CHAPTER 1

Configuring NetFlow-lite

> **Note** NetFlow-lite is only supported on Catalyst 4948E Ethernet Switch.

This chapter describes how to configure NetFlow-lite on the Catalyst 4948E switch. NetFlow-lite provides traffic monitoring capabilities similar to those provided through NetFlow.

> **Note** For complete syntax and usage information for the switch commands used in this chapter, first look at the *Cisco Catalyst 4500 Series Switch Command Reference* and related publications at this location:
>
> http://www.cisco.com/en/US/products//hw/switches/ps4324/index.html
>
> If the command is not found in the *Catalyst 4500 Command Reference*, it will be found in the larger Cisco IOS library. Refer to the *Cisco IOS Command Reference and related publications at this location:*
>
> http://www.cisco.com/en/US/products/ps6350/index.html

> **Note** VLAN monitors are not supported in Cisco IOS Release 15.0(2)SG.

> **Note** Refer to the *NetFlow Solutions Guide* for more detailed information on Netflow usage and management.

The following topics are included:

- About NetFlow Packet Sampling, page 1-2
- Feature Interaction, page 1-2
- Configuring NetFlow Packet Sampling, page 1-2
- Display Commands, page 1-8
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About NetFlow Packet Sampling

The Netflow-lite feature is based on ingress packet sampling at a monitoring point that can be an interface on the switch. By exporting NetFlow sampled packets, it provides visibility into traffic that is switched through the device. The rate at which input packets are sampled is configurable and a wide range of sampling rates are supported. The sampled packets can be exported with Netflow V9 or IPFIX format.

Feature Interaction

Feature interactions exists on three levels:

System-wide Restrictions

- WCCP output redirect is not supported when NetFlow-lite is configured on any interface.
- Configuring NetFlow-lite monitor on any interface causes Layer 3 Deny ACLs to not generate ICMP unreachable packets.
- Enabling Netflow-lite monitoring reduces the available TCAM usage and packet forwarding bandwidth.

Interface-level Restrictions

- NetFlow-lite monitoring and ingress QoS policy cannot coexist on the same interface. QoS policy takes precedence over NetFlow-lite monitoring.
- NetFlow-lite monitoring and the WCCP Exclude feature cannot coexist on the same interface.
- NetFlow-lite and SPAN cannot coexist on the same interface. NetFlow-lite takes precedence over SPAN.

Monitor-level Restrictions

- Port channel with an aggregate bandwidth exceeding 20 Gigabit support the highest sampling rate of 1 in 64; those with an aggregate bandwidth exceeding 40 Gigabit support 1 in 128.
- When running PIM bidirectional mode, NetFlow-lite monitoring for multicast packets does not work when the RP or DF and any of the receivers are on the same VLAN.

Configuring NetFlow Packet Sampling

To configure the NetFlow-lite feature, complete the tasks in these sections:

- Configuring Information about the External Collector, page 1-3
- Configuring Sampling Parameters, page 1-4
- Activating Sampling on an Interface or VLAN, page 1-5

Configuring Information about the External Collector

To configure the external collector, perform this task:

	Command	Purpose
Step 1	Switch# **config terminal**	Enters configuration mode
Step 2	Switch(config)# **netflow-lite exporter** *exporter*	Defines an exporter and to enter NetFlow-lite exporter submode
Step 3	Switch(config-netflow-lite-exporter)# **destination** *source-address*	Specifies a destination address
Step 4	Switch(config-netflow-lite-exporter)# **source** *source-address*	Specifies a source Layer 3 interface
Step 5	Switch(config-netflow-lite-exporter)# **vrf** *source-address*	Specifies a VRF label
Step 6	Switch(config-netflow-lite-exporter)# **transport udp** *destination-port*	Specifies a UDP transport destination port
Step 7	Switch(config-netflow-lite-exporter)# **ttl** *ttl-value*	Specifies a ttl value
Step 8	Switch(config-netflow-lite-exporter)# **cos** *cos-value*	Specifies a cos value
Step 9	Switch(config-netflow-lite-exporter)# **dscp** *dscp-value*	Specifies a dscp value
Step 10	Switch(config-netflow-lite-exporter)# **template data timeout** *timeout*	Specifies a template data timeout
Step 11	Switch(config-netflow-lite-exporter)# **options** {**sampler-table** | **interface-table**} **timeout** *timeout*	Specifies an options timeout
Step 12	Switch(config-netflow-lite-exporter)# **export-protocol** {**netflow-v9** | **ipfix**}	Specifies the export protocol
Step 13	Switch(config-netflow-lite-exporter)# **exit**	Returns to global configuration mode
Step 14	Switch(config)# **exit**	Returns to EXEC mode
Step 15	Switch# **show netflow-lite exporter** *exporter*	Displays the exporter configuration

Example

This example shows how configure the external collector and to verify the exporter configuration:

```
Switch# config terminal
Switch(config)# netflow-lite exporter exporter1
Switch(config-netflow-lite-exporter)# destination 5.5.5.6
Switch(config-netflow-lite-exporter)# source 5.5.5.5
Switch(config-netflow-lite-exporter)# transport udp 8188
Switch(config-netflow-lite-exporter)# ttl 128
Switch(config-netflow-lite-exporter)# cos 7
Switch(config-netflow-lite-exporter)# dscp 32
Switch(config-netflow-lite-exporter)# template data timeout 1
Switch(config-netflow-lite-exporter)# options sampler-table timeout 1
Switch(config-netflow-lite-exporter)# options interface-table timeout 1
Switch(config-netflow-lite-exporter)# export-protocol netflow-v9
Switch(config-netflow-lite-exporter)# exit
Switch(config)# exit
Switch# show netflow-lite exporter exporter1
Netflow-lite  Exporter exporter1:
  Network Protocol Configuration:
    Destination IP address:   5.5.5.6
    Source IP Address:        5.5.5.5
```

```
                    VRF label:            none
                    DSCP:                 0x20
                    TTL:                  128
                    COS:                  7
               Transport Protocol Configuration:
                    Transport Protocol:   UDP
                    Source Port:          50441
                    Destination Port:     8188
                    Destination Ports to Load-share:  1
               Export Protocol Configuration:
                    Export Protocol:      netflow-v9
                    Template data timeout:        1800
                    Options sampler-table timeout:    1800
                    Options interface-table timeout:  1800
               Exporter Statistics:
                    Packets Exported:     56
```

Usage Guidelines

The collector's IP address and UDP port can be specified. Optionally a vrf label can be provided in which the collector is reachable. The exporter agent's address is specified as the source interface. We support either IPFIX or Netflow V9 export.

The exporter's name can be specified when activating sampling at a monitor. This can be done in interface or VLAN mode. If no exporter is specified for a sampling instance, then no samples are exported.

The exporter submode also allows you to specify the refresh frequency for the NetFlow templates. Metadata about the NetFlow packet sampling process like sampler configuration parameters and SNMP interface table mapping can also be exported periodically to the collector.

Mandatory parameters for a minimal exporter configuration are the destination address of the collector, the source Layer 3 interface, and the UDP destination port of the collector.

The VRF label is ignored if the collector's address is IPv6. The default global routing table is used to route the IPv6 export packets to the collector.

The CoS CLI option is used to set the CoS value of VLAN tags for packet samples exported by fpga alone.

Configuring Sampling Parameters

This task configures packet and counter sampling parameters as reusable named entities.

To configure the NetFlow cache and enable switched IP flow collection, perform this task:

	Command	Purpose
Step 1	Switch# **config terminal**	Enters configuration mode.
Step 2	Switch(config)# **netflow-lite sampler** *sampler*	Configure packet sampling parameters as a reusable named entity and to enter NetFlow-lite sampler submode.
Step 3	Switch(config-netflow-lite-sampler)# **packet-rate** *rate*	Specifies the specify a packet sampling rate in NetFlow-lite sampler submode.
Step 4	Switch(config-netflow-lite-sampler)# **packet-section size** *size*	Specifies a sampled header size in NetFlow-lite submode.

	Command	Purpose
Step 5	Switch(config-netflow-lite-sampler)# **packet-offset** *offset*	Specifies a starting packet offset in NetFlow-lite submode.
Step 6	Switch(config-netflow-lite-sampler)# **exit**	Exits NetFlow-lite sampler submode.
Step 7	Switch(config)# **exit**	Exits global configuration mode.
Step 8	Switch# **show netflow-lite sampler** *sampler*	Displays information about a sampler.

Example

This example shows how to configure sampling parameters and to display the sampler configuration:

```
Switch# config terminal
Switch(config)# netflow-lite sampler sampler1
Switch(config-netflow-lite-sampler)# packet-rate 32
Switch(config-netflow-lite-sampler)# packet-section size 128
Switch(config-netflow-lite-sampler)# packet-offset 16
Switch(config-netflow-lite-sampler)# exit
Switch(config)# exit
Switch#

Switch# show netflow-lite sampler sampler1
Netflow-lite Sampler sampler1:
  Id :                 1
  Packet Sampling rate:  1 out of 32
  Packet Section Size:   64     bytes
  Packet offset:         16     bytes
```

You can verify your settings with the **show netflow-lite sampler** privileged EXEC command

Usage Guidelines

The packet sampling rate can range from 32 to 2^15 in powers of 2. To troubleshoot two 1 Gigabit ports, a rate of 1 is allowed. This is equivalent to rx span only. It cannot be configured on 10 Gigabit ports because the bandwidth demand for export will be too high.

Mandatory parameters are packet rate. A maximum of 2 x 1Gigabit ports can be configured with 1-in-1 sampling. The best packet sampling rate that can be configured on any 1 Gigabit or 10 Gigabit port is 1-in-32. Packet sampling rates can be configured in powers of 2 (like 1-in-64 and 1-in-128).

You can update a sampler at a target interface, but you cannot remove or unconfigure mandatory parameters.

All mandatory parameters must be present to validate a sampler. Any unspecified non-mandatory parameters take on default values.

Activating Sampling on an Interface or VLAN

This task defines a monitor instance on an interface or VLAN, identifying the sampler and exporter to use.

To activate sampling on an interface, perform this task:

	Command	Purpose
Step 1	Switch# **config terminal**	Enters configuration mode.
Step 2	Switch(config)# **interface** *interface-id*	Enters interface configuration mode.
Step 3	Switch(config-if)# **netflow-lite monitor** *monitor*	Defines a monitor instance on an interface and enters NetFlow-lite monitor submode.
Step 4	Switch(config-netflow-lite-monitor)# **sampler** *sampler*	Activates sampling on an interface in NetFlow-lite monitor submode.
Step 5	Switch(config-netflow-lite-monitor)# **exporter** *exporter*	Assigns an exporter in NetFlow-lite monitor submode
Step 6	Switch(config-netflow-lite-monitor)# **average-packet-size** *size*	Specifies the average packet size at the observation point in NetFlow-lite monitor submode.
Step 7	Switch(config-netflow-lite-monitor)# **exit**	Exits NetFlow-lite monitor submode.
Step 8	Switch(config)# **exit**	Exits global configuration mode.
Step 9	Switch# **show netflow-lite monitor** *monitor* **interface** *interface-name*	Displays information about a particular packet or per data source stats.

To activate sampling on an interface, perform this task:

	Command	Purpose
Step 1	Switch# **config terminal**	Enters configuration mode.
Step 2	Switch(config)# **vlan config 2**	Enters interface configuration mode.
Step 3	Switch(config-vlan-config)# **netflow-lite monitor** *monitor*	Defines a monitor instance on an interface and enters NetFlow-lite monitor submode.
Step 4	Switch(config-netflow-lite-monitor)# **average-packet-size** *size*	Specifies the average packet size at the observation point in NetFlow-lite monitor submode.
Step 5	Switch(config-netflow-lite-monitor)# **exporter** *exporter*	Assigns an exporter in NetFlow-lite monitor submode.
Step 6	Switch(config-netflow-lite-monitor)# **sampler** *sampler*	Activates sampling on an interface in NetFlow-lite monitor submode.
Step 7	Switch(config-netflow-lite-monitor)# **exit**	Exits NetFlow-lite monitor submode
Step 8	Switch(config)# **exit**	Exits global configuration mode.
Step 9	Switch# **show netflow-lite monitor** *monitor* **vlan** *vlan*	Displays information about a particular packet or per data source stats.

Examples

The following example shows how to configure a monitor on a port interface Gigabit 1/3:

```
Switch# config terminal
Switch(config)# int GigabitEthernet1/3
Switch(config-if)# netflow-lite monitor 1
Switch(config-netflow-lite-monitor)# sampler sampler1
Switch(config-netflow-lite-monitor)# average-packet-size 128
```

```
Switch(config-netflow-lite-monitor)# exporter exporter1
Switch(config-netflow-lite-monitor)# exit
Switch(config-if)# exit
Switch(config)# exit
Switch(config)#
Switch# show netflow-lite monitor 1 interface gi1/3
Interface GigabitEthernet1/3:
  Netflow-lite  Monitor-1:
    Active:               TRUE
    Sampler:              sampler1
    Exporter:             exporter1
    Average Packet Size:  0
  Statistics:
    Packets exported:     0
    Packets observed:     0
    Packets dropped:      0
    Average Packet Size observed: 64
    Average Packet Size used: 64
```

Similarly, you can configure a monitor on a VLAN in VLAN config mode:

```
Switch# config terminal
Switch(config)# vlan config 2
Switch(config-vlan-config)# netflow-lite monitor 1
Switch(config-netflow-lite-monitor)# average-packet-size 128
Switch(config-netflow-lite-monitor)# exporter exporter1
Switch(config-netflow-lite-monitor)# sampler sampler1
Switch(config-netflow-lite-monitor)# exit
Switch(config-vlan-config)# exit
Switch(config)#
Switch# show netflow-lite monitor 1 vlan 2
VlanID-2:
  Netflow-lite  Monitor-1:
    Active:               TRUE
    Sampler:              sampler1
    Exporter:             exporter1
    Average Packet Size:  0
  Statistics:
    Packets exported:     0
    Packets observed:     0
    Packets dropped:      0
    Average Packet Size observed: 64
    Average Packet Size used: 64
```

You can verify your settings with the **show policy-map** privileged EXEC command.

Usage Guidelines

Only a single packet sampling instance is supported on a monitor. These commands are entered under the physical port interface mode, port channel interface, or config vlan mode. Monitor is not supported on other interfaces. If the physical port is a member of a port channel, applying the monitor to the port has no effect. Instead, the monitor must be applied to the port channel.

When configuring a monitor, the mandatory parameters are sampler and exporter. If no exporter is associated with a monitor, no samples are exported. If no sampler is specified, no input packet sampling occurs for that target interface.

The packet sampling mechanism tries to achieve random 1-in-N sampling. The accuracy of the algorithm is dependent on the size of the packets arriving at a given interface. To tune the relative accuracy of the algorithm, use the **average-packet-size** parameter. The whole system supports a maximum of 200 monitors.

The system automatically determines the average packet size at an interface based on observation of input traffic and uses that value in rate DBL sampling.

Valid range of packet sizes that can be used by the algorithm is 64 - 9216 bytes. A value of 0 is taken to mean that automatic determination of average packet size is desired.

The sampler and exporter must be valid for packet sampling. If any mandatory parameters are missing, a warning message indicating that sampler or exporter is invalid is displayed.

Display Commands

To view the configured value of the minimum mask, use the following commands for each aggregation scheme, as needed:

Command	Purpose
Switch# **show netflow-lite sampler** *sampler_name*	Displays information about a sampler.
Switch# **show netflow-lite monitor** *monitor* **interface** *interface_name* Switch# **show netflow-lite monitor** *monitor* **vlan** *vlan_id*	The following commands display information about a particular packet and per monitor stats. The interface can be either a physical port or a VLAN. They display the following packet sampling statistics: • Total # of packet (samples) exported • Total # of packet (samples) dropped due to lack of local resources • Total# of packets seen at the monitor
Switch# **show netflow-lite exporter** *exporter_nsme*	Displays information about the collector and global stats.

The following example shows how to displays information about a sampler:

```
Switch# show netflow-lite sampler low-rate
Netflow-lite Sampler low-rate:
  Description:          Sampler
  Sampling rate:       1 out of 256
  Packet Section Size:  64 bytes
  Packet offset:       0 bytes
```

The following example shows how to display information about a particular packet and per monitor stats on a physical port:

```
Switch# show netflow-lite monitor 1 interface gi1/3
Interface GigabitEthernet1/3:
  Netflow-lite  Monitor-1:
    Active:              TRUE
    Sampler:             sampler1
    Exporter:            exporter1
    Average Packet Size: 0
  Statistics:
    Packets exported:    0
    Packets observed:    0
    Packets dropped:     0
```

```
                    Average Packet Size observed: 64
                    Average Packet Size used: 64
```

The following example shows how to display information about a particular packet and per monitor stats on a VLAN:

```
Switch# show netflow-lite monitor 1 vlan 2
VlanID-2:
  Netflow-lite  Monitor-1:
    Active:                 TRUE
    Sampler:                sampler1
    Exporter:               exporter1
    Average Packet Size:  0
  Statistics:
    Packets exported:       0
    Packets observed:       0
    Packets dropped:        0
    Average Packet Size observed: 64
    Average Packet Size used: 64
```

The following example shows how to display the total number of export packets sent:

```
Switch# show netflow-lite  e1
Netflow-lite  Exporter e1:
  Description:              Exporter
  Network Protocol Configuration:
    Destination IP address:  192.168.1.1
    VRF label:             cisc
    Source IP Address:     10.1.1.5
    DSCP:                  0x1
    TTL:                   30
    COS:                   1
  Transport Protocol Configuration:
    Transport Protocol:    UDP
    Destination Port:      1234
    Source Port:           65535
  Export Protocol Configuration:
    Export Protocol:       netflow-v9
  Exporter Statistics:
    Export packets sent:   36
```

Clear Commands

To clear statistics of a packet sampler at a monitor, use the following commands, as needed:

Command	Purpose
Switch# **clear netflow-lite monitor** *monitor_id* **statistics interface** *interface name* Switch# **clear netflow-lite monitor** *monitor_id* **statistics vlan** *vlan_id*	Clear the statistics of a packet sampler at a datasource
Switch# **clear netflow-lite exporter** *exporter_ name* **statistics**	Clear the collector statistics

Clear Commands