Netflow Configuration Guide for Cisco NCS 6000 Series Routers, Release 6.1.x

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CONTENTS

Preface

This guide describes the Cisco IOS XR Netflow configurations. For complete command reference of NetFlow, see the *NetFlow Commands* chapter in the *Netflow Command Reference for Cisco NCS 6000 Series Routers*.

The preface contains the following sections:

Changes to this Document

This table lists the technical changes made to this document since it was first released.

Table 1: Changes to This Document

Date	Summary
November 2016	Initial release of this document.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
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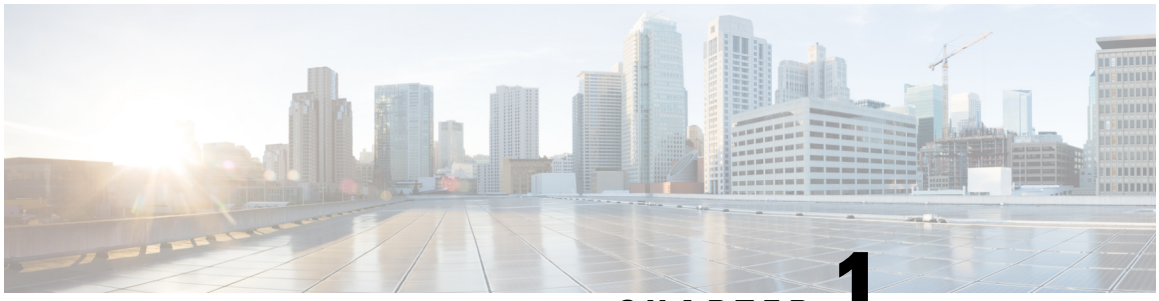
Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



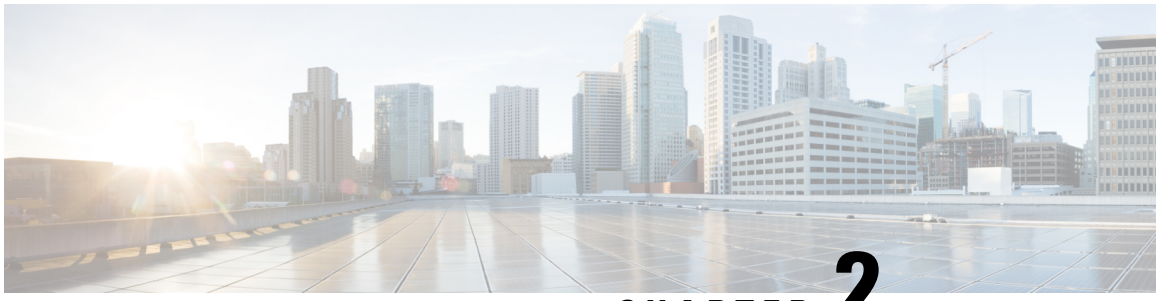
CHAPTER 1

New and Changed Feature Information in Cisco IOS XR

New and Changed NetFlow Feature Information

This table summarizes the new and changed information for Netflow Configuration Guide for Cisco NCS 6000 Series Routers.

Feature	Description	Changed in Release	Where Documented
None	No new features introduced.	Release 6.1.2	Not Applicable.



CHAPTER 2

Configuring NetFlow

A NetFlow flow is a unidirectional sequence of packets that arrive on a single interface (or subinterface), and have the same values for key fields.

NetFlow is useful for the following:

- Accounting/Billing—NetFlow data provides fine grained metering for highly flexible and detailed resource utilization accounting.
- Network Planning and Analysis—NetFlow data provides key information for strategic network planning.
- Network Monitoring—NetFlow data enables near real-time network monitoring capabilities.

Feature History for Configuring NetFlow

Release	Modification
Release 5.0.0	This feature was introduced.

This module includes these sections:

Prerequisites for Configuring NetFlow

To perform these configuration tasks, your Cisco IOS XR software system administrator must assign you to a user group associated with a task group that includes the corresponding command task IDs. If you need assistance with your task group assignment, contact your system administrator.

Restrictions for Configuring NetFlow

Consider these restrictions when configuring NetFlow in Cisco IOS XR software:

- A source interface must always be configured. If you do not configure a source interface, the exporter will remain in a disabled state.
- The export format Version 9 is supported.
- A valid record map name must always be configured for every flow monitor map.

Tip Do not use the management interface to export the NetFlow packets.

Information About Configuring NetFlow

NetFlow Overview

A flow is exported as part of a NetFlow export User Datagram Protocol (UDP) datagram under these circumstances:

- The flow has been inactive or active for too long.
- The flow cache is getting full.
- One of the counters (packets and or bytes) has wrapped.
- The user forces the flow to export.

NetFlow export UDP datagrams are sent to an external flow collector device that provides NetFlow export data filtering and aggregation. The export of data consists of expired flows and control information.

The NetFlow infrastructure is based on the configuration and use of these maps:

- Exporter map
- Monitor map
- Sampler map

These maps are described in the sections that follow.

Exporter Map Overview

An exporter map contains user network specification and transport layer details for the NetFlow export packet. The **flow exporter-map** command allows you to configure collector and version attributes. You can configure these collector information:

- Export destination IP address

- DSCP value for export packet
- Source interface
- UDP port number (This is where the collector is listening for NetFlow packets.)
- Transport protocol for export packets

Note In Cisco IOS XR Software, UDP is the only supported transport protocol for export packets.

Note NetFlow export packets use the IP address that is assigned to the source interface. If the source interface does not have an IP address assigned to it, the exporter will be inactive.

You can also configure these export version attributes:

- Template timeout
- Template data timeout
- Template options timeout
- Interface table timeout
- Sampler table timeout

Note A single flow monitor map can support up to eight exporters.

Monitor Map Overview

A monitor map contains name references to the flow record map and flow exporter map. Monitor maps are applied to an interface. You can configure these monitor map attributes:

- Number of entries in the flow cache
- Type of cache (permanent or normal). Permanent caches do not have their entries removed from the cache unless they are explicitly cleared by the user
- Active flow timeout
- Inactive flow timeout
- Update timeout
- Default timeouts
- Record type of packets sampled and collected

Note The record name specifies the type of packets that NetFlow samples as they pass through the router. Currently, MPLS, IPv4, and IPv6 packet sampling is supported.

Note The active flow and inactive flow timeouts are associated with a normal cache type. The update timeout is associated with the permanent cache type.

Sampler Map Overview

The sampler map specifies the rate at which packets (one out of n packets) are sampled. On high bandwidth interfaces, applying NetFlow processing to every single packet can result in significant CPU utilization. Sampler map configuration is typically geared towards such high speed interfaces. However, in order to find out the best sampling rate for the device, use the below sampling rate formula:

If NetFlow is applied in both directions, then the flow record packets are policed at the rate of 500,000 packets per second per direction. If NetFlow is applied in one direction only, then the flow record packets are policed at the rate of 1,000,000 packets per second per direction.

Options Template Overview

NetFlow version 9 is a template-based version. The templates provide an extensible design to the record format. This feature allows enhancements to NetFlow services without requiring concurrent changes to the basic flow-record format. An options template is a special type of template record that is used to communicate the format of data related to the NetFlow process. Rather than supplying information about IP flows, the options are used to supply metadata about the NetFlow process itself. The sampler options template and the interface options template are different forms of options templates. These two tables are exported by the NetFlow process. From release 5.2.0, the NetFlow process will also export the VRF table.

Sampler Table

The sampler options template consists of sampler tables. Similarly, the interface option templates consist of interface tables. By enabling the options for sampler table and interface table, it becomes easier for the collector to determine the information on data flow.

The sampler table consists of information on the active samplers. It is used by the collector to estimate the sampling rate for each data flow. The sampler table consists of the following information for each sampler:

Field Name	Value
FlowSamplerID	This ID is assigned to the sampler. It is used by the collector to retrieve information about the sampler for a data flow record.
FlowSamplerMode	This field indicates the mode in which the sampling has been performed. The default value for this field is 1 for deterministic sampling and 2 for random sampling.

Field Name	Value
FlowSamplerRandomInterval	This field indicates the rate at which the sampling is performed.
SamplerName	This field indicates the name of the sampler.

Interface Table

The interface table consists of information on interfaces that are being monitored for data flow. By using this information, the collector determines the names of interfaces associated with the data flow. The interface table consists of the following information:

Field Name	Value
ingressInterface	This field indicates the SNMP index assigned to the interface. By matching this value to the Ingress interface and the Egress Interface in the data flow record, the collector is able to retrieve the name of the interface.
interfaceDescription	This field indicates the name of the interface.

VRF Table

The VRF table consists of mapping of VRF IDs to the VRF names. By using this information, the collector determines the name of the required VRF. The VRF table consists of the following information:

Field Name	Value
ingressVRFID	The identifier of the VRF with the name in the VRF-Name field.
VRF-Name	The VRF name which has the VRFID value ingressVRFID. The value "default" indicates that the interface is not assigned explicitly to a VRF.

The data records contain ingressVRFID and egressVRFID fields as extra fields in each record. The values of these fields are used to lookup the VRF Table to find the VRF names. A value 0 in these fields indicates that the VRF is unknown.

The VRF table is exported at intervals specified by the optional **timeout** keyword that can be configured manually. The default value is 1800 seconds.

NetFlow Configuration Submodes

In Cisco IOS XR Software, NetFlow map configuration takes place in map-specific submodes. Cisco IOS XR Software supports these NetFlow map configuration submodes:

Note The Cisco IOS XR Software allows you to issue most commands available under submodes as one single command string from XR Config mode. For example, you can issue the **record ipv4** command from the flow monitor map configuration submode as follows:

```
RP/0/RP0/CPU0:router(config)# flow monitor-map fmm
RP/0/RP0/CPU0:router(config-fmm)# record ipv4
```

Alternatively, you can issue the same command from global configuration mode, as shown in the following example:

```
RP/0/RP0/CPU0:router(config)# flow monitor-map fmm record ipv4
```

Flow Exporter Map Configuration Submode

When you issue the **flow exporter-map** *fem-name* command in XR Config mode, the command-line interface (CLI) prompt changes to "config-fem," indicating that you have entered the flow exporter map configuration submode.

In this sample output, the question mark (?) online help function displays all the commands available under the flow exporter map configuration submode:

```
RP/0/RP0/CPU0:router(config)# flow exporter-map fem

RP/0/RP0/CPU0:router(config-fem)# ?

clear        Clear the uncommitted configuration
clear        Clear the configuration
commit       Commit the configuration changes to running
describe     Describe a command without taking real actions
destination  Export destination configuration
do           Run an exec command
dscp         Specify DSCP value for export packets
exit         Exit from this submode
no           Negate a command or set its defaults
pwd          Commands used to reach current submode
root         Exit to the global configuration mode
show         Show contents of configuration
source       Source interface
transport    Specify the transport protocol for export packets
version      Specify export version parameters
```

Note If you enter the **version** command, you enter the flow exporter map version configuration submode.

Note A single flow monitor map can support up to eight exporters.

Flow Exporter Map Version Configuration Submode

When you issue the **version v9** command in the flow exporter map configuration submode, the CLI prompt changes to "config-fem-ver," indicating that you have entered the flow exporter map version configuration submode.

In this sample output, the question mark (?) online help function displays all the commands available under the flow exporter map version configuration submode:

```
RP/0/RP0/CPU0:router(config-fem)# version v9

RP/0/RP0/CPU0:router(config-fem-ver)# ?

commit    Commit the configuration changes to running
describe  Describe a command without taking real actions
do        Run an exec command
exit      Exit from this submode
no        Negate a command or set its defaults
options   Specify export of options template
show      Show contents of configuration
template  Specify template export parameters
```

Flow Monitor Map Configuration Submode

When you issue the **flow monitor-map** *map_name* command in XR Config mode, the CLI prompt changes to "config-fmm," indicating that you have entered the flow monitor map configuration submode.

In this sample output, the question mark (?) online help function displays all the commands available under the flow monitor map configuration submode:

```
RP/0/RP0/CPU0:router(config)# flow monitor-map fmm

RP/0/RP0/CPU0:router(config-fmm)# ?

cache     Specify flow cache attributes
commit    Commit the configuration changes to running
describe  Describe a command without taking real actions
do        Run an exec command
exit      Exit from this submode
exporter  Specify flow exporter map name
no        Negate a command or set its defaults
record    Specify a flow record map name
show      Show contents of configuration
```

Sampler Map Configuration Submode

When you issue the **sampler-map** *map_name* command in XR Config mode, the CLI prompt changes to "config-sm," indicating that you have entered the sampler map configuration submode.

In this sample output, the question mark (?) online help function displays all the commands available under the sampler map configuration submode:

```
RP/0/RP0/CPU0:router(config)# sampler-map fmm

RP/0/RP0/CPU0:router(config-sm)# ?
clear     Clear the uncommitted configuration
clear     Clear the configuration
```

```
commit    Commit the configuration changes to running
describe  Describe a command without taking real actions
do        Run an exec command
exit      Exit from this submode
no        Negate a command or set its defaults
pwd       Commands used to reach current submode
random    Use random mode for sampling packets
root      Exit to the global configuration mode
show      Show contents of configuration
```

Enabling the NetFlow BGP Data Export Function

Use the **bgp attribute-download** command to enable NetFlow BGP routing attribute collection. The routing attributes are then exported. When no routing attributes are collected, zeroes (0) are exported.

When BGP attribute download is enabled, BGP downloads the attribute information for prefixes (community, extended community, and as-path) to the Routing Information Base (RIB) and Forwarding Information Base (FIB). This enables FIB to associate the prefixes with attributes and send the NetFlow statistics along with the associated attributes.

MPLS Flow Monitor with IPv4 and IPv6 Support

Cisco IOS XR Software supports the NetFlow collection of MPLS packets. It also supports the NetFlow collection of MPLS packets carrying IPv4, IPv6, or both IPv4 and IPv6 payloads.

MPLS Cache Reorganization to Support Both IPv4 and IPv6

In Cisco IOS XR Software, at a time, you can have only one MPLS flow monitor running on an interface. If you apply an additional MPLS flow monitor to the interface, the new flow monitor overwrites the existing one.

At a time, you can apply only one flow monitor on an interface per direction. You can apply either the same flow monitor to an interface in both directions, or each direction can have its own flow monitor.

You can configure the MPLS flow monitor to collect IPv4 fields, IPv6 fields, or IPv4-IPv6 fields. IPv4-IPv6 configuration collects both IPv4 and IPv6 addresses using one MPLS flow monitor. IPv4 configuration collects only IPv4 addresses. IPv6 configuration collects only IPv6 addresses.

The MPLS flow monitor supports up to 1,000,000 cache entries. NetFlow entries include these types of fields:

- IPv4 fields
- IPv6 fields
- MPLS with IPv4 fields
- MPLS with IPv6 fields

The maximum number of bytes per NetFlow cache entry is as follows:

- IPv4–88 bytes per entry
- MPLS–88 bytes per entry
- IPv6–108 bytes per entry
- MPLS with IPv4 fields–108 bytes per entry

- MPLS with IPv6 fields–128 bytes per entry

Note The different types of NetFlow entries are stored in separate caches. Consequently, the number of NetFlow entries on a line card can significantly impact the amount of available memory on the line card. Also, even though the sampling rate for IPv6 is the same as the sampling rate for IPv4, the CPU utilization for IPv6 is higher due to the longer keys used by the IPv6 fields.

MPLS Packets with IPv6 Flows

The collection of IPv6 flows in MPLS packets is an option. The CPU uses 128 bytes for each IPv6 field. IPv6 flows may contain these types of information:

- Source IP address
- Destination IP address
- Traffic class value
- Layer 4 protocol number
- Layer 4 source port number
- Layer 4 destination port number
- Flow ID
- Header option mask

To collect the IPv6 fields in MPLS packets, you must activate the MPLS record type, ipv6-fields by running the **record mpls ipv6-fields** command. You can also specify the number of labels to be used for aggregation with this command.

Destination-based NetFlow Accounting

Destination-based NetFlow accounting (DBA) is a usage-based billing application that tracks and records traffic according to its destination. It enables service providers to do destination-specific accounting and billing. The destination-based NetFlow accounting record includes the destination peer autonomous system (AS) number and the BGP next-hop IP address.

Note When an EBGP neighborship is established towards a directly connected peer (neighborship toward's the Peer routers Global IPv6 address configured on the directly connected interface), the EBGPv6 peer will advertise both the Link Local Next Hop (LL NH) and the Global Next Hop.

In destination-based NetFlow accounting, these parameters are collected and exported to destination:

- Destination peer AS number
- BGP next-hop IP address
- Ingress interface

- Egress interface
- Forwarding status

Destination-based NetFlow accounting supports:

- Only IPv4 addresses
- Configuration on physical interfaces, bundle interfaces, and logical subinterfaces
- IPv4 unicast and multicast traffic
- Only ingress traffic
- Only full mode NetFlow
- NetFlow export format Version 9 over User Datagram Protocols (UDPs)

Destination-based NetFlow accounting does not support:

- IPv6 addresses
- MPLS IPv4 and IPv6
- Configuration for individual Modular QoS Command-Line Interface (MQC) classes
- Simultaneous configuration of destination-based NetFlow accounting with IPv4 sampled NetFlow on the same interface, in the same direction.
- Layer 2 switched MPLS traffic
- Egress traffic
- Sampled mode NetFlow
- NetFlow export formats version 5, version 8, IP Flow Information Export (IPFIX), or Stream Control Transmission Protocol (SCTP).

Flow Filter

NetFlow provides highly granular per-flow traffic statistics in a Cisco router. The router accumulates NetFlow statistics of all the flows in a NetFlow cache and exports them to an external device for further processing. But in some cases, you might want to gather NetFlow data on only a subset of these flows. The flow filter feature provides the capability to gather NetFlow data on only a specific user-defined subset of flow.

The flow filter feature is configured on interfaces in ingress or egress direction. The flow filter feature uses ACL and QoS bits to filter the NetFlow data; the match criteria is based on five tuple and DSCP bits. The filtered Netflow data is sampled (not all interface flows are sampled) and exported to a collector.

When both security ACL and Netflow filtering ACL are configured on an interface, the security ACL takes precedence over Netflow filtering ACL.

The Flow Filter supports:

- NetFlow v9 and IPFIX export formats.
- Yang data model for dynamic provisioning.

Note This feature is supported only on the Cisco ASR 9000 Third Generation High Density Ethernet LCs.

Restrictions

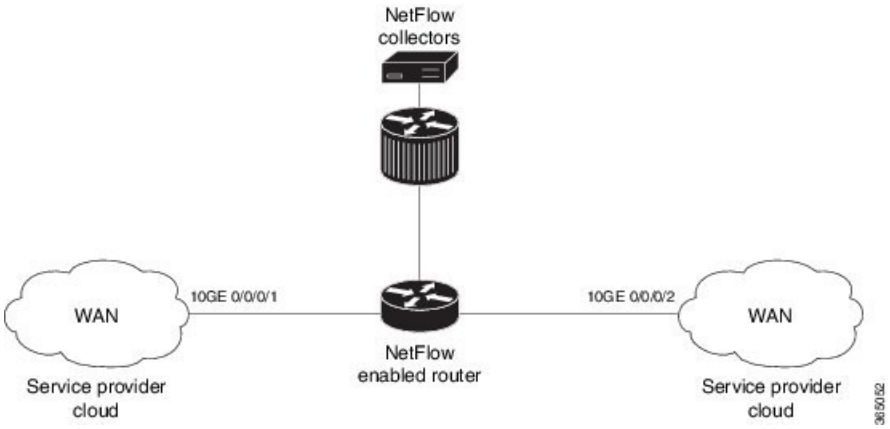
These are the restrictions for the flow filter feature:

- Supported on physical interface, physical subinterface, bundle interface, and bundle subinterface
- Not supported on satellite access interface, ICL interface and clusters.
- MPLS netflow filtering is not supported.

Configuring Flow Filter

Consider SP-PE use case where SP (Service Provide) cloud is connected to the PE (Provider Edge) router through gigabit ethernet.

Figure 1: SP-PE Topology



Configuring NetFlow on PE router involves:

1. Configuring ACL based filter criteria for NetFlow
2. Configuring Monitor map with filter netflow object
3. Configuring Sampler map
4. Configuring Exporter map
5. Applying the NetFlow flow filter ACL configuration and Monitor map to an interface

Configuring ACL based filter criteria for NetFlow

```
ipv4 access-list nf_ex
   10 permit ipv4 192.168.1.1/24 any capture
```

Configuring Monitor map with filter netflow object

```
flow monitor-map fmm1
   record ipv4
    option filtered
   exporter fem1
   cache entries 10000
   cache timeout active 1800
   cache timeout inactive 15
   exit
```

Configuring Sampler map

```
sampler-map fsm1
 random 1 out-of 65535
exit
```

Configuring Exporter map

```
flow exporter-map fem1
 destination 10.1.1.1
 source Loopback 0
 transport udp 1024
 dscp 10
exit
version v9
 template data timeout 600
 options interface-table
exit
```

Applying the NetFlow Flow filter ACL configuration and Monitor map to an interface

```
interface 10GE0/0/0/1
ipv4 access-group nf_ex_ing
flow ipv4 monitor fmm1 sampler fsm1 ingress
exit
```

Verification

Use the **show flow monitor** command to verify the flow filter configuration successfully applied on the PE router:

```
RP/0/RP0/CPU0:router# show flow monitor fmm1 location 0/0/CPU0

Flow Monitor :        fmm1
-----------------------------------------------
  Flow definition:    ipv4-raw
  Cache configuration:
    Type:             Normal
    Cache size:                      65535 entries
    Inactive timeout:                   15 seconds
    Active timeout:                   1800 seconds
    Update timeout:                    N/A
    Rate limit:                       2000 entries per second
    Options:                       filtered
```

How to Configure NetFlow on Cisco IOS XR Software

The steps that follow provide a general overview of NetFlow configuration:

SUMMARY STEPS

1. Create and configure an exporter map.
2. Create and configure a monitor map and a sampler map.
3. Apply the monitor map and sampler map to an interface.

DETAILED STEPS

Step 1 Create and configure an exporter map.

Step 2 Create and configure a monitor map and a sampler map.

Note The monitor map must reference the exporter map you created in Step 1. If you do not apply an exporter-map to the monitor-map, the flow records are not exported, and aging is done according to the cache parameters specified in the monitor-map.

Step 3 Apply the monitor map and sampler map to an interface.

These steps are described in detail in these sections:

Configuring an Exporter Map

Configure an exporter map and apply it to the monitor map with the **flow monitor-map** *map_name* **exporter** *map_name* command. You can configure the exporter map prior to configuring the monitor map, or you can configure the monitor map first and then configure and apply an exporter map later on.

Note Cisco IOS XR Software supports the configuration of a single collector only in the exporter map.

The steps that follow describe how to create and configure an exporter map and enable exporting of the sampler table or the interface table.

SUMMARY STEPS

1. **configure**
2. **flow exporter-map** *map_name*
3. **destination** *hostname_or_IP_address*
4. **dscp** *dscp_value*
5. **source** *type interface-path-id*
6. **transport udp** *port*
7. **version v9**
8. **options** {**interface-table** | **sampler-table** | **vrf-table**} [**timeout** *seconds*]

9. **template** [**data** | **options**] **timeout** *seconds*
10. **commit**
11. **exit**
12. **exit**
13. **show flow exporter-map** *map_name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	
Step 2	**flow exporter-map** *map_name* **Example:** `RP/0/RP0/CPU0:router(config)# flow exporter-map fem`	Creates an exporter map, configures the exporter map name, and enters flow exporter map configuration mode.
Step 3	**destination** *hostname_or_IP_address* **Example:** `RP/0/RP0/CPU0:router(config-fem)# destination 170.1.1.11`	Configures the export destination for the flow exporter map. The destination can be a hostname or an IPv4 address.
Step 4	**dscp** *dscp_value* **Example:** `RP/0/RP0/CPU0:router(config-fem)# dscp 55`	(Optional) Specifies the differentiated services codepoint (DSCP) value for export packets. Replace the *dscp_value* argument with a value in the range from 0 through 63.
Step 5	**source** *type interface-path-id* **Example:** `RP/0/RP0/CPU0:router(config-fem)# source HundredGigE 0/3/0/0`	Specifies a source interface, in the format *type interface-path-id*.
Step 6	**transport udp** *port* **Example:** `RP/0/RP0/CPU0:router(config-fem)# transport udp 9991`	(Optional) Specifies the destination port for UDP packets. Replace *port* with the destination UDP port value, in the range from 1024 through 65535.
Step 7	**version v9** **Example:** `RP/0/RP0/CPU0:router(config-fem-ver)# version v9`	(Optional) Enters flow exporter map version configuration submode.
Step 8	**options** {**interface-table** | **sampler-table** | **vrf-table**} [**timeout** *seconds*] **Example:**	(Optional) Configures the export timeout value for the sampler table. Replace *seconds* with the export timeout value, in the range from 1 through 604800 seconds. Default is 1800 seconds.

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router(config-fem-ver)# options sampler-table timeout 2000`	
Step 9	**template** [**data** | **options**] **timeout** *seconds* **Example:** `RP/0/RP0/CPU0:router(config-fem-ver)# template data timeout 10000`	(Optional) Configures the export period for data packets. Replace *seconds* with the export timeout value, in the range from 1 through 604800 seconds.
Step 10	**commit**	
Step 11	**exit** **Example:** `RP/0/RP0/CPU0:router(config-fem-ver)# exit`	Exits flow exporter map version configuration submode.
Step 12	**exit** **Example:** `RP/0/RP0/CPU0:router(config)# exit`	Exits XR Config mode.
Step 13	**show flow exporter-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show flow exporter-map fem`	Displays exporter map data.

Configuring a Sampler Map

Perform these steps to create and configure a sampler map.

SUMMARY STEPS

1. **configure**
2. **sampler-map** *map_name*
3. **random 1 out-of** *sampling_interval*
4. **commit**
5. **exit**
6. **exit**
7. **show sampler-map** *map_name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	
Step 2	**sampler-map** *map_name* **Example:**	Creates a sampler map and enters sampler map configuration mode.

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router(config)# sampler-map sm` `RP/0/RP0/CPU0:router(config-sm)#`	Keep the following in mind when configuring a sampler map: • NetFlow supports policing at a rate of 35,000 packets per second per direction for each individual line card. •
Step 3	**random 1 out-of** *sampling_interval* **Example:** `RP/0/RP0/CPU0:router(config-sm)# random 1 out-of 65535`	Configures the sampling interval to use random mode for sampling packets. Replace the *sampling_interval* argument with a number, in the range from 1 through 65535 units.
Step 4	**commit**	
Step 5	**exit** **Example:** `RP/0/RP0/CPU0:router(config-sm)# exit`	Exits sampler map configuration mode and enters the XR Config mode.
Step 6	**exit** **Example:** `RP/0/RP0/CPU0:router(config)# exit`	Exits the XR Config mode and enters XR EXEC mode.
Step 7	**show sampler-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show sampler-map fsm`	Displays sampler map data.

Configuring a Monitor Map

Perform these steps to create and configure a monitor map.

SUMMARY STEPS

1. **configure**
2. **flow monitor-map** *map_name*
3. Do one of the following:
   - **record ipv4**
   - **record ipv4** [**peer as**]
   - **record ipv6**
   - **record mpls** [**labels** *number*]
   - **record mpls** [**ipv4-fields**] [**labels** *number*]
   - **record mpls** [**ipv6-fields**] [**labels** *number*]
   - **record mpls** [**ipv4-ipv6-fields**] [**labels** *number*]

4. **cache entries** *number*
5. **cache permanent**
6. **cache timeout** {**active** *timeout_value* | **inactive** *timeout_value* | **update** *timeout_value*}
7. **exporter** *map_name*
8. **commit**
9. **exit**
10. **exit**
11. **show flow monitor-map** *map_name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	

Step 2	**flow monitor-map** *map_name*
	Example:
	`RP/0/RP0/CPU0:router(config)# flow monitor-map fmm`
	`RP/0/RP0/CPU0:router(config-fmm)#`
		Creates a monitor map and configures a monitor map name and enters flow monitor map configuration submode.

Step 3	Do one of the following: • **record ipv4** • **record ipv4** [**peer as**] • **record ipv6** • **record mpls** [**labels** *number*] • **record mpls** [**ipv4-fields**] [**labels** *number*] • **record mpls** [**ipv6-fields**] [**labels** *number*] • **record mpls** [**ipv4-ipv6-fields**] [**labels** *number*] **Example:** `RP/0/RP0/CPU0:router(config-fmm)# record ipv4`	Configures the flow record map name for IPv4, IPv6, or MPLS. • Use the **record ipv4** command to configure the flow record map name for IPv4. By default, you collect and export the originating autonomous system (AS) numbers. • Use the **record ipv4** [**peer-as**] command to record peer AS. Here, you collect and export the peer AS numbers. **Note** Ensure that the **bgp attribute-download** command is configured. Else, no AS is collected when the **record ipv4** or **record ipv4 peer-as** command is configured. • Use the **record ipv6** command to configure the flow record map name for IPv6. • Use the **record mpls labels** command with the *number* argument to specify the number of labels that you want to aggregate. By default, MPLS-aware NetFlow aggregates the top six labels of the MPLS label stack. The maximum value is 6. • Use the **record mpls ipv4-fields** command to collect IPv4 fields in the MPLS-aware NetFlow. • Use the **record mpls ipv6-fields** command to collect IPV6 fields in the MPLS-aware NetFlow.

	Command or Action	Purpose
		• Use the **record mpls ipv4-ipv6-fields** command to collect IPv4 and IPv6 fields in the MPLS-aware NetFlow.
Step 4	**cache entries** *number* **Example:** `RP/0/RP0/CPU0:router(config-fmm)# cache entries 10000`	(Optional) Configures the number of entries in the flow cache. Replace the *number* argument with the number of flow entries allowed in the flow cache, in the range from 4096 through 1000000. The default number of cache entries is 65535.
Step 5	**cache permanent** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# flow monitor-map fmm cache permanent`	(Optional) Disables removal of entries from flow cache.
Step 6	**cache timeout** {**active** *timeout_value* | **inactive** *timeout_value* | **update** *timeout_value*} **Example:** `RP/0/RP0/CPU0:router(config-fmm)# cache timeout inactive 1000`	(Optional) Configures the active, inactive, or update flow cache timeout value. • The default timeout value for the inactive flow cache is 15 seconds. • The default timeout value for the active flow cache is 1800 seconds. • The default timeout value for the update flow cache is 1800 seconds. **Note** The **update** *timeout_value* keyword argument is used for permanent caches only. It specifies the timeout value that is used to export entries from permanent caches. In this case, the entries are exported but remain the cache.
Step 7	**exporter** *map_name* **Example:** `RP/0/RP0/CPU0:router(config-fmm)# exporter fem`	Associates an exporter map with a monitor map. **Note** A single flow monitor map can support up to eight exporters.
Step 8	**commit**	
Step 9	**exit** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# exit`	Exits flow monitor map configuration submode.
Step 10	**exit** **Example:** `RP/0/RP0/CPU0:router(config)# exit`	Exits XR Config mode.

	Command or Action	Purpose
Step 11	**show flow monitor-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show flow monitor-map fmm`	Displays flow monitor map data.

Applying a Monitor Map and a Sampler Map to an Interface

Perform these steps to apply a monitor map and a sampler map to an interface.

SUMMARY STEPS

1. **configure**
2. **interface** *type number*
3. **flow** [**ipv4** | **ipv6** | **mpls**] **monitor** *monitor_map* **sampler** *sampler_map* {**egress** | **ingress**}
4. **commit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	

Step 2	**interface** *type number*
	Example:
	`RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0`
	`RP/0/RP0/CPU0:router(config-if)#`
		Enters interface configuration mode.

Step 3	**flow** [**ipv4**	**ipv6**	**mpls**] **monitor** *monitor_map* **sampler** *sampler_map* {**egress**	**ingress**} **Example:** `RP/0/RP0/CPU0:router(config-if)# flow ipv4 monitor fmm sampler fsm egress`	Associates a monitor map and a sampler map with an interface. Enter **ipv4** to enable IPV4 NetFlow on the specified interface. Enter **ipv6** to enable IPV6 NetFlow on the specified interface. Enter **mpls** to enable MPLS-aware NetFlow on the specified interface.
Step 4	**commit**	

Clearing NetFlow Data

Perform these steps to clear flow exporter map and flow monitor map data.

SUMMARY STEPS

1. **clear flow exporter** [*exporter_name*] {**restart** | **statistics**} **location** *node-id*
2. **clear flow monitor** [*monitor_name*] **cache** [**force-export** | **statistics**] **location** *node-id*}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**clear flow exporter** [*exporter_name*] {**restart** | **statistics**} **location** *node-id* **Example:** `RP/0/RP0/CPU0:router# clear flow exporter statistics location 0/0/CPU0`	Clears the flow exporter data. Specify the **statistics** option to clear exporter statistics. Specify the **restart** option to export all of the templates that are currently configured on the specified node.
Step 2	**clear flow monitor** [*monitor_name*] **cache** [**force-export** | **statistics**] **location** *node-id*} **Example:** `RP/0/RP0/CPU0:router# clear flow monitor cache force-export location 0/0/CPU0`	Clears the flow monitor data. Specify the **statistics** option to clear cache statistics. Specify the **force-export** option to export the data from cache to server first and then clear the entries from cache.

Configuring NetFlow Collection of MPLS Packets with IPv6 Fields

Perform these steps to configure NetFlow collection of MPLS packets with IPv6 fields.

SUMMARY STEPS

1. **configure**
2. **flow exporter-map** *map_name*
3. **version v9**
4. **options** {**interface-table** | **sampler-table**} [**timeout** *seconds*]
5. **template** [**data** | **options**] **timeout** *seconds*
6. **exit**
7. **transport udp** *port*
8. **source** *type interface-path-id*
9. **destination** *hostname_or_IP_address*
10. **exit**
11. **flow monitor-map** *map_name*
12. **record mpls** [**ipv4-ipv6-fields**] [**labels** *number*]
13. **exporter** *map_name*
14. **cache entries** *number*
15. **cache timeout** {**active** *timeout_value* | **inactive** *timeout_value* | **update** *timeout_value*}
16. **cache permanent**
17. **exit**
18. **sampler-map** *map_name*
19. **random 1 out-of** *sampling_interval*
20. **exit**
21. **interface** *type number*
22. **flow** [**ipv4** | **ipv6** | **mpls**] **monitor** *monitor_map* **sampler** *sampler_map* {**egress** | **ingress**}
23. **commit**

24. **exit**
25. **exit**
26. **show flow monitor-map** *map_name*
27. **show flow exporter-map** *map_name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	
Step 2	**flow exporter-map** *map_name* **Example:** `RP/0/RP0/CPU0:router(config)# flow exporter-map exp1`	Creates an exporter map, configures the exporter map name, and enters flow exporter map configuration mode.
Step 3	**version v9** **Example:** `RP/0/RP0/CPU0:router(config-fem)# version v9`	(Optional) Enters flow exporter map version configuration submode.
Step 4	**options** {**interface-table** | **sampler-table**} [**timeout** *seconds*] **Example:** `RP/0/RP0/CPU0:router(config-fem-ver)# options interface-table timeout 300`	(Optional) Configures the export timeout value for the interface table or the sampler table. Replace *seconds* with the export timeout value, in the range from 1 through 604800 seconds. The default is 1800 seconds for both the interface table and the sample table. You must perform this step twice to configure the export timeout value for both an interface table and a sample table.
Step 5	**template** [**data** | **options**] **timeout** *seconds* **Example:** `RP/0/RP0/CPU0:router(config-fem-ver)# template data timeout 300`	(Optional) Configures the export period for data packets or options packets. Replace *seconds* with the export timeout value, in the range from 1 through 604800 seconds. You must perform this step twice to configure the export period for both data packets and options packets.
Step 6	**exit** **Example:** `/CPU0:router(config-fem-ver)# exit`	Exits flow exporter map version configuration mode, and enters flow exporter map configuration mode.
Step 7	**transport udp** *port* **Example:** `RP/0/RP0/CPU0:router(config-fem)# transport udp 12515`	(Optional) Specifies the destination port for UDP packets. Replace *port* with the destination UDP port value, in the range from 1024 through 65535.
Step 8	**source** *type interface-path-id* **Example:**	Specifies a source interface, in the format *type interface-path-id*. For example:

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router(config-fem)# source Loopback0`	`POS 0/1/0/1 or Loopback0`
Step 9	**destination** *hostname_or_IP_address* **Example:** `RP/0/RP0/CPU0:router(config-fem)# destination 170.1.1.11`	Configures the export destination for the flow exporter map. The destination can be a hostname or an IPv4 address.
Step 10	**exit** **Example:** `RP/0/RP0/CPU0:router(config-fem)# exit`	Exits flow exporter map configuration mode, and enters XR Config mode.
Step 11	**flow monitor-map** *map_name* **Example:** `RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-IPv6-fmm`	Creates a monitor map and configures a monitor map name and enters flow monitor map configuration submode.
Step 12	**record mpls** [**ipv4-ipv6-fields**] [**labels** *number*] **Example:** `RP/0/RP0/CPU0:router(config-fmm)# record mpls ipv6-fields labels 3`	Configures the flow record map name for IPv4, IPv6, or MPLS. Use the **ipv4-ipv6-fields** keyword to collect IPv4 and IPv6 fields in an MPLS-aware NetFlow.
Step 13	**exporter** *map_name* **Example:** `RP/0/RP0/CPU0:router(config-fmm)# exporter exp1`	Associates an exporter map with a monitor map. **Note** A single flow monitor map can support up to eight exporters.
Step 14	**cache entries** *number* **Example:** `RP/0/RP0/CPU0:router(config-fmm)# cache entries 10000`	(Optional) Configures the number of entries in the flow cache. Replace the *number* argument with the number of flow entries allowed in the flow cache, in the range from 4096 through 1000000. The default number of cache entries is 65535.
Step 15	**cache timeout** {**active** *timeout_value* | **inactive** *timeout_value* | **update** *timeout_value*} **Example:** `RP/0/RP0/CPU0:router(config-fmm)# cache timeout inactive 1800`	(Optional) Configures the active, inactive, or update flow cache timeout value. • The default timeout value for the inactive flow cache is 15 seconds. • The default timeout value for the active flow cache is 1800 seconds. • The default timeout value for the update flow cache is 1800 seconds.

	Command or Action	Purpose
		Note The **inactive** and **active** keywords are not applicable to permanent caches. **Note** The **update** keyword is used for permanent caches only. It specifies the timeout value that is used to export entries from permanent caches. In this case, the entries are exported but remain the cache.
Step 16	**cache permanent** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# flow monitor-map fmm cache permanent`	(Optional) Disables the removal of entries from flow cache.
Step 17	**exit** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# exit`	Exits flow monitor map configuration submode.

Step 18	**sampler-map** *map_name*
	Example:
	`RP/0/RP0/CPU0:router(config)# sampler-map fsm`
	`RP/0/RP0/CPU0:router(config-sm)#`
		Creates a sampler map and enters sampler map configuration mode.
		Keep the following in mind when configuring a sampler map:
		• NetFlow supports policing at a rate of 35,000 packets per second per direction for each individual line card.

Step 19	**random 1 out-of** *sampling_interval* **Example:** `RP/0/RP0/CPU0:router(config-sm)# random 1 out-of 65535`	Configures the sampling interval to use random mode for sampling packets. Replace the *sampling_interval* argument with a number, in the range from 1 through 65535 units.
Step 20	**exit** **Example:** `RP/0/RP0/CPU0:router(config-sm)#exit`	Exits sampler map configuration mode and enters XR Config mode.

Step 21	**interface** *type number*
	Example:
	`RP/0/RP0/CPU0:router(config)# HundredGigE 0/3/0/0`
	`RP/0/RP0/CPU0:router(config-if)#`
		Enters interface configuration mode.

Step 22	**flow** [**ipv4** | **ipv6** | **mpls**] **monitor** *monitor_map* **sampler** *sampler_map* {**egress** | **ingress**} **Example:**	Associates a monitor map and a sampler map with an interface.

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router(config-if)# flow ipv4 monitor MPLS-IPv6-fmm sampler fsm egress`	Enter **ipv4** to enable IPV4 NetFlow on the specified interface. Enter **ipv6** to enable IPV6 NetFlow on the specified interface. Enter **mpls** to enable MPLS-aware NetFlow on the specified interface.
Step 23	**commit**	
Step 24	**exit** **Example:** `RP/0/RP0/CPU0:router(config-if)# exit`	Exits interface configuration submode for the Ethernet interface.
Step 25	**exit** **Example:** `RP/0/RP0/CPU0:router(config)# exit`	Exits XR Config mode.
Step 26	**show flow monitor-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show flow monitor-map fmm`	Displays flow monitor map data.
Step 27	**show flow exporter-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show flow exporter-map fem`	Displays exporter map data.

Configuring Destination-based NetFlow Accounting

Perform these tasks to configure destination-based NetFlow accounting.

SUMMARY STEPS

1. **configure**
2. **flow monitor-map** *map_name*
3. **record ipv4**
4. **exit**
5. **interface** *type interface-path-id*
6. **flow ipv4 monitor** *name* **ingress**
7. **commit**
8. **show flow monitor-map** *map_name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	

	Command or Action	Purpose

Step 2	**flow monitor-map** *map_name*
	Example:
	`RP/0/RP0/CPU0:router(config)# flow monitor-map map1`
	`RP/0/RP0/CPU0:router(config-fmm)#`
		Creates a monitor map and configures a monitor map name and enters flow monitor map configuration submode.

Step 3	**record ipv4** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# record ipv4`	Configures the flow record for an IPv4 destination-based NetFlow accounting record. The **destination** keyword specifies that the record is for IPv4 destination-based NetFlow accounting.
Step 4	**exit** **Example:** `RP/0/RP0/CPU0:router(config-fmm)# exit`	Exits flow monitor map mode and enters the XR Config mode.
Step 5	**interface** *type interface-path-id* **Example:** `RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0`	Interface *type* and physical *interface-path-id* in the format *type rack*/*slot*/*module*/*port*. *type*—POS, Ethernet, ATM, etc. *rack*—Chassis number of the rack. *slot*—Physical slot number of the line card or modular services card. *module*—Module number. A physical layer interface module (PLIM) is always 0. *port*—Physical port number of the interface.
Step 6	**flow ipv4 monitor** *name* **ingress** **Example:** `RP/0/RP0/CPU0:router(config-if)# flow ipv4 monitor monitor1 ingress`	Configures an IPv4 flow monitor for the ingress direction and assigns the name of the monitor.
Step 7	**commit**	
Step 8	**show flow monitor-map** *map_name* **Example:** `RP/0/RP0/CPU0:router# show flow monitor-map map1`	Verifies monitor map data.

Configuration Examples for NetFlow

These examples show NetFlow configurations:

Sampler Map: Example

This example shows how to create a new sampler map called “fsm1,” which samples 1 out of 65535 packets:

```
RP/0/RP0/CPU0:router# sampler-map fsm1
RP/0/RP0/CPU0:router(config-sm)# random 1 out-of 65535
RP/0/RP0/CPU0:router(config)# exit
```

Exporter Map: Example

This example shows how to create a new flow exporter map called “fem1,” which uses the version 9 (V9) export format for NetFlow export packets. The data template flow-set is inserted into the V9 export packets once every 10 minutes, and the options interface table flow-set is inserted into the V9 export packet. The export packets are sent to the flow collector destination 10.1.1.1, where the source address is identical to the interface IP address of Loopback 0. The UDP destination port is 1024, and the DSCP value is 10:

```
RP/0/RP0/CPU0:router(config)# flow exporter-map fem1
RP/0/RP0/CPU0:router(config-fem)# destination 10.1.1.1
RP/0/RP0/CPU0:router(config-fem)# source Loopback 0
RP/0/RP0/CPU0:router(config-fem)# transport udp 1024
RP/0/RP0/CPU0:router(config-fem)# dscp 10
RP/0/RP0/CPU0:router(config-fem)# exit
RP/0/RP0/CPU0:router(config-fem)# version v9
RP/0/RP0/CPU0:router(config-fem-ver)# template data timeout 600
RP/0/RP0/CPU0:router(config-fem-ver)# options interface-table
RP/0/RP0/CPU0:router(config-fem-ver)# exit
```

This example shows how to create a new flow exporter map called “fem1,” which uses the version 9 (V9) export format for the NetFlow export packets. The data template flow-set is inserted into the V9 export packets once every 10 minutes, and the options sampler table flow-set is inserted into the V9 export packet. The export packets are sent to the flow collector destination 10.1.1.1, where the source address is identical to the interface IP address of Loopback 0. The UDP destination port is 1024, and the DSCP value is 10:

```
RP/0/RP0/CPU0:router(config)# flow exporter-map fem1
RP/0/RP0/CPU0:router(config-fem)# destination 10.1.1.1
RP/0/RP0/CPU0:router(config-fem)# source Loopback 0
RP/0/RP0/CPU0:router(config-fem)# transport udp 1024
RP/0/RP0/CPU0:router(config-fem)# dscp 10
RP/0/RP0/CPU0:router(config-fem)# exit
RP/0/RP0/CPU0:router(config-fem)# version v9
RP/0/RP0/CPU0:router(config-fem-ver)# template data timeout 600
RP/0/RP0/CPU0:router(config-fem-ver)# options sampler-table
RP/0/RP0/CPU0:router(config-fem-ver)# exit
```

Flow Monitor Map: Examples

This example shows how to create a new flow monitor map with name “fmm1”. This flow monitor map references the flow exporter map “fem1,” and sets the flow cache attributes to 10000 cache entries. The active entries from the cache are aged every 30 seconds, while the inactive entries from the cache are aged every 15 seconds. The record map for this monitor map is IPv4:

```
RP/0/RP0/CPU0:router(config)# flow monitor-map fmm1
RP/0/RP0/CPU0:router(config-fmm)# record ipv4
RP/0/RP0/CPU0:router(config-fmm)# exporter fem1
```

```
RP/0/RP0/CPU0:router(config-fmm)# cache entries 10000
RP/0/RP0/CPU0:router(config-fmm)# cache timeout active 30
RP/0/RP0/CPU0:router(config-fmm)# cache timeout inactive 15
RP/0/RP0/CPU0:router(config-fmm)# exit
```

This example shows how to apply the flow monitor “fmm1”and the sampler “fsm1” to the TenGigE 0/0/0/0 interface in the ingress direction:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow ipv4 monitor fmm1 sampler fsm1 ingress
RP/0/RP0/CPU0:router(config-if)# exit
```

This example shows how to configure the NetFlow monitor to collect MPLS packets with IPv6 fields:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# flow exporter-map exp1
RP/0/RP0/CPU0:router(config-fem)# version v9
RP/0/RP0/CPU0:router(config-fem-ver)# options interface-table timeout 300
RP/0/RP0/CPU0:router(config-fem-ver)# options sampler-table timeout 300
RP/0/RP0/CPU0:router(config-fem-ver)# template data timeout 300
RP/0/RP0/CPU0:router(config-fem-ver)# template options timeout 300
RP/0/RP0/CPU0:router(config-fem-ver)# exit
RP/0/RP0/CPU0:router(config-fem)# transport udp 12515
RP/0/RP0/CPU0:router(config-fem)# source Loopback0
RP/0/RP0/CPU0:router(config-fem)# destination 170.1.1.11
RP/0/RP0/CPU0:router(config-fmm)# exit
RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-IPv6-fmm
RP/0/RP0/CPU0:router(config-fmm)# record mpls ipv6-fields labels 3
RP/0/RP0/CPU0:router(config-fmm)# exporter exp1
RP/0/RP0/CPU0:router(config-fmm)# cache entries 10000
RP/0/RP0/CPU0:router(config-fmm)# cache permanent
RP/0/RP0/CPU0:router(config-fmm)# exit

RP/0/RP0/CPU0:router(config)# sampler-map FSM
RP/0/RP0/CPU0:router(config-sm)# random 1 out-of 65535
RP/0/RP0/CPU0:router(config-sm)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow mpls monitor MPLS-IPv6-fmm sampler FSM ingress
```

MPLS Flow Monitor with IPv4 and IPv6 Support: Examples

This configuration collects MPLS traffic, but no payload information is collected.

```
RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-fmm
RP/0/RP0/CPU0:router(config-fmm)# record mpls labels 3
RP/0/RP0/CPU0:router(config-fmm)# cache permanent
RP/0/RP0/CPU0:router(config)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow mpls monitor MPLS-fmm sampler fsm ingress
```

This configuration collects MPLS traffic with IPv4 payloads. It also collects MPLS traffic without IPv4 payloads, but it populates the IPv4 fields with zeros (0).

```
RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-IPv4-fmm
RP/0/RP0/CPU0:router(config-fmm)# record mpls IPv4-fields labels 3
RP/0/RP0/CPU0:router(config-fmm)# cache permanent
RP/0/RP0/CPU0:router(config-fmm)# exit
```

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow mpls monitor MPLS-IPv4-fmm sampler fsm ingress
```

This configuration collects MPLS traffic with IPv6 payloads. It also collects MPLS traffic without IPv6 payloads, but it populates the IPv6 fields with zeros (0).

```
RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-IPv6-fmm
RP/0/RP0/CPU0:router(config-fmm)# record mpls IPv6-fields labels 3
RP/0/RP0/CPU0:router(config-fmm)# cache permanent
RP/0/RP0/CPU0:router(config-fmm)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow mpls monitor MPLS-IPv6-fmm sampler fsm ingress
```

This configuration collects MPLS traffic with both IPv6 and IPv4 fields. It also collects MPLS traffic without IPv4 or IPv6 payloads, but it populates the IPv6 and IPv4 fields with zeros (0).

```
RP/0/RP0/CPU0:router(config)# flow monitor-map MPLS-IPv4-IPv6-fmm
RP/0/RP0/CPU0:router(config-fmm)# record mpls IPv4-IPv6-fields labels 3
RP/0/RP0/CPU0:router(config-fmm)# cache permanent
RP/0/RP0/CPU0:router(config-fmm)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow mpls monitor MPLS-IPv4-IPv6-fmm sampler fsm ingress
```

Note Flow records are exported using the Version 9 format.

Destination-based NetFlow Accounting: Example

This example shows how to configure an IPv4 flow record for destination-based NetFlow accounting:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# flow exporter-map fem
RP/0/RP0/CPU0:router(config-fem)#  source Loopback0
RP/0/RP0/CPU0:router(config-fem)#  destination 80.80.80.5
RP/0/RP0/CPU0:router(config-fem)#  transport udp 1025
RP/0/RP0/CPU0:router(config-fem)# exit
RP/0/RP0/CPU0:router(config)# flow monitor-map map1
RP/0/RP0/CPU0:router(config-fmm)# record ipv4 destination
RP/0/RP0/CPU0:router(config-fmm)# exporter fem
RP/0/RP0/CPU0:router(config-fmm)# exit
RP/0/RP0/CPU0:router(config)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# flow ipv4 monitor map1 ingress
RP/0/RP0/CPU0:router(config-if)# end
RP/0/RP0/CPU0:router#  show flow monitor-map map1
```

Additional References

These sections provide references related to interface configuration.

Related Documents

Related Topic	Document Title
Cisco IOS XR master command reference	Cisco IOS XR Master Commands List
Cisco IOS XR interface configuration commands	*Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers*
Initial system bootup and configuration information for a router using the Cisco IOS XR software.	
Information about user groups and task IDs	*Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers*
Information about configuring interfaces and other components from a remote Craft Works Interface (CWI) client management application.	Cisco Craft Works Interface User Guide

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	Title
3954	NetFlow services export protocol Version 9.

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport