging buffered informational
```

The *message level* parameter can have one of the following values:

- alerts
- critical
- debugging
- emergencies
- errors
- informational
- notifications
- warnings

The commands in the example above change the log level to notification messages or higher. The software does not log informational or debugging messages. The changed message level also applies to the Syslog servers.

Changing the number of entries the local buffer can hold

You also can use the **logging buffered** command to change the number of entries the local Syslog buffer can store. For example.

```
device(config)# logging buffered 1000
device(config)# write memory
device(config)# exit
device# reload
```

The default number of messages is 50. For FastIron devices, you can set the Syslog buffer limit from 1 - 1000 entries.

Local buffer configuration notes

- You must save the configuration and reload the software to place the change into effect.
- If you decrease the size of the buffer, the software clears the buffer before placing the change into effect.
- If you increase the size of the Syslog buffer, the software will clear some of the older locally buffered Syslog messages.

Changing the log facility

The Syslog daemon on the Syslog server uses a facility to determine where to log the messages from the Ruckus device. The default facility for messages the Ruckus device sends to the Syslog server is "user". You can change the facility using the following command.

NOTE
You can specify only one facility. If you configure the Ruckus device to use two Syslog servers, the device uses the same facility on both servers.

```
device(config)# logging facility local0
```

The *facility name* parameter can be one of the following:

- kern — kernel messages
- user — random user—level messages
- mail — mail system
- daemon — system daemons
- auth — security or authorization messages
- syslog — messages generated internally by Syslog
- lpr — line printer subsystem
- news — netnews subsystem
- uucp — uucp subsystem
- sys9 — cron/at subsystem
- sys10 — reserved for system use
- sys11 — reserved for system use
- sys12 — reserved for system use
- sys13 — reserved for system use
- sys14 — reserved for system use
- cron — cron/at subsystem
- local0 — reserved for local use

- local1 — reserved for local use
- local2 — reserved for local use
- local3 — reserved for local use
- local4 — reserved for local use
- local5 — reserved for local use
- local6 — reserved for local use
- local7 — reserved for local use

Displaying interface names in Syslog messages

By default, an interface slot number (if applicable) and port number are displayed when you display Syslog messages. If you want to display the name of the interface instead of its number, enter the following command:

```
device(config)# ip show-portname
```

This command is applied globally to all interfaces on Layer 2 and Layer 3 switches.

By default, Syslog messages show the interface type, such as "ethernet", and so on. For example, you see the following

```
SYSLOG: <14>0d00h02m18s:ICX6610-48P Router System: Interface ethernet 1/1/5, state up
```

However, if **ip show-portname** is configured and a name has been assigned to the port, the port name replaces the interface type as in the example below, where "port5_name" is the name of the port.

```
SYSLOG: <14>0d00h02m18s:ICX6610-48P Router System: Interface port5_name 1/1/5, state up
```

Also, when you display the messages in the Syslog, you see the interface name under the Dynamic Log Buffer section. The actual interface number is appended to the interface name. For example, if the interface name is "lab" and its port number is "2", you see "lab2" displayed as in the example below:

```
device# show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 3 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
          I=informational N=notification W=warning
Static Log Buffer:
Dec 15 19:04:14:A:Fan 1, fan on right connector, failed
Dynamic Log Buffer (50 entries):
Dec 15 18:46:17:I:Interface ethernet Lab2
, state up
Dec 15 18:45:15:I:Warm start
```

Retaining Syslog messages after a soft reboot

You can configure the device to save the System log (Syslog) after a soft reboot (**reload** command).

Syslog reboot configuration considerations

- If the Syslog buffer size was set to a different value using the CLI command **logging buffered** , the Syslog is cleared after a soft reboot, even when this feature (logging persistence) is in effect. This occurs only with a soft reboot immediately following a Syslog buffer size change. A soft reboot by itself does not clear the Syslog. To prevent the system from clearing the Syslog, leave the number of entries allowed in the Syslog buffer unchanged.
- This feature does not save Syslog messages after a hard reboot. When the Ruckus device is power-cycled, the Syslog messages are cleared.

- If *logging persistence* is enabled and you load a new software image on the device, you must first clear the log if you want to reload the device. (Refer to Clearing the Syslog messages from the local buffer on page 124.)

To configure the device to save the Syslog messages after a soft reboot, enter the following command.

```
device(config)# logging persistence
```

Clearing the Syslog messages from the local buffer

To clear the Syslog messages stored in the local buffer of the Ruckus device, enter the **clear logging** command.

```
device# clear logging
```

Syslog messages

- Ruckus Syslog messages..... 125
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This section lists all of the Syslog messages. Note that some of the messages apply only to Layer 3 switches.

NOTE
This chapter does not list Syslog messages that can be displayed when a debug option is enabled.

The messages are listed by message level, in the following order, then by message type:

- Emergencies (none)
- Alerts
- Critical
- Errors
- Warnings
- Notifications
- Informational
- Debugging

Ruckus Syslog messages

Message `num-modules modules and 1 power supply, need more power supply!!`
Explanation Indicates that the chassis needs more power supplies to run the modules in the chassis.

The num-modules parameter indicates the number of modules in the chassis.
Message Level Alert

Message *Stack: system upgrade completed*
Explanation Indicates that the system upgrade is completed successfully.
Message Level Informational

Message *Stack: system upgrade failed*
Explanation Indicates that the system upgrade failed.
Message Level Alert

Message *Stack: stack unit <unit_id> completed upgrade*
Explanation Indicates that the stack unit with a particular stack id completed system upgrade.
Message Level Informational

Message *Stack: system upgrade failed, stack unit <unit_id> is in <failure_state>*
Explanation Indicates that the system upgrade for stack unit with a particular stack id failed and is in the failure state as specified in the message.
Message Level Alert

Message *Stack: system upgrade started and most of user interfaces are blocked*
Explanation Indicates that the system upgrade started and most of user interfaces are blocked.
Message Level Alert

Message `Fan num , location , failed`
Explanation A fan has failed.

The num is the fan number.

The location describes where the failed fan is in the chassis.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum`
Explanation RADIUS authentication was successful for the specified mac-address on the specified portnum ; however, the VLAN returned in the RADIUS Access-Accept message did not refer to a valid VLAN or VLAN ID on the Ruckus device. This is treated as an authentication failure.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum (Invalid User)`
Explanation RADIUS authentication failed for the specified mac-address on the specified portnum because the MAC address sent to the RADIUS server was not found in the RADIUS server users database.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum (No VLAN Info received from RADIUS server)`
Explanation RADIUS authentication was successful for the specified mac-address on the specified portnum ; however, dynamic VLAN assignment was enabled for the port, but the RADIUS Access-Accept message did not include VLAN information. This is treated as an authentication failure.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum (Port is already in another radius given vlan)`
Explanation RADIUS authentication was successful for the specified mac-address on the specified portnum ; however, the RADIUS Access-Accept message specified a VLAN ID, although the port had previously been moved to a different RADIUS-assigned VLAN. This is treated as an authentication failure.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum (RADIUS given vlan does not exist)`
Explanation RADIUS authentication was successful for the specified mac-address on the specified portnum ; however, the RADIUS Access-Accept message specified a VLAN that does not exist in the Ruckus configuration. This is treated as an authentication failure.
Message Level Alert

Message `MAC Authentication failed for mac-address on portnum (RADIUS given VLAN does not match with TAGGED vlan)`
Explanation Multi-device port authentication failed for the mac-address on a tagged port because the packet with this MAC address as the source was tagged with a VLAN ID different from the RADIUS-supplied VLAN ID.
Message Level Alert

Message `Management module at slot slot-num state changed from module-state to module-state .`
Explanation Indicates a state change in a management module.

The slot-num indicates the chassis slot containing the module.

The module-state can be one of the following:

- active
- standby

- crashed
- coming-up
- unknown

Message Level Alert

Message `OSPF LSA Overflow, LSA Type = lsa-type`

Explanation Indicates an LSA database overflow.

The lsa-type parameter indicates the type of LSA that experienced the overflow condition. The LSA type is one of the following:

- 1 - Router
- 2 - Network
- 3 - Summary
- 4 - Summary
- 5 - External

Message Level Alert

Message `OSPF Memory Overflow`

Explanation OSPF has run out of memory.

Message Level Alert

Message `System: Module in slot slot-num encountered PCI config read error: Bus PCI-bus-number , Dev PCI-device-number , Reg Offset PCI-config-register-offse t .`

Explanation The module encountered a hardware configuration read error.

Message Level Alert

Message `System: Module in slot slot-num encountered PCI config write error: Bus PCI-bus-number , Dev PCI-device-number , Reg Offset PCI-config-register-offset .`

Explanation The module encountered a hardware configuration write error.

Message Level Alert

Message `System: Module in slot slot-num encountered PCI memory read error: Mem Addr memory-address`

Explanation The module encountered a hardware memory read error.

The memory-address is in hexadecimal format.

Message Level Alert

Message `System: Module in slot slot-num encountered PCI memory write error: Mem Addr memory-address .`

Explanation The module encountered a hardware memory write error.

The memory-address is in hexadecimal format.

Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI bridge validation failure. Module will be deleted.`

Explanation The module encountered an unrecoverable (hardware) bridge validation failure. The module will be disabled or powered down.

Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI config read failure. Module will be deleted.`

Explanation The module encountered an unrecoverable hardware configuration read failure. The module will be disabled or powered down.
Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI config write failure. Module will be deleted.`
Explanation The module encountered an unrecoverable hardware configuration write failure. The module will be disabled or powered down.
Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI device validation failure. Module will be deleted.`
Explanation The module encountered an unrecoverable (hardware) device validation failure. The module will be disabled or powered down.
Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI memory read failure. Module will be deleted.`
Explanation The module encountered an unrecoverable hardware memory read failure. The module will be disabled or powered down.
Message Level Alert

Message `System: Module in slot slot-num encountered unrecoverable PCI memory write failure. Module will be deleted.`
Explanation The module encountered an unrecoverable hardware memory write failure. The module will be disabled or powered down.
Message Level Alert

Message `System: No Free Tcam Entry available. System will be unstable`
Explanation You must reboot the device.
Message Level Alert

Message `System: Temperature is over shutdown level, system is going to be reset in num seconds`
Explanation The chassis temperature has risen above shutdown level. The system will be shut down in the amount of time indicated.
Message Level Alert

Message `Temperature degrees C degrees, warning level warn-degrees C degrees, shutdown level shutdown-degrees C degrees`
Explanation Indicates an over temperature condition on the active module.

The degrees value indicates the temperature of the module.

The warn-degrees value is the warning threshold temperature configured for the module.

The shutdown-degrees value is the shutdown temperature configured for the module.
Message Level Alert

Message `Authentication shut down portnum due to DOS attack`
Explanation Denial of Service (DoS) attack protection was enabled for multi-device port authentication on the specified portnum , and the per-second rate of RADIUS authentication attempts for the port exceeded the configured limit. The Ruckus device considers this to be a DoS attack and disables the port.
Message Level Critical

Message	`BGP4: Not enough memory available to run BGP4`
Explanation	The device could not start the BGP4 routing protocol because there is not enough memory available.
Message Level	Debug
Message	`DOT1X: Not enough memory`
Explanation	There is not enough system memory for 802.1X authentication to take place. Contact Ruckus Technical Support.
Message Level	Debug
Message	`No of prefixes received from BGP peer ip-addr exceeds maximum prefix-limit...shutdown`
Explanation	The Layer 3 switch has received more than the specified maximum number of prefixes from the neighbor, and the Layer 3 switch is therefore shutting down its BGP4 session with the neighbor.
Message Level	Error
Message	`IPv6: IPv6 protocol disabled on the device from session-id`
Explanation	IPv6 protocol was disabled on the device during the specified session.
Message Level	Informational
Message	`IPv6: IPv6 protocol enabled on the device from session-id`
Explanation	IPv6 protocol was enabled on the device during the specified session.
Message Level	Informational
Message	`MAC Filter applied to port port-id by username from session-id (filter id= filter-ids )`
Explanation	Indicates a MAC address filter was applied to the specified port by the specified user during the specified session. session-id can be console, telnet, ssh, or snmp. filter-ids is a list of the MAC address filters that were applied.
Message Level	Informational
Message	`MAC Filter removed from port port-id by username from session-id (filter id= filter-ids )`
Explanation	Indicates a MAC address filter was removed from the specified port by the specified user during the specified session. session-id can be console, telnet, ssh, or snmp. filter-ids is a list of the MAC address filters that were removed.
Message Level	Informational
Message	`Security: Password has been changed for user username from session-id`
Explanation	Password of the specified user has been changed during the specified session ID or type. session-id can be console, telnet, ssh, or snmp.
Message Level	Informational
Message	`device-name : Logical link on interface ethernet slot#/port# is down.`
Explanation	The specified ports were logically brought down while **singleton** was configured on the port.
Message Level	Informational
Message	`device-name : Logical link on interface ethernet slot#/port# is up.`
Explanation	The specified ports were logically brought up while **singleton** was configured on the port.
Message Level	Informational
Message	`user-name login to PRIVILEGED mode`

Explanation	A user has logged into the Privileged exec mode of the CLI. The user-name is the user name.
Message Level	Informational
Message	`user-name login to USER EXEC mode`
Explanation	A user has logged into the User exec mode of the CLI. The user-name is the user name.
Message Level	Informational
Message	`user-name logout from PRIVILEGED mode`
Explanation	A user has logged out of Privileged exec mode of the CLI. The user-name is the user name.
Message Level	Informational
Message	`user-name logout from USER EXEC mode`
Explanation	A user has logged out of the User exec mode of the CLI. The user-name is the user name.
Message Level	Informational
Message	`ACL ACL id added | deleted | modified from console | telnet | ssh| snmp session`
Explanation	A user created, modified, deleted, or applied an ACL through an SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`Bridge is new root, vlan vlan-id , root ID root-id`
Explanation	A Spanning Tree Protocol (STP) topology change has occurred, resulting in the Ruckus device becoming the root bridge. The vlan-id is the ID of the VLAN in which the STP topology change occurred. The root-id is the STP bridge root ID.
Message Level	Informational
Message	`Bridge root changed, vlan vlan-id , new root ID string , root interface portnum`
Explanation	A Spanning Tree Protocol (STP) topology change has occurred. The vlan-id is the ID of the VLAN in which the STP topology change occurred. The root-id is the STP bridge root ID. The portnum is the number of the port connected to the new root bridge.
Message Level	Informational
Message	`Bridge topology change, vlan vlan-id , interface portnum , changed state to stp-state`
Explanation	A Spanning Tree Protocol (STP) topology change has occurred on a port. The vlan-id is the ID of the VLAN in which the STP topology change occurred. The portnum is the port number. The stp-state is the new STP state and can be one of the following: • disabled • blocking • listening

- learning
- forwarding
- unknown

Message Level Informational

Message `Cold start`
Explanation The device has been powered on.
Message Level Informational

Message `DHCP: snooping on untrusted port portnum , type number, drop`
Explanation The device has indicated that the DHCP client receives DHCP server reply packets on untrusted ports, and packets are dropped.
Message Level Informational

Message `DOT1X: port portnum - MAC mac address Cannot apply an ACL or MAC filter on a port member of a VE (virtual interface)`
Explanation The RADIUS server returned an IP ACL or MAC address filter, but the port is a member of a virtual interface (VE).
Message Level Informational

Message `DOT1X: port portnum - MAC mac address cannot remove inbound ACL`
Explanation An error occurred while removing the inbound ACL.
Message Level Informational

Message `DOT1X: port portnum - MAC mac address Downloading a MAC filter, but MAC filter have no effect on router port`
Explanation The RADIUS server returned an MAC address filter, but the portnum is a router port (it has one or more IP addresses).
Message Level Informational

Message `DOT1X: port portnum - MAC mac address Downloading an IP ACL, but IP ACL have no effect on a switch port`
Explanation The RADIUS server returned an IP ACL, but the portnum is a switch port (no IP address).
Message Level Informational

Message `DOT1X:port portnum - MAC mac address Error - could not add all MAC filters`
Explanation The Ruckus device was unable to implement the MAC address filters returned by the RADIUS server.
Message Level Informational

Message `DOT1X: port portnum - MAC mac address Invalid MAC filter ID - this ID doesn't exist`
Explanation The MAC address filter ID returned by the RADIUS server does not exist in the Ruckus configuration.
Message Level Informational

Message `DOT1X: port portnum - MAC mac address Invalid MAC filter ID - this ID is user defined and cannot be used`
Explanation The port was assigned a MAC address filter ID that had been dynamically created by another user.
Message Level Informational

Message `DOT1X: port portnum - MAC mac address is unauthorized because system resource is not enough or the invalid information to set the dynamic assigned IP ACLs or MAC address filters`
Explanation 802.1X authentication failed for the Client with the specified mac address on the specified portnum either due to insufficient system resources on the device, or due to invalid IP ACL or MAC address filter information returned by the RADIUS server.

Message Level	Informational
Message	`DOT1X: port portnum – MAC mac address Port is already bound with MAC filter`
Explanation	The RADIUS server returned a MAC address filter, but a MAC address filter had already been applied to the port.
Message Level	Informational
Message	`DOT1X:port portnum - MAC mac address This device doesn't support ACL with MAC Filtering on the same port`
Explanation	The RADIUS server returned a MAC address filter while an IP ACL was applied to the port, or returned an IP ACL while a MAC address filter was applied to the port.
Message Level	Informational
Message	`DOT1X: Port portnum is unauthorized because system resource is not enough or the invalid information to set the dynamic assigned IP ACLs or MAC address filters`
Explanation	802.1X authentication could not take place on the port. This happened because strict security mode was enabled and one of the following occurred: • Insufficient system resources were available on the device to apply an IP ACL or MAC address filter to the port • Invalid information was received from the RADIUS server (for example, the Filter-ID attribute did not refer to an existing IP ACL or MAC address filter)
Message Level	Informational
Message	`DOT1X: Port portnum currently used vlan-id changes to vlan-id due to dot1x-RADIUS vlan assignment`
Explanation	A user has completed 802.1X authentication. The profile received from the RADIUS server specifies a VLAN ID for the user. The port to which the user is connected has been moved to the VLAN indicated by vlan-id .
Message Level	Informational
Message	`DOT1X: Port portnum currently used vlan-id is set back to port default vlan-id vlan-id`
Explanation	The user connected to portnum has disconnected, causing the port to be moved back into its default VLAN, vlan-id .
Message Level	Informational
Message	`DOT1X: Port portnum , AuthControlledPortStatus change: authorized`
Explanation	The status of the interface controlled port has changed from unauthorized to authorized.
Message Level	Informational
Message	`DOT1X: Port portnum , AuthControlledPortStatus change: unauthorized`
Explanation	The status of the interface controlled port has changed from authorized to unauthorized.
Message Level	Informational
Message	`Enable super | port-config | read-only password deleted | added | modified from console | telnet | ssh| snmp OR Line password deleted | added | modified from console | telnet | ssh| snmp`
Explanation	A user created, re-configured, or deleted an Enable or Line password through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`ERR_DISABLE: Interface ethernet portnum err-disable recovery timeout`
Explanation	Errdisable recovery timer expired and the port has been reenabled.
Message Level	Informational

Message	`ERR_DISABLE: Interface ethernet 16, err-disable recovery timeout`
Explanation	If the wait time (port is down and is waiting to come up) expires and the port is brought up the following message is displayed.
Message Level	Informational
Message	`ERR_DISABLE: Link flaps on port ethernet 16 exceeded threshold; port in err-disable state`
Explanation	The threshold for the number of times that a port link toggles from "up" to "down" and "down" to "up" has been exceeded.
Message Level	Informational
Message	`Interface portnum , line protocol down`
Explanation	The line protocol on a port has gone down. The portnum is the port number.
Message Level	Informational
Message	`Interface portnum , line protocol up`
Explanation	The line protocol on a port has come up. The portnum is the port number.
Message Level	Informational
Message	`System: Interface portnum , state down`
Explanation	A port has gone down. The portnum is the port number.
Message Level	Informational
Message	`Interface portnum , state up`
Explanation	A port has come up. The portnum is the port number.
Message Level	Informational
Message	`MAC Based Vlan Disabled on port port id`
Explanation	A MAC Based VLAN has been disabled on a port
Message Level	Informational
Message	`MAC Based Vlan Enabled on port port id`
Explanation	A MAC Based VLAN has been enabled on a port.
Message Level	Informational
Message	`MAC Filter added | deleted | modified from console | telnet | ssh| snmp session filter id = MAC filter ID , src MAC = Source MAC address | any, dst MAC = Destination MAC address | any`
Explanation	A user created, modified, deleted, or applied this MAC address filter through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`MSTP: BPDU-guard interface ethernet port-number detect (Received BPDU), putting into err-disable state.`
Explanation	BPDU guard violation occurred in MSTP.
Message Level	Informational
Message	`OPTICAL MONITORING: port port-number is not capable.`

Explanation	The optical transceiver is qualified by Ruckus, but the transceiver does not support digital optical performance monitoring.
Message Level	Informational
Message	`Port p priority changed to n`
Explanation	A port priority has changed.
Message Level	Informational
Message	`Port portnum , srcip-security max-ipaddr-per-int reached.Last IP= ipaddr`
Explanation	The address limit specified by the **srcip-security max-ipaddr-per-interface** command has been reached for the port.
Message Level	Informational
Message	`Port portnum , srcip-security max-ipaddr-per-int reached.Last IP= ipaddr`
Explanation	The address limit specified by the **srcip-security max-ipaddr-per-interface** command has been reached for the port.
Message Level	Informational
Message	`Security: console login by username to USER | PRIVILEGE EXEC mode`
Explanation	The specified user logged into the device console into the specified exec mode.
Message Level	Informational
Message	`Security: console logout by username`
Explanation	The specified user logged out of the device console.
Message Level	Informational
Message	`Security: telnet | SSH login by username from src IP i p-address , src MAC mac-address to USER | PRIVILEGE EXEC mode`
Explanation	The specified user logged into the device using Telnet or SSH from either or both the specified IP address and MAC address. The user logged into the specified exec mode.
Message Level	Informational
Message	`Security: telnet | SSH logout by username from src IP ip-address, src MAC mac-address to USER | PRIVILEGE EXEC mode`
Explanation	The specified user logged out of the device. The user was using Telnet or SSH to access the device from either or both the specified IP address and MAC address. The user logged out of the specified exec mode.
Message Level	Informational
Message	`SNMP read-only community | read-write community | contact | location | user | group | view | engineId | trap [host] [ value -str ] deleted | added | modified from console | telnet | ssh| snmp session`
Explanation	A user made SNMP configuration changes through the SNMP, console, SSH, or Telnet session. [value-str] does not appear in the message if SNMP **community** or **engineId** is specified.
Message Level	Informational
Message	`SNMP Auth. failure, intruder IP: ip-addr`
Explanation	A user has tried to open a management session with the device using an invalid SNMP community string. The ip-addr is the IP address of the host that sent the invalid community string.
Message Level	Informational
Message	`SSH | telnet server enabled | disabled from console | telnet | ssh| snmp session [by user username ]`

Explanation	A user enabled or disabled an SSH or Telnet session, or changed the SSH enable/disable configuration through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`startup-config was changed or startup-config was changed by user-name`
Explanation	A configuration change was saved to the startup-config file. The user-name is the user ID, if they entered a user ID to log in.
Message Level	Informational
Message	`STP: Root Guard Port port-number, VLAN vlan-ID consistent (Timeout).`
Explanation	Root guard unblocks a port.
Message Level	Informational
Message	`STP: Root Guard Port port-number , VLAN vlan-ID inconsistent (Received superior BPDU).`
Explanation	Root guard blocked a port.
Message Level	Informational
Message	`STP: VLAN vlan id BPDU-Guard on Port port id triggered (Received BPDU), putting into err-disable state`
Explanation	The BPDU guard feature has detected an incoming BPDU on {vlan-id, port-id}
Message Level	Informational
Message	`STP: VLAN vlan id Root-Protect Port port id , Consistent (Timeout)`
Explanation	The root protect feature goes back to the consistent state.
Message Level	Informational
Message	`STP: VLAN vlan id Root-Protect Port port id , Inconsistent (Received superior BPDU)`
Explanation	The root protect feature has detected a superior BPDU and goes into the inconsistent state on { vlan-id , port-id }.
Message Level	Informational
Message	`STP: VLAN vlan-id BPDU-guard port port-number detect (Received BPDU), putting into err-disable state`
Explanation	STP placed a port into an errdisable state for BPDU guard.
Message Level	Informational
Message	`STP: VLAN 1 BPDU-guard port port-number detect (Received BPDU), putting into err-disable state.`
Explanation	BPDU guard violation in occurred in STP or RSTP.
Message Level	Informational
Message	`Syslog server IP-address deleted | added | modified from console | telnet | ssh| snmp OR Syslog operation enabled | disabled from console | telnet | ssh| snmp`
Explanation	A user made Syslog configuration changes to the specified Syslog server address, or enabled or disabled a Syslog operation through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`SYSTEM: Optic is not Ruckus-qualified ( port-number )`
Explanation	Ruckus does not support the optical transceiver.
Message Level	Informational
Message	`System: Fan fan id (from left when facing right side), ok`
Explanation	The fan status has changed from fail to normal.
Message Level	Informational

Message `System: Fan speed changed automatically to fan speed`
Explanation The system automatically changed the fan speed to the speed specified in this message.
Message Level Informational

Message `System: No free TCAM entry. System will be unstable`
Explanation There are no TCAM entries available.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is added from the unit / slot / port to unit / slot / port on VLANs vlan-id to vlan-id`
Explanation A MAC address is added to a range of interfaces, which are members of the specified VLAN range.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is added to the unit / slot / port to unit / slot / port on vlan-id`
Explanation A MAC address is added to a range of interfaces, which are members of the specified VLAN.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is added to portnumber unit / slot / port on VLAN vlan-id`
Explanation A MAC address is added to an interface and the interface is a member of the specified VLAN.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is deleted from the unit/slot/ port to unit / slot / port on vlan-id`
Explanation A MAC address is deleted from a range of interfaces, which are members of the specified VLAN.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is deleted from et he unit / slot / port to unit / slot / port on VLANs vlan-id to vlan-id`
Explanation A MAC address is deleted from a range of interfaces, which are members of the specified VLAN range.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is deleted from portnumber unit / slot / port on vlan-id`
Explanation A MAC address is deleted from an interface and the interface is a member of the specified VLAN.
Message Level Informational

Message `System: Static MAC entry with MAC Address mac-address is deleted from portnumber unit / slot / port on VLANs vlan-id to vlan-id`
Explanation A MAC address is deleted from an interface and the interface is a member of the specified VLAN range.
Message Level Informational

Message `telnet | SSH| access [by username ] from src IP source ip address , src MAC source MAC address rejected, n attempts`
Explanation There were failed SSH, or Telnet login access attempts from the specified source IP and MAC address.

- [by *user* username] does not appear if **telnet** or **SSH** clients are specified.
- n is the number of times this SNMP trap occurred in the last five minutes, or other configured number of minutes.

Message Level Informational

Message `Trunk group ( ports ) created by 802.3ad link-aggregation module.`
Explanation 802.3ad link aggregation is configured on the device, and the feature has dynamically created a trunk group (aggregate link).

	The ports variable is a list of the ports that were aggregated to make the trunk group.
Message Level	Informational
Message	`user username added | deleted | modified from console | telnet | ssh| snmp`
Explanation	A user created, modified, or deleted a local user account through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`vlan vlan id added | deleted | modified from console | telnet | ssh| snmp session`
Explanation	A user created, modified, or deleted a VLAN through the SNMP, console, SSH, or Telnet session.
Message Level	Informational
Message	`Warm start`
Explanation	The system software (flash code) has been reloaded.
Message Level	Informational
Message	`Stack: Stack unit unit# has been deleted to the stack system`
Explanation	The specified unit has been deleted from the stacking system.
Message Level	Informational
Message	`Stack unit unitNumber has been elected as ACTIVE unit of the stack system`
Explanation	The specified unit in a stack has been elected as the Master unit for the stacking system.
Message Level	Informational
Message	`Stack: Stack unit unit# has been added to the stack system`
Explanation	The specified unit has been added to the stacking system.
Message Level	Informational
Message	`System: Management MAC address changed to mac_address`
Explanation	The management MAC address of a stacking system has been changed
Message Level	Informational
Message	`System: Stack unit unit# Fan fan# ( description ), failed`
Explanation	The operational status of a fan in the specified unit in a stack changed from normal to failure.
Message Level	Informational
Message	`System: Stack unit unit# Power supply power-supply# is down`
Explanation	The operational status of a power supply of the specified unit in a stack changed from normal to failure.
Message Level	Informational
Message	`System: Stack unit unit# Power supply power-supply# is up`
Explanation	The operational status of a power supply of the specified unit in a stack changed from failure to normal.
Message Level	Informational
Message	`System: Stack unit unit# Fan fan# ( description ), ok`
Explanation	The operational status of a fan in the specified unit in a stack changed from failure to normal.
Message Level	Informational
Message	`System: Stack unit unitNumbe r Temperature actual-temp C degrees, warning level warning-temp C degrees, shutdown level shutdown-temp C degrees`
Explanation	The actual temperature reading for a unit in a stack is above the warning temperature threshold.
Message Level	Informational
Message	`vlan vlan-id Bridge is RootBridge mac-address (MgmtPriChg)`
Explanation	802.1W changed the current bridge to be the root bridge of the given topology due to administrative change in bridge priority.
Message Level	Informational

Message `vlan vlan-id Bridge is RootBridge mac-address (MsgAgeExpiry)`
Explanation The message age expired on the Root port so 802.1W changed the current bridge to be the root bridge of the topology.
Message Level Informational

Message `vlan vlan-id interface portnum Bridge TC Event (DOT1wTransition)`
Explanation 802.1W recognized a topology change event in the bridge. The topology change event is the forwarding action that started on a non-edge Designated port or Root port.
Message Level Informational

Message `vlan vlan-id interface portnum STP state - state (DOT1wTransition)`
Explanation 802.1W changed the state of a port to a new state: forwarding, learning, blocking. If the port changes to blocking, the bridge port is in discarding state.
Message Level Informational

Message `vlan vlan-id New RootBridge mac-address RootPort portnum (BpduRcvd)`
Explanation 802.1W selected a new root bridge as a result of the BPDUs received on a bridge port.
Message Level Informational

Message `vlan vlan-id New RootPort portnum (RootSelection)`
Explanation 802.1W changed the port role to Root port, using the root selection computation.
Message Level Informational

Message `ACL exceed max DMA L4 cam resource, using flow based ACL instead`
Explanation The port does not have enough Layer 4 CAM entries for the ACL.

To correct this condition, allocate more Layer 4 CAM entries. To allocate more Layer 4 CAM entries, enter the following command at the CLI configuration level for the interface:

ip access-group max-l4-cam num
Message Level Notification

Message `ACL insufficient L4 cam resource, using flow based ACL instead`
Explanation The port does not have a large enough CAM partition for the ACLs
Message Level Notification

Message `ACL insufficient L4 session resource, using flow based ACL instead`
Explanation The device does not have enough Layer 4 session entries.

To correct this condition, allocate more memory for sessions. To allocate more memory, enter the following command from the global configuration mode of the CLI interface:

system-max session-limit num
Message Level Notification

Message `ACL port fragment packet inspect rate rate exceeded on port portnum`
Explanation The fragment rate allowed on an individual interface has been exceeded.

The *rate* indicates the maximum rate allowed.

The portnum indicates the port.

This message can occur if fragment thottling is enabled.
Message Level Notification

Message `ACL system fragment packet inspect rate rate exceeded`
Explanation The fragment rate allowed on the device has been exceeded.

	The rate indicates the maximum rate allowed. This message can occur if fragment thottling is enabled.
Message Level	Notification
Message	`Authentication Disabled on portnum`
Explanation	The multi-device port authentication feature was disabled on the on the specified portnum .
Message Level	Notification
Message	`Authentication Enabled on portnum`
Explanation	The multi-device port authentication feature was enabled on the on the specified portnum .
Message Level	Notification
Message	`BGP Peer ip-addr DOWN (IDLE)`
Explanation	Indicates that a BGP4 neighbor has gone down. The ip-addr is the IP address of the neighbor BGP4 interface with the Ruckus device.
Message Level	Notification
Message	`BGP Peer ip-addr UP (ESTABLISHED)`
Explanation	Indicates that a BGP4 neighbor has come up. The ip-addr is the IP address of the neighbor BGP4 interface with the Ruckus device.
Message Level	Notification
Message	`DHCP: snooping on untrusted port portnum , type number, drop`
Explanation	Indicates that the DHCP client receives DHCP server reply packets on untrusted ports, and packets are dropped.
Message Level	Notification
Message	`DOT1X issues software but not physical port down indication of Port portnum to other software applications`
Explanation	The device has indicated that the specified is no longer authorized, but the actual port may still be active.
Message Level	Notification
Message	`DOT1X issues software but not physical port up indication of Port portnum to other software applications`
Explanation	The device has indicated that the specified port has been authenticated, but the actual port may not be active.
Message Level	Notification
Message	`DOT1X: Port port_id Mac mac_address -user user_id - RADIUS timeout for authentication`
Explanation	The RADIUS session has timed out for this 802.1x port.
Message Level	Notification
Message	`ISIS L1 ADJACENCY DOWN system-id on circuit circuit-id`
Explanation	The Layer 3 switch adjacency with this Level-1 IS-IS has gone down. The system-i *d* is the system ID of the IS-IS. The circuit-id is the ID of the circuit over which the adjacency was established.
Message Level	Notification
Message	`ISIS L1 ADJACENCY UP system-id on circuit circuit-id`
Explanation	The Layer 3 switch adjacency with this Level-1 IS-IS has come up. The system-id is the system ID of the IS-IS.

The circuit-id is the ID of the circuit over which the adjacency was established.

Message Level Notification

Message `ISIS L2 ADJACENCY DOWN system-id on circuit circuit-id`

Explanation The Layer 3 switch adjacency with this Level-2 IS-IS has gone down.

The system-id is the system ID of the IS-IS.

The circuit-id is the ID of the circuit over which the adjacency was established.

Message Level Notification

Message `ISIS L2 ADJACENCY UP system-id on circuit circuit-id`

Explanation The Layer 3 switch adjacency with this Level-2 IS-IS has come up.

The system-id is the system ID of the IS-IS.

The circuit-id is the ID of the circuit over which the adjacency was established.

Message Level Notification

Message `Local ICMP exceeds burst-max burst packets, stopping for lockup seconds!!`

Explanation The number of ICMP packets exceeds the burst-max threshold set by the **ip icmp burst** command. The Ruckus device may be the victim of a Denial of Service (DoS) attack.

All ICMP packets will be dropped for the number of seconds specified by the lockup value. When the lockup period expires, the packet counter is reset and measurement is restarted.

Message Level Notification

Message `Local TCP exceeds burst-max burst packets, stopping for lockup seconds!!`

Explanation The number of TCP SYN packets exceeds the burst-max threshold set by the **ip tcp burst** command. The Ruckus device may be the victim of a TCP SYN DoS attack.

All TCP SYN packets will be dropped for the number of seconds specified by the locku *p* value. When the lockup period expires, the packet counter is reset and measurement is restarted.

Message Level Notification

Message `Local TCP exceeds num burst packets, stopping for num seconds!!`

Explanation Threshold parameters for local TCP traffic on the device have been configured, and the maximum burst size for TCP packets has been exceeded.

The first num is the maximum burst size (maximum number of packets allowed).

The second num is the number of seconds during which additional TCP packets will be blocked on the device.

NOTE
This message can occur in response to an attempted TCP SYN attack.

Message Level Notification

Message `MAC Authentication RADIUS timeout for mac_address on port port_id`

Explanation The RADIUS session has timed out for the MAC address for this port.

Message Level Notification

Message `MAC Authentication succeeded for mac-address on portnum`

Explanation RADIUS authentication was successful for the specified mac-address on the specified portnum .

Message Level Notification

Message `Module was inserted to slot slot-num`

Explanation Indicates that a module was inserted into a chassis slot.

The slot-num is the number of the chassis slot into which the module was inserted.

Message Level Notification

Message `Module was removed from slot slot-num`

Explanation Indicates that a module was removed from a chassis slot.

The slot-num is the number of the chassis slot from which the module was removed.

Message Level Notification

Message `OSPF interface state changed,rid router-id , intf addr ip-addr , state ospf-state`

Explanation Indicates that the state of an OSPF interface has changed.

The router-id is the router ID of the Ruckus device.

The ip-addr is the interface IP address.

The ospf-state indicates the state to which the interface has changed and can be one of the following:

- down
- loopback
- waiting
- point-to-point
- designated router
- backup designated router
- other designated router
- unknown

Message Level Notification

Message `OSPF intf authen failure, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr , error type error-type , pkt type pkt-type`

Explanation Indicates that an OSPF interface authentication failure has occurred.

The *router-id* is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the authentication failure.

The error-type can be one of the following:

- bad version
- area mismatch
- unknown NBMA neighbor
- unknown virtual neighbor
- authentication type mismatch
- authentication failure
- network mask mismatch
- hello interval mismatch
- dead interval mismatch
- option mismatch
- unknown

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

Message Level Notification

Message `OSPF intf config error, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr , error type error-type , pkt type pkt-type`

Explanation Indicates that an OSPF interface configuration error has occurred.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the error packet.

The error-type can be one of the following:

- bad version
- area mismatch
- unknown NBMA neighbor
- unknown virtual neighbor
- authentication type mismatch
- authentication failure
- network mask mismatch
- hello interval mismatch
- dead interval mismatch
- option mismatch
- unknown

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

Message Level Notification

Message `OSPF intf rcvd bad pkt, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr, pkt type pkt-type`

Explanation Indicates that an OSPF interface received a bad packet.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the authentication failure.

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

Message Level Notification

Message `OSPF intf rcvd bad pkt: Bad Checksum, rid ip-addr , intf addr ip-addr , pkt size num , checksum num , pkt src addr ip-addr , pkt type type`

Explanation The device received an OSPF packet that had an invalid checksum.

The rid ip-addr is the Ruckus router ID.

The intf addr ip-addr is the IP address of the Ruckus interface that received the packet.

The pkt size num is the number of bytes in the packet.

The checksum num is the checksum value for the packet.

The pkt src addr ip-addr is the IP address of the neighbor that sent the packet.

The pkt type type is the OSPF packet type and can be one of the following:

- hello
- database description
- link state request
- link state update
- link state acknowledgement
- unknown (indicates an invalid packet type)

Message Level Notification

Message `OSPF intf rcvd bad pkt: Bad Packet type, rid ip-addr, intf addr ip-addr , pkt size num , checksum num , pkt src addr ip-addr , pkt type type`

Explanation The device received an OSPF packet with an invalid type.

The parameters are the same as for the Bad Checksum message. The pkt type type value is "unknown", indicating that the packet type is invalid.

Message Level Notification

Message `OSPF intf rcvd bad pkt: Invalid packet size, rid ip-addr, intf addr ip-addr, pkt size num , checksum num , pkt src addr ip-addr , pkt type type`

Explanation The device received an OSPF packet with an invalid packet size.

The parameters are the same as for the Bad Checksum message.

Message Level Notification

Message `OSPF intf rcvd bad pkt: Unable to find associated neighbor, rid ip-addr, intf addr ip-addr, pkt size num , checksum num , pkt src addr ip-addr , pkt type type`

Explanation The neighbor IP address in the packet is not in the list of OSPF neighbors in the Ruckus device.

The parameters are the same as for the Bad Checksum message.

Message Level Notification

Message `OSPF intf retransmit, rid router-id, intf addr i p-addr, nbr rid nbr- router-id , pkt type is pkt-type, LSA type lsa-type , LSA id lsa-id, LSA rid lsa-router-id`

Explanation An OSPF interface on the Ruckus device has retransmitted a Link State Advertisement (LSA).

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The nbr-router-id is the router ID of the neighbor router.

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

The lsa-type is the type of LSA.

The lsa-id is the LSA ID.

The lsa-router-id is the LSA router ID.

Message Level Notification

Message `OSPF LSDB approaching overflow, rid router-id , limit num`

Explanation The software is close to an LSDB condition.

The router-id is the router ID of the Ruckus device.

The num is the number of LSAs.

Message Level Notification

Message `OSPF LSDB overflow, rid router-id, limit num`

Explanation A Link State Database Overflow (LSDB) condition has occurred.

The router-id is the router ID of the Ruckus device.

The num is the number of LSAs.

Message Level Notification

Message `OSPF max age LSA, rid router-id , area area-id , LSA type lsa-type , LSA id lsa-id , LSA rid lsa-router-id`

Explanation An LSA has reached its maximum age.

The router-id is the router ID of the Ruckus device.

The area-id is the OSPF area.

The lsa-type is the type of LSA.

The lsa-id is the LSA ID.

The lsa-router-id is the LSA router ID.

Message Level Notification

Message `OSPF nbr state changed, rid router-id , nbr addr ip-addr , nbr rid nbr-router-Id , state ospf-state`

Explanation Indicates that the state of an OSPF neighbor has changed.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the neighbor.

The nbr-router-id is the router ID of the neighbor.

The ospf-state indicates the state to which the interface has changed and can be one of the following:

- down
- attempt
- initializing
- 2-way
- exchange start
- exchange
- loading
- full
- unknown

Message Level Notification

Message `OSPF originate LSA, rid router-id , area area-id , LSA type lsa-type , LSA id lsa-id , LSA router id lsa-router-id`

Explanation An OSPF interface has originated an LSA.

The router-id is the router ID of the Ruckus device.

The area-id is the OSPF area.

The lsa-type is the type of LSA.

The lsa-id is the LSA ID.

The lsa-router-id is the LSA router ID.

Message Level Notification

Message `OSPF virtual intf authen failure, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr , error type error-type , pkt type pkt-type`

Explanation Indicates that an OSPF virtual routing interface authentication failure has occurred.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the authentication failure.

The error-type can be one of the following:

- bad version
- area mismatch
- unknown NBMA neighbor
- unknown virtual neighbor

- authentication type mismatch
- authentication failure
- network mask mismatch
- hello interval mismatch
- dead interval mismatch
- option mismatch
- unknown

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

Message Level Notification

Message `OSPF virtual intf config error, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr , error type error-type , pkt type pkt-type`

Explanation Indicates that an OSPF virtual routing interface configuration error has occurred.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the error packet.

The error-type can be one of the following:

- bad version
- area mismatch
- unknown NBMA neighbor
- unknown virtual neighbor
- authentication type mismatch
- authentication failure
- network mask mismatch
- hello interval mismatch
- dead interval mismatch
- option mismatch
- unknown

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack

- unknown

Message Level Notification

Message `OSPF virtual intf rcvd bad pkt, rid router-id , intf addr ip-addr , pkt src addr src-ip-addr , pkt type pkt-type`

Explanation Indicates that an OSPF interface received a bad packet.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The src-ip-addr is the IP address of the interface from which the Ruckus device received the authentication failure.

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

Message Level Notification

Message `OSPF virtual intf retransmit, rid router-id , intf addr ip-addr , nbr rid nbr-router-id , pkt type is pkt-type , LSA type lsa-type , LSA id lsa-id , LSA rid lsa-router-id`

Explanation An OSPF interface on the Ruckus device has retransmitted a Link State Advertisement (LSA).

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the interface on the Ruckus device.

The nbr-router-id is the router ID of the neighbor router.

The packet-type can be one of the following:

- hello
- database description
- link state request
- link state update
- link state ack
- unknown

The lsa-type is the type of LSA.

The lsa-id is the LSA ID.

The lsa-router-id is the LSA router ID.

Message Level Notification

Message `OSPF virtual intf state changed, rid router-id , area area-id , nbr ip-addr , state ospf-state`

Explanation Indicates that the state of an OSPF virtual routing interface has changed.

The router-id is the router ID of the router the interface is on.

The area-id is the area the interface is in.

The ip-addr is the IP address of the OSPF neighbor.

The ospf-state indicates the state to which the interface has changed and can be one of the following:

- down
- loopback
- waiting
- point-to-point
- designated router
- backup designated router
- other designated router
- unknown

Message Level Notification

Message `OSPF virtual nbr state changed, rid router-id , nbr addr ip-addr , nbr rid nbr-router-id , state ospf-state`

Explanation Indicates that the state of an OSPF virtual neighbor has changed.

The router-id is the router ID of the Ruckus device.

The ip-addr is the IP address of the neighbor.

The nbr-router-id is the router ID of the neighbor.

The ospf-state indicates the state to which the interface has changed and can be one of the following:

- down
- attempt
- initializing
- 2-way
- exchange start
- exchange
- loading
- full
- unknown

Message Level Notification

Message `Transit ICMP in interface portnum exceeds num burst packets, stopping for num seconds!!`

Explanation Threshold parameters for ICMP transit (through) traffic have been configured on an interface, and the maximum burst size for ICMP packets on the interface has been exceeded.

The portnum is the port number.

The first num is the maximum burst size (maximum number of packets allowed).

The second num is the number of seconds during which additional ICMP packets will be blocked on the interface.

NOTE
This message can occur in response to an attempted Smurf attack.

Message Level Notification

Message `Transit TCP in interface portnum exceeds num burst packets, stopping for num seconds!`

Explanation Threshold parameters for TCP transit (through) traffic have been configured on an interface, and the maximum burst size for TCP packets on the interface has been exceeded.

The portnum is the port number.

The first num is the maximum burst size (maximum number of packets allowed).

The second num is the number of seconds during which additional TCP packets will be blocked on the interface.

NOTE
This message can occur in response to an attempted TCP SYN attack.

Message Level Notification

Message `VRRP intf state changed, intf portnum , vrid virtual-router-id , state vrrp-state`
`VRRP (IPv6) intf state changed, intf portnum , vrid virtual-router-id , state vrrp-state`

Explanation A state change has occurred in a Virtual Router Redundancy Protocol (VRRP) or VRRP-E IPv4 or IPv6 interface.

The portnum is the port or interface where VRRP or VRRP-E is configured.

The virtual-router-id is the virtual router ID (VRID) configured on the interface.

The vrrp-state can be one of the following:

- init
- master
- backup
- unknown

Message Level Notification

Message `DOT1X security violation at port portnum , malicious MAC address detected: mac-address`

Explanation A security violation was encountered at the specified port number.

Message Level Warning

Message `Dup IP ip-addr detected, sent from MAC mac-addr interface portnum`

Explanation Indicates that the Ruckus device received a packet from another device on the network with an IP address that is also configured on the Ruckus device.

The ip-addr is the duplicate IP address.

The mac-addr is the MAC address of the device with the duplicate IP address. alert

The portnum is the Ruckus port that received the packet with the duplicate IP address. The address is the packet source IP address.

Message Level Warning

Message `IGMP/MLD no hardware vidx, broadcast to the entire vlan. rated limited number`

Explanation IGMP or MLD snooping has run out of hardware application VLANs. There are 4096 application VLANs per device. Traffic streams for snooping entries without an application VLAN are switched to the entire VLAN and to the CPU to be dropped. This message is rate-limited to appear a maximum of once every 10 minutes. The rate-limited number shows the number on non-printed warnings.

Message Level	Warning
Message	`IGMP/MLD: vlanId(portId) is V1 but rcvd V2 from nbr ipAddr`
Explanation	Port has received a query with a MLD version that does not match the port MLD version. This message is rated-limited to appear a maximum of once every 10 hours.
Message Level	Warning
Message	`Latched low RX Power | TX Power | TX Bias Current | Supply Voltage | Temperature warning alarm | warning, port port-number`
Explanation	The optical transceiver on the given port has risen above or fallen below the alarm or warning threshold.
Message Level	Warning
Message	`list ACL-num denied ip-proto src-ip-addr ( src-tcp / udp-port ) (Ethernet portnum mac-addr ) - dst-ip-addr ( dst-tcp / udp-port ), 1 event(s)`
Explanation	Indicates that an Access Control List (ACL) denied (dropped) packets. The ACL-num indicates the ACL number. Numbers 1 - 99 indicate standard ACLs. Numbers 100 - 199 indicate extended ACLs. The ip-proto indicates the IP protocol of the denied packets. The src-ip-addr is the source IP address of the denied packets. The src-tcp / udp-port is the source TCP or UDP port, if applicable, of the denied packets. The portnum indicates the port number on which the packet was denied. The mac-addr indicates the source MAC address of the denied packets. The dst-ip-addr indicates the destination IP address of the denied packets. The dst-tcp / udp-port indicates the destination TCP or UDP port number, if applicable, of the denied packets.
Message Level	Warning
Message	`MAC filter group denied packets on port portnum, src macaddr mac-addr , num packets`
Explanation	Indicates that a MAC address filtergroup configured on a port has denied packets. The portnum is the port on which the packets were denied. The mac-addr is the source MAC address of the denied packets. The num indicates how many packets matching the values above were dropped during the five-minute interval represented by the log entry.
Message Level	Warning
Message	`multicast no software resource: resource-name , rate-limited number`
Explanation	IGMP or MLD snooping has run out of software resources. This message is rate-limited to appear a maximum of once every 10 minutes. The rate-limited number shows the number of non-printed warnings.
Message Level	Warning
Message	`No global IP! cannot send IGMP msg.`
Explanation	The device is configured for **ip multicast active** but there is no configured IP address and the device cannot send out IGMP queries.
Message Level	Warning
Message	`No of prefixes received from BGP peer ip-addr exceeds warning limit num`
Explanation	The Layer 3 switch has received more than the allowed percentage of prefixes from the neighbor. The ip-addr is the IP address of the neighbor.

	The num is the number of prefixes that matches the percentage you specified. For example, if you specified a threshold of 100 prefixes and 75 percent as the warning threshold, this message is generated if the Layer 3 switch receives a 76th prefix from the neighbor.
Message Level	Warning
Message	`rip filter list list-num direction V1 | V2 denied ip-addr , num packets`
Explanation	Indicates that a RIP route filter denied (dropped) packets. The list-num is the ID of the filter list. The direction indicates whether the filter was applied to incoming packets or outgoing packets. The value can be one of the following: • in • out The V1 or V2 value specifies the RIP version (RIPv1 or RIPv2). The ip-addr indicates the network number in the denied updates. The num indicates how many packets matching the values above were dropped during the five-minute interval represented by the log entry.
Message Level	Warning
Message	`Temperature is over warning level.`
Explanation	The chassis temperature has risen above the warning level.
Message Level	Warning
Message	ZTP: zero-touch-enable detects total <num of chains> chains (<num of units> units). unstable=<num of units>
Explanation	Zero-touch-enable detects units. The *num of chains* is the total number of detected chains The *num of units* is the total number of detected units The *num of units* is the total number of unstable units
Message Level	Informational
Message	ZTP: Detect an invalid chain, aborts. <port_id> links to an invalid chain.
Explanation	Zero-touch-enable detects an invalid chain. *Port_id* is the id of a port links to the chain.
Message Level	Informational
Message	ZTP: Send reload to chain <chain_id>
Explanation	Zero-touch-enable sends reload to detected chain. *Chain_id*is the chain to be reloaded.
Message Level	Informational
Message	ZTP: Recv ZTP request, not qualify reason= <reason>
Explanation	Unit receive ztp request, but is not qualify to join. *Reason* is the reason for not being qualified.
Message Level	Informational
Message	ZTP: Add spx-port <port_id> for a discovered unit to join.
Explanation	Ztp adds spx-port which links to a new chain.

	Port_id is the ID of the port links to the chain.
Message Level	Informational
Message Explanation	ZTP: Add spx-lag <port_id> for a discovered unit to join. Ztp adds spx-lag which links to a new chain.
	Port_id is the ID of the port links to the chain.
Message Level	Informational
Message Explanation	INTERACTIVE SETUP: Detect an invalid chain, aborts. <port_id> links to an invalid chain. INTERACTIVE SETUP detects an invalid chain.
	Port_id is the ID of the port links to the chain.
Message Level	Informational
Message Explanation	INTERACTIVE SETUP: Send reload to chain <chain_id>. INTERACTIVE SETUP sends reload to detected chain.
	Chain_id is the ID of the chain to be reloaded.
Message Level	Informational
Message Explanation	INTERACTIVE: Add spx-port <port_id> for a discovered unit to join. INTERACTIVE SETUP add spx-port which links to a new chain.
	Port_id is the ID of the port links to the chain.
Message Level	Informational
Message Explanation	INTERACTIVE: Add spx-lag <port_id> for a discovered unit to join. INTERACTIVE SETUP add spx-port which links to a new chain.
	Port_id is the ID of the port links to the chain
Message Level	Informational
Message Explanation	INTERACTIVE SETUP: Change IDs: <unit_id> -> <unit_id>. INTERACTIVE SETUP changes existing PE id.
	Unit_id is the old PE ID.
	Unit_id is the new PE ID.
Message Level	Informational
Message Explanation	INTERACTIVE SETUP: Toggle ports <port_id> due to interactive PE-ID change. INTERACTIVE SETUP makes port down and up due to PE-ID change.
	Port_id ports link to the PE.
Message Level	Informational
Message Explanation	SPX: Crate PE unit <unit_id>, mac=<mac address> PE-port=<port_id>, CB-port=<port_id>. Creates PE when a new PE joins.
	Unit_id is the new PE ID.
	MAC address is the MAC address of the PE.
	Port_id is the port on PE links to CB.
	CB-port is the port on CB links to the new PE.
Message Level	Informational
Message	SPX: PE unit <unit_id> is ready.

Explanation Indicates that PE is set to ready by CB.

Unit_id is the PE ID.

Message Level Informational

Message SPX: Delete PE unit <unit_id>, reason=<reason>. <elected_role> unit <unit_id> deletes u<unit_id> but keeps its static config.

Explanation When a PE is down, CB delete the PE configuration.

Unit_id is the new PE ID.

Reason is the reason to delete.

Elected_role is the elected role of the CB unit, active, standalone or standby.

Unit_id is the ID of the CB unit.

Unit_id is the ID of the PE unit.

Message Level Informational

Message SPX: SPX ring join error: <error_string>.

Explanation The error occurs when PE joins.

Error_string is the error message which shows the reason for failure.

Message Level Informational

Message *License: Self-Authenticated Upgrade license %s is applied to unit %d\n*

Explanation The command **update-license** is successfully entered.

Message Level Informational

Message `PoE Fatal Error: Power being injected on port <number>. No new PDs can get powered on this unit.Configure "no inline power" on all Switch to Switch connected ports of this unit and peer unit(s) to resolve the issue.`

Explanation Voltage applied from ext src is detected from POE port.

Message Level Error

Message `PoE Fatal Error: PD on port <number> cannot be powered due to power being injected on another port of this unit.Configure "no inline power" on all Switch to Switch connected ports of this unit and peer unit(s) to resolve the issue.`

Explanation Misconfiguration or the unit/PSU require RMA .

Message Level Error

Message `PoE Error: Incompatible firmware on PoE module. Please install latest firmware.`

Explanation Indicates that the firmware is not compatible after performing PoE Hardware - firmware compatibility check during boot up and firmware upgrade.

Message Level Informational

Syslog messages IPsec and IKEv2

Message `IKEv2: Maximum IKE Peers Limit Reached`

Explanation The maximum IKEv2 peer limit is reached on the device.

Message Level Warning

Message `IKEv2: Recovered from Maximum IKE Peers Limit Condition`

Explanation The device is recovered after reaching the maximum IKEv2 peer limit.

Message Level Informational

Message `IKEv2: IKEv2 session <up_down> source <source_address> Destination <destination_address> VRF <vrf_id> SPI <spi_id>`

Explanation A state change has occurred for an IKEv2 session.

The *up_down* is the state of the interface.

The *source_address* is the source IP address of the IKEv2 session.

The *destination address* is the destination IP address in the packet.

The *vrf_id* is the tunnel base VRF.

The *spi_id* is the security parameter index (SPI) in the packet.

Message Level Informational

Message `IKEv2: Invalid Message Type Received with Source <source_address> Destination <destination_address> SPI <spi_id> MessageType <x>`

Explanation An invalid IKEv2 message type is received.

The *source_address* is the source IP address in the packet.

The *destination address* is the destination IP address in the packet.

The *spi_id* is the security parameter index (SPI) in the packet.

The *x* is the value of the unsupported message type in the IKEv2 packet.

Message Level Informational

Message `IKEv2: Invalid Payload Type Received with Source <source_address> Destination <destination_address> SPI <spi_id> PayloadType <x>`

Explanation A state change has occurred for an IPsec session.

The *source_address* is the source IP address in the packet.

The *destination address* is the destination IP address in the packet.

The *spi_id* is the security parameter index (SPI) in the packet.

The *x* is the value of the unsupported payload type.

Message Level Informational

Message `IPsec: IPSec module <module_id> on unit <unit_id> is <up_down>`

Explanation A state change has occurred for an IPsec module. Hot swapping of the module is not supported, but an IPsec module is marked as down when the IPsec module is not usable.

The *module_id* is the module ID.

The *unit_id* is the unit ID.

The *up_down* is the state of the module.

Message Level Alert

Message `IPsec: IPsec session <up_down> source <source_address> Destination <destination_address> VRF <vrf_id> SPI <spi_id> Direction <direction>`

Explanation A state change has occurred for an IPsec session.

The *up_down* is the state of the interface.

The *source_address* is the source IP address of the IPsec session.

The *destination address* is the destination IP address in the packet.

The *vrf_id* is the tunnel base VRF.

The *spi_id* is the security parameter index (SPI) in the packet.

The *direction* is ingress or egress.

Message Level Informational

Syslog messages system

Message `System: Interface ipsec_tnnl <tunnel_id>, state up`

Explanation The IPsec tunnel interface has come up .

The *tunnel_id* is the tunnel ID.

Message Level Informational

Message `System: Interface ipsec_tnnl <tunnel_id>, state down <reason>`

Explanation The IPsec tunnel interface has gone down.

The *tunnel_id* is the tunnel ID.

The *reason* variable can be one of the following:

- clear IKE SA
- clear IPSEC SA
- IKE session down
- IPSEC session down
- tunnel source interface down
- tunnel no destination route
- Administratively brought down
- IPSEC card down
- Switchover and Failover

Message Level Informational



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