
Port Monitoring and sFlow

The FastIron GS supports sFlow and port monitoring together on the same ports.

On the FastIron GS, you can use QoS queue 1 for priority traffic, even when sFlow is enabled on the port. This differs from the FastIron X Series. When sFlow is enabled on the FESX, FSX, and FWSX, these devices support seven priorities instead of eight because QoS queue 1 is reserved for sFlow and is not used by other packets. Any non-sFlow packets assigned to QoS queue 1 will be directed to QoS queue 0.

- FESX and FWSX devices running software release 02.2.01 or later support port monitoring and sFlow together on the same device. The caveat is that these features cannot be configured together within the same port region. See “About Port Regions” on page 5-2 for a list of valid port regions.
- FSX devices running software release 02.2.00 or later support port monitoring and sFlow together on the same device. The caveat is that these features cannot be configured together within the same port region.

sFlow Support for IPv6 Packets

Foundry’s implementation of sFlow features provide support for 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.

Extended Router Information

Extended router information contains information for the next hop router. This information includes the next hop router’s IP address and the outgoing VLAN ID. Extended router information also includes the source IP address prefix length and the destination IP address prefix length.

Note that in IPv4, prefix length of source and destination IP addresses is collected only if BGP is configured on the devices. In IPv6, the information is collected if BGP is configured and once the route lookup is complete.

To obtain extended router information in IPv6 sampled packets, use “struct extended_router” as presented in RFC 3176.

Extended Gateway Information

Extended gateway information is included in an sFlow sampled packet if BGP is enabled. The extended gateway information includes the following BGP information about the packet’s destination route:

- This router’s autonomous system (AS) number
- The route’s source IP AS
- The route’s source peer AS
- The AS path to the destination

NOTE: AS 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.

Configuring and Enabling sFlow

To configure sFlow:

- 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 rate.
- Enable sFlow globally.
- Enable sFlow forwarding on individual interfaces.

NOTE: If you change the router ID or other IP address value that sFlow uses for its agent_address, you need to disable and then re-enable sFlow to cause the feature to use the new source address.

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 address and UDP port number.

To specify sFlow collectors, enter a command such as the following:

```
FastIron Router(config)# sflow destination 10.10.10.1
```

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

Syntax: [no] sflow destination <ip-addr> [<dest-udp-port>]

The <ip-addr> parameter specifies the collector's IP address.

The <dest-udp-port> parameter specifies the UDP port on which the sFlow collector will be listening for exported sFlow data. The default port number is 6343.

The sampled sFlow data sent to the collectors includes an agent_address field. This field identifies the device that sent the data. See "Source Address" on page B-14.

Changing the Polling Interval

The polling interval defines how often sFlow byte and packet counter data for a port are sent to the sFlow collector(s). If multiple ports are enabled for sFlow, the Foundry 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 Foundry 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 Foundry device sends counter data every four seconds.

The default polling interval is 20 seconds. You can change the interval to a value from 1 to any higher value. 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 at the global CONFIG level of the CLI:

```
FastIron Router(config)# sflow polling-interval 30
```

Syntax: [no] sflow polling-interval <secs>

The <secs> parameter specifies the interval and can be from 1 to any higher value. The default is 20 seconds. If you specify 0, counter data sampling is disabled.

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 512. With a sampling rate of 512, on average, one in every 512 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 will be sampled. The **sflow sample** command at the global level or port level 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 will be sampled.

NOTE: Foundry 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.

Configured Rate and Actual Rate

When you enter a sampling rate value, this value is the **configured rate**. The software rounds the value you enter to the next higher odd power of 2 to obtain the **actual rate**. This value becomes the actual sampling rate. For example, if the configured sampling rate is 1000, then the actual rate is 2048 and 1 in 2048 packets are sampled by the hardware.

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, 1/2, and 5/1. If you configure the sampling rate on port 1/1 but leave the other two ports using the default rate, then a change to the global sampling rate applies to ports 1/2 and 5/1 but not port 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 will be programmed to take samples at a single rate (the module sampling rate). The module sampling rate will be the highest sampling rate (i.e. 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 which 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 4/2 and 4/8, and port 4/2 is using the default sampling rate of 512, and port 4/8 is configured explicitly for a rate of 2048, then the module sampling rate will be 512 because this is this highest port sampling rate (lowest number). The subsampling factor for port 4/2 will be 1, meaning that every sample taken by the hardware will be exported, while the subsampling factor for port 4/8 will be 4, meaning that one out of every four samples taken by the hardware will be exported. Whether a port's 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. For simplicity, the syntax information in this section lists the valid sampling rates. In addition, the software will round the value you enter up to the nearest value listed. You can display the rates you entered (the configured rates) as well as the rates rounded up to by the software (the actual rates) for the default sampling rate, module rates, and all sFlow-enabled ports by entering the **show sflow** command. See "Displaying sFlow Information" on page B-20.

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:

```
FastIron Router(config)# sflow sample 2048
```

Syntax: [no] sflow sample <num>

The <num> parameter specifies the average number of packets from which each sample will be taken. The software rounds the value you enter to the next higher odd power of 2. This value becomes the actual default sampling rate and is one of the following.

- 2
- 8
- 32
- 128
- 512

- 2048
- 8192
- 32768
- 131072
- 524288
- 2097152
- 8388608
- 33554432
- 134217728
- 536870912
- 2147483648

For example, if the configured sampling rate is 1000, then the actual rate is 2048 and 1 in 2048 packets are sampled by the hardware.

Changing the Sampling Rate of a Module

You cannot change a module's sampling rate directly. You can change a module's 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 Gigabit Ethernet ports, you might want to configure the Gigabit 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 at the configuration level for the port:

```
FastIron SuperX Switch(config-if-1/1)# sflow sample 8192
```

Syntax: [no] sflow sample <num>

The <num> parameter specifies the average number of packets from which each sample will be taken. The software rounds the value you enter up to the next odd power of 2. The actual sampling rate becomes one of the values listed in "Changing the Default Sampling Rate" .

Enabling sFlow Forwarding

sFlow exports data only for the interfaces on which you enable sFlow forwarding. You can enable sFlow forwarding on Ethernet interfaces.

To enable sFlow forwarding:

- Globally enable the sFlow feature.
- Enable sFlow forwarding on individual interfaces.

NOTE: Before you enable sFlow, make sure the device has an IP address that sFlow can use as its source address. See "Source Address" on page B-14 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 the inbound and/or outbound ports, if that information is available. For information about 802.1X, see the chapter "Configuring 802.1X Port Security" on page 33-1.

Enabling sFlow Forwarding

To enable sFlow forwarding, enter commands such as the following:

```
FastIron Router(config)# sflow enable
FastIron Router(config)# interface ethernet 1/1 to 1/8
FastIron Router(config-mif-1/1-1/8)# sflow forwarding
```

These commands globally enable sFlow, then enable sFlow forwarding on Ethernet ports 1/1 – 1/8. You must use both the **sflow enable** and **sflow forwarding** commands to enable the feature.

Syntax: [no] sflow enable

Syntax: [no] sflow forwarding

Displaying sFlow Information

To display sFlow configuration information and statistics, enter the following command at any level of the CLI:

```
FastIron Router(config)# show sflow
sFlow services are enabled.
sFlow agent IP address: 123.123.123.1
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
Polling interval is 0 seconds.
Configured default sampling rate: 1 per 512 packets.
Actual default sampling rate: 1 per 512 packets.
10552 UDP packets exported
24127 sFlow samples collected.
sFlow ports: ethe 1/2 to 1/12 ethe 1/15 ethe 1/25 to 1/26 ethe 4/1 ethe 5/10 to
5/20 ethe 8/1 ethe 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 8/4, configured rate=512, actual rate=512, Subsampling factor=1
Port 8/1, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/20, configured rate=3000, actual rate=8192, Subsampling factor=16
Port 5/19, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/18, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/17, configured rate=1500, actual rate=2048, Subsampling factor=4
Port 5/16, configured rate=1500, actual rate=2048, Subsampling factor=4
Port 5/15, configured rate=1500, actual rate=2048, Subsampling factor=4
Port 5/14, configured rate=1500, actual rate=2048, Subsampling factor=4
Port 5/13, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/12, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/11, configured rate=512, actual rate=512, Subsampling factor=1
Port 5/10, configured rate=512, actual rate=512, Subsampling factor=1
Port 4/1, configured rate=10000, actual rate=32768, Subsampling factor=1
Port 1/26, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/25, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/15, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/12, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/11, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/10, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/9, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/8, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/7, configured rate=1000, actual rate=2048, Subsampling factor=4
Port 1/6, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/5, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/4, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/3, configured rate=512, actual rate=512, Subsampling factor=1
Port 1/2, configured rate=1000, actual rate=2048, Subsampling factor=4
```

Syntax: show sflow