



Cisco Configuration Guide,Cisco SD-WAN Controllers Release 20.8.x Release 4.2

First Published: 2008-09-24

Last Modified: 2008-09-24

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Text Part Number: 123-456

The Java logo is a trademark or registered trademark of Sun Microsystems, Inc. in the U.S. or other countries.

The Bluetooth word mark and logo are registered trademarks owned by Bluetooth SIG, Inc., and any use of such marks by Cisco Systems, Inc., is under license.

© 2026 Cisco Systems, Inc. All rights reserved.



CONTENTS

PREFACE

Preface	vii
Document Organization	vii
Document Conventions	vii

CHAPTER 1

whats-changed-in-this-book	1
whats changed in this book content	1

PART I

g_basic_network_wrapper	3
--------------------------------	----------

CHAPTER 2

basic network short info Cisco SD-WAN Controllers Release 20.5.x	5
Basic Networking - Expressway	5
SIP Calls Port Reference	8
LDAP Port Reference	10
ct-concept-18112025	11
ct-task-23122025	15
ct-process-23122025 Cisco SD-WAN Controllers Release 20.5.x	17
ct-principle-23122025	19
ct-principle-18112025	24
Interface Table	26
Networking Port Reference - Expressway	26
Basic Networking - Traversal Pair	26
Networking Port Reference - Expressway Traversal Pair	27
create vsan	28
create wwn-pool	29

CHAPTER 3

clustering conn wrapper	31
--------------------------------	-----------

Cluster Connections Before X8.8 31

Interface Table 31

ct-process-18112025 32

 ct-principle-23122025 35

 ct-task-23122025 37

 Cluster Port Reference X8.8 Onwards 40

ct-refrence-18112025 45

ct-task-18112025 47

Cluster Connections X8.8 Onwards 49

Cluster Port Reference Before X8.8 50

PART II

[g_netflow_configuration_wrapper](#) 51

CHAPTER 4

Netflow Config Short Desc 53

 NetFlow Essential Concepts and Terms 53

 How NetFlow Works 54

 Recording of Packet Flows in NetFlow 55

 Key Attributes Within IP and MPLS Packets 56

 Interface Types Supported with NetFlow 56

 NetFlow Guidelines and Limitations 57

 Comparative Overview of NetFlow Version 9 and Version 10 (IPFIX) 58

 NetFlow Version 9 58

 NetFlow Options Template 58

 Sampler Table 58

 Interface Table 59

 VRF Table 59

 Configure NetFlow Version 9 59

 Configure MPLS-Aware NetFlow 65

 Modify NetFlow Configuration 67

 IPFIX (NetFlow Version 10) 67

 NetFlow v9 and NetFlow v10 (IPFIX) 68

 Configure IPFIX 69

 Configure IPFIX 315 71

 Flow Filter 73

Configure Flow Filter 73

Destination-based NetFlow Accounting 75

Configuring Destination-based NetFlow Accounting 77

CHAPTER 5 **rendering-test-wrapper** 79

my-topic-33 79

APPENDIX A **Glossary** 81



Preface

This preface describes the audience, organization, and conventions of the Cisco NX-OS Security Configuration Guide, Release . It also provides information on how to obtain related documentation.

- [Document Organization, on page vii](#)
- [Document Conventions, on page vii](#)

Document Organization

This document is organized into the following chapters:

Chapter	Description
test chapter	test desc

Document Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element(keyword or argument).
[x y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.

Convention	Description
[x {y z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
<i>variable</i>	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Screen examples use the following conventions:

Convention	Description
<i>screen font</i>	Terminal sessions and information the switch displays are in screen font.
boldface screen font	Information you must enter is in boldface screen font.
<i>italic screen font</i>	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:



Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



CHAPTER 1

whats-changed-in-this-book

- [whats changed in this book content, on page 1](#)

whats changed in this book content

NetFlow updated creates flow [Nested topic-1](#) records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. [Parent topic-1](#) These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, [Chapter wrapper -1](#) which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the [Chapter wrapper-2](#) line card's cache until they age out due to timer expiration. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.



Note NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



Caution NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

**Warning**

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

**Tip**

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



PART I

g_basic_network_wrapper

- [basic network short info Cisco SD-WAN Controllers Release 20.5.x, on page 5](#)
- [clustering conn wrapper, on page 31](#)



CHAPTER 2

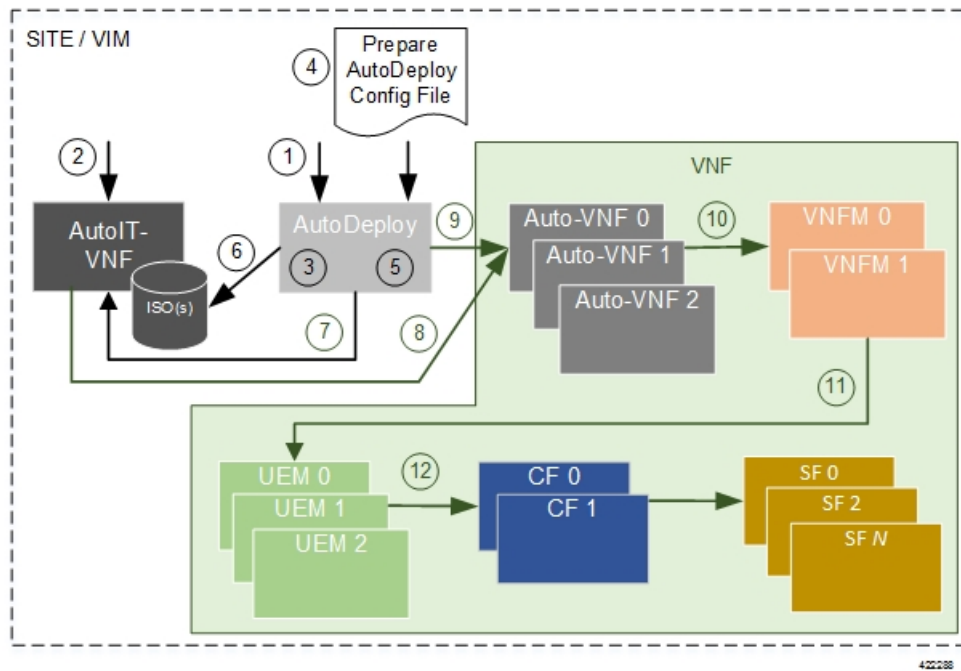
basic network short info Cisco SD-WAN Controllers Release 20.5.x

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- [Basic Networking - Expressway, on page 5](#)
- [ct-concept-18112025, on page 11](#)
- [ct-principle-18112025, on page 24](#)
- [Networking Port Reference - Expressway, on page 26](#)
- [Basic Networking - Traversal Pair, on page 26](#)
- [Networking Port Reference - Expressway Traversal Pair, on page 27](#)
- [create vsan, on page 28](#)
- [create wwn-pool, on page 29](#)

Basic Networking - Expressway

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



Tip The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.



Caution The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.



Warning The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.



Note The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- Testing the UL tag
- Testing the UL tag
- Testing the UL tag
- Testing the UL tag

1. Testing the OL tag
2. Testing the OL tag
3. Testing the OL tag
4. Testing the OL tag

```
switch-A# scope org org3
switch-A /org # scope service-profile sp1
switch-A /org/service-profile # create vnic vnic110
switch-A /org/service-profile/vnic* # commit-buffer
switch-A /org/service-profile/vnic #
```

Section title 1

NetFlow creates [External link](#) flow records by monitoring network [Same chapter child topic xref](#) traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. [Another chapter wrapper](#) These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. [Same chapter parent topic xref](#) The packets are subject to a policer, [Same chapter wrapper](#) which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Section title 2

NetFlow serves as a network monitoring protocol that facilitates [Other Chapter child topic xref](#) the logging of metadata for each flow that traverses the router, both entering or leaving it. This protocol provides comprehensive insights into network flows, including details such as source [Other Chapter Parent topic xref](#) and destination IP addresses, ports, and packet counts. It's commonly applied for traffic analysis, capacity planning, and network troubleshooting.

Related Topics

[ct-reference-23122025](#), on page 21

SIP Calls Port Reference

Table 1: SIP Calls Port Reference

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
SIP signaling	Expressway-C	25000-29999	TCP or TLS	Expressway-E	7001 (for first traversal zone; 7002 for second etc.)
SIP signaling	Expressway-C	5060	UDP	SIP endpoint	5060 (often, but could be different, >=1024) Port number defined by registration (if registered) or by DNS lookup
SIP signaling	Expressway-C	25000-29999	TCP or TLS	SIP endpoint	>=1024 Port number defined by registration (if registered) or by DNS lookup
SIP signaling	Expressway-E	25000-29999	TCP or TLS	SIP endpoint (or its firewall)	>=1024 Port number defined by registration (if registered) or by DNS lookup
SIP signaling	SIP endpoint (or its firewall)	>=1024	UDP	Expressway-E	5060 SIP UDP disabled by default. Not recommended for internet facing connections.
SIP signaling	SIP endpoint (or its firewall)	>=1024	TCP	Expressway-E	5060 SIP TCP disabled by default (X8.9.2 and later).

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
SIP signaling	SIP endpoint (or its firewall)	>=1024	TLS	Expressway-E	5061
SIP signaling	SIP endpoint (or its firewall)	>=1024	MTLS	Expressway-E	5062
Assent RTP (traversed media)	Expressway-C	36000-59999	UDP	Expressway-E	2776 or 36000 (Small/Medium) 36000 - 36010 (even ports) (Large)
Assent RTCP (traversed media)	Expressway-C	36000-59999	UDP	Expressway-E	2777 or 36001 (Small/Medium) 36001 - 36011 (odd ports) (Large)
Assent RTP (traversed media)	SIP endpoint (or its firewall)	>=1024 Could be the firewall port where the media egressed, rather than an endpoint port	UDP	Expressway-E	36000-59999
Assent RTCP (traversed media)	SIP endpoint (or its firewall)	>=1024 Could be translated by the firewall to port where the media egressed, rather than an endpoint port	UDP	Expressway-E	36000-59999
Assent RTP (traversed media)	Expressway-E	36000-59999	UDP	SIP endpoint (or its firewall)	>=1024 Expressway waits until it receives media, then sends media to that source port (which could be the port where the media egressed the firewall, not an endpoint port)

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
TURN control	Any IP address†	>=1024 (signaling port from endpoint or the firewall)	UDP & TCP	Expressway-E	3478 (Small/Medium) 3478-3483 (Large)
TURN control	Expressway-C	>=1024	UDP & TCP	Expressway-E	3478 (Small/Medium) 3478-3483 (Large)
TURN media	Expressway-E	24000-29999	UDP & TCP	Any IP address	>=1024
TURN media	Any IP address‡	>=1024 Port of relevant ICE candidate: host IP port, server reflexive port (outside firewall port), or TURN server port	UDP & TCP	Expressway-E	24000-29999

† The request could be from any IP address, unknown to the TURN server. Assume for example, that endpoint A and endpoint C (TURN clients) can use the Expressway-E TURN server. The actual IP address from which the TURN server receives the request could be the endpoint's firewall egress address (NATed).

‡ The media could go to any of the candidate addresses. For example, before ICE negotiation the TURN server does not know which of endpoint B's candidate addresses will be the highest priority.

LDAP Port Reference

You can choose to use an LDAP server to authenticate and authorize administrator or user logins. You would only need to allow the LDAP ports [Xref interface table](#) inbound from the Expressway-E in the rare case where you want a user to log in from outside the network and you also do not allow credentials to be stored on the Expressway.

Table 2: LDAP Port Reference

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Authentication requests from the Expressway-C	Expressway-C	30000-35999	TCP	Directory Server	389
Authentication requests from the Expressway-E	Expressway-E private	30000-35999	TCP	Directory Server	389

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Encrypted authentication requests from the Expressway-C	Expressway-C	30000-35999	TLS	Directory Server	636
Encrypted authentication requests from the Expressway-E	Expressway-E private	30000-35999	TLS	Directory Server	636

ct-concept-18112025

The NetFlow Options Template serves as *Testing the var tag* a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the *testing the varname* NetFlow process itself. **Testing the UI control tag** There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also **Testing the cmd name tag** exports the VRF (Virtual Routing and Forwarding) table.

- The router extracts pertinent header details *testing the codeph* from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent **testing the menucascade test** > header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the *testing the cite tag* line card's cache until they age out due to timer expiration.
- The router extracts pertinent header details from **testing the kwd tag** the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival *testing the codeph tag* of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Test ref title

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

1. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
2. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
3. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
4. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
5. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- Item: Description

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 3: Comparison Table Title

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 4: Contrast Table Title

Head-1	Head-2
With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 5: Look up Table Title

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



Note The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Version 1.1

Version 1.2

Version 1.3

Version 1.4

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the

same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

ct-task-23122025

section title 1

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

section title 2

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

section title 3

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. **Testing the UI control tag** Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow

process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Before you begin

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Procedure

Example:

```
switch-A# scope org org3
switch-A /org # create wwn-pool wwnpl port-wnn-assignment
switch-A /org/wnn-pool* # commit-buffer
switch-A /org/wnn-pool #
```

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Table 6: Test If then Table

If...	Then...
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.

- test choice

The router extracts pertinent header details from the packets and creates cache entries.

The router extracts pertinent header details from the packets and creates cache entries.

What to do next

The router extracts pertinent header details from the packets and creates cache entries.

- The router extracts pertinent header details from the packets and creates cache entries.

ct-process-23122025 Cisco SD-WAN Controllers Release 20.5.x

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Summary

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. [my xref test](#)With each subsequent arrival of a

packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Workflow

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

1. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
 - The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

When...	And...	Then...	And...
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Result

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

What's next

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

section title-1

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

ct-principle-23122025

Test Principle Title

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates:

the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

test principle title 2

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-1

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-2

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

ct-reference-23122025

The NetFlow Options Template serves as a [External link](#) distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, [Same chapter child topic xref](#) these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-1

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process [Same chapter parent topic xref](#) also exports the VRF (Virtual Routing and Forwarding) table. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-2

There are distinct options templates: the sampler [Other Chapter child topic xref](#) options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. [Other Chapter parent topic xref](#) There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Table 7: Test lookup table title

Head-1	Head-2	Head-3	Head-4
NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.
NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

- NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.
- NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

Table 8: Test look up table

Head-1	Head-2	Head-3	Head-4
NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.
NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.

Table 9: Test comp table title

Head-1	Head-2	Head-3
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Note Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Warning Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Tip Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Caution Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.

```
switch-A# scope fc-uplink
switch-A /fc-uplink # create vsan vs2 6 10
switch-A /fc-uplink/vsan* # commit-buffer
switch-A /fc-uplink/vsan #
```

ct-principle-18112025

Test Principle Title

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

test principle title 2

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates:

the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Interface Table

The interface table, contains data about interfaces that are monitored for data flow. With this data, the collector derives the interface names linked to the data flow. The interface table contains 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 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.

Networking Port Reference - Expressway

Table 10: Basic Networking Ports for Expressway-C

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Administrator SSH	Admin PCs	1024-65535	TCP	Expressway-C	22
Administrator HTTP*	Admin PCs	1024-65535	TCP	Expressway-C	80
Administrator HTTPS	Admin PCs	1024-65535	TCP	Expressway-C	443
Name resolution (DNS)	Expressway-C	30000-35999	UDP & TCP†	Internal name server	53
Time synchronization (NTP)	Expressway-C	123	UDP	Internal time server	123

* Expressway redirects HTTP to HTTPS by default. You don't need to open the HTTP port, but you can allow HTTP for convenience and redirect to HTTPS.

† Expressway will attempt DNS resolution over TCP if the response is too large.

Basic Networking - Traversal Pair

Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables.

NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it. This protocol provides comprehensive insights into network flows, including details such as source and destination IP addresses, ports, and packet counts. It's commonly applied for traffic analysis, capacity planning, and network troubleshooting. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. [test test testin the xref](#)

For more information, see [Secure Workload documentation](#)

Networking Port Reference - Expressway Traversal Pair

Table 11: Basic Networking Ports for Expressway-C

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Administrator SSH	Admin PCs	1024-65535	TCP	Expressway-C	22
Administrator HTTP*	Admin PCs	1024-65535	TCP	Expressway-C	80
Administrator HTTPS	Admin PCs	1024-65535	TCP	Expressway-C	443
Name resolution (DNS)	Expressway-C	30000-35999	UDP & TCP †	Internal name server	53
Time synchronization (NTP)	Expressway-C	123	UDP	Internal time server	123

* Expressway redirects HTTP to HTTPS by default. You don't need to open the HTTP port, but you can allow HTTP for convenience and redirect to HTTPS.

† Expressway will attempt DNS resolution over TCP if the response is too large.

Table 12: Basic Networking Ports for Expressway-E

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Administrator SSH	Admin PCs	1024-65535	TCP	Expressway-E private IP	22
Administrator HTTP	Admin PCs	1024-65535	TCP	Expressway-E private IP	80

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Administrator HTTPS	Admin PCs	1024-65535	TLS	Expressway-E private IP	443
Internal name resolution (DNS)*	Expressway-E private IP	30000-35999	UDP & TCP	Internal name server	53
External name resolution (DNS)	Expressway-E public IP	30000-35999	UDP & TCP	External name server	53
Internal time synchronization (NTP)*	Expressway-E private IP	123	UDP	Internal time server	123
External time synchronization (NTP)	Expressway-E public IP	123	UDP	External time server	123

* You may prefer to connect Expressway-E to external DNS and NTP. You do not need both.

Related Topics

[ct-principle-18112025](#), on page 24

create vsan

QA Test Sprint 9 CSCta77961: Test that each Command appears in its own page. Karthik has changed it

To create a VSAN, use the **create vsan** command.

karthik included this after os patch

karthik has included this during sprint6-round1 build

sprint-5 round1

sprint-5 round1 patch

create vsan *name id fcoe-vlan*

Syntax Description

name VSAN name. The range of valid values is 1 to 16.

id VSAN identification number. The range of valid values is 1 to 4093.

default-2 Specifies default 1.

fcoe-vlan Fibre Channel over Ethernet VLAN. The range of valid values is 1 to 4093.

default-1 Specifies default 2.

Command Default

None

Command Modes Fibre Channel uplink (/fc-uplink)
Switch (/fc-uplink/switch)

Command History

Release	Modification
1.0(1)	This command was introduced.

Usage Guidelines Use this command to create a VSAN with the specified name, and enters organization VSAN mode. You can create a named VSAN with IDs from 1 to 4093. VSANs configured on different FCoE VLANs cannot share the same ID.

Examples

This example shows how to create a VSAN:

```
switch-A# scope fc-uplink
switch-A /fc-uplink # create vsan vs2 6 10
switch-A /fc-uplink/vsan* # commit-buffer
switch-A /fc-uplink/vsan #
```

Related Topics

[Cluster Connections Before X8.8](#), on page 31

create wwn-pool

To create a WWN (World Wide Name) pool, use the **create wwn-pool** command.

create wwn-pool *name* {**node-wwn-assignment** | **port-wwn-assignment**}

Syntax Description	
<i>name</i>	WWN pool name. The range of valid values is 1 to 16.
node-wwn-assignment	Specifies world wide node name assignment.
port-wwn-assignment	Specifies world wide node port assignment.

Command Default None

Command Modes Organization (/org)

Command History

Release	Modification
1.0(1)	This command was introduced.

Usage Guidelines Use this command to create a WWN pool with the specified name, and enters organization WWN pool mode. A WWN pool can include only WWNNs or WWPNS in the 20:xx range. All other WWN ranges are reserved.

Examples

This example shows how to create a WWN pool:

```
switch-A# scope org org3
switch-A /org # create wwn-pool wwnp1 port-wwn-assignment
switch-A /org/wwn-pool* # commit-buffer
switch-A /org/wwn-pool #
```



CHAPTER 3

clustering conn wrapper

- [Cluster Connections Before X8.8, on page 31](#)
- [Interface Table, on page 31](#)
- [ct-process-18112025, on page 32](#)
- [ct-refrence-18112025, on page 45](#)
- [ct-task-18112025, on page 47](#)
- [Cluster Connections X8.8 Onwards, on page 49](#)
- [Cluster Port Reference Before X8.8, on page 50](#)

Cluster Connections Before X8.8

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to [xref interface table3](#) the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Interface Table

The interface table, contains data about interfaces that are monitored for data flow. With this data, the collector derives the interface names linked to the data flow. The interface table contains 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 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.

ct-process-18112025

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Summary

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. [my xref test](#)With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the [Interface Table](#) internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Workflow

Figure 1:

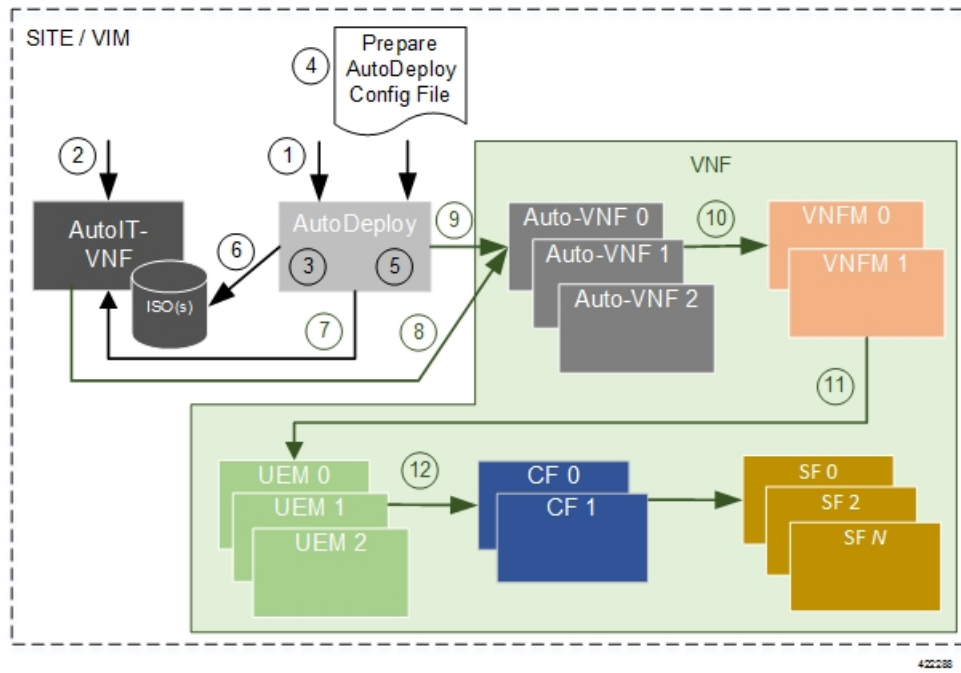


Figure 2:



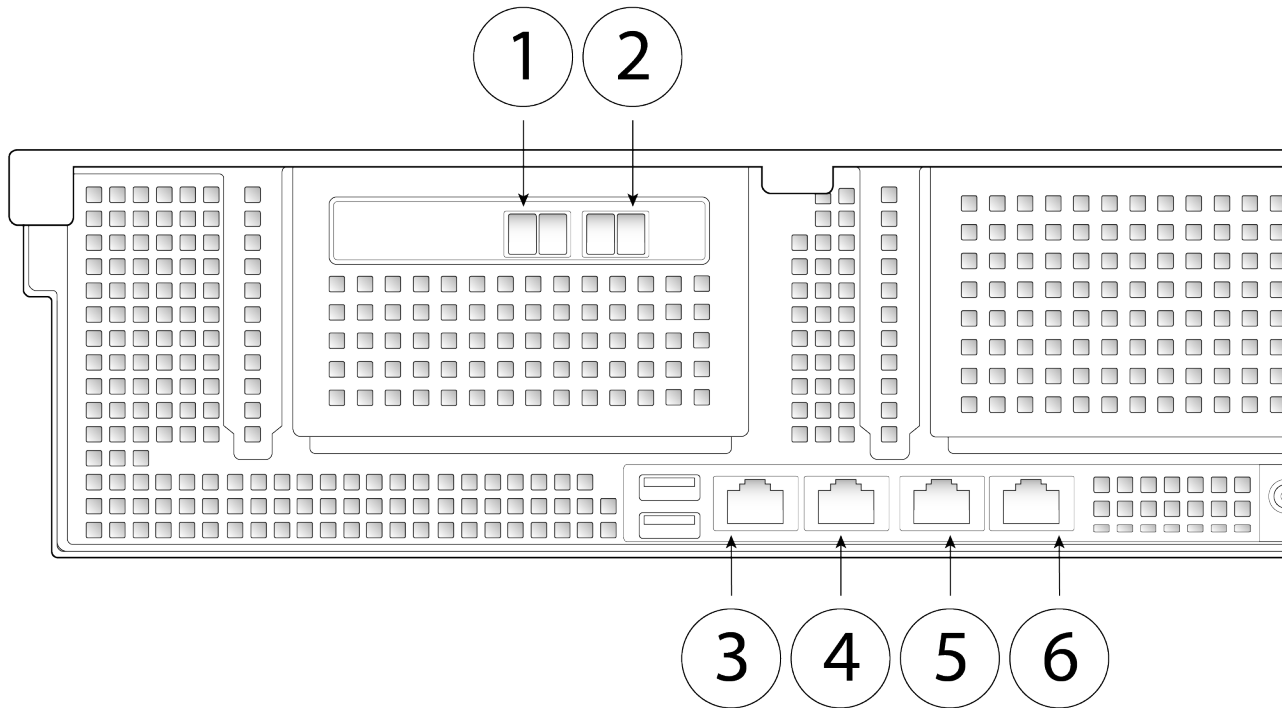
Figure 3:



Figure 4:



Figure 5:



The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

1. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
 - The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

When...	And...	Then...	And...
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

When...	And...	Then...	And...
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Result

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

What's next

Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

Supported features

Destination-based NetFlow accounting supports the following features.

- IPv4 and IPv6 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)
- Normal and permanent cache type (active and inactive timeout aged flow records)

ct-principle-23122025

Test Principle Title

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these

options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

test principle title 2

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-1

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Section title-2

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

ct-task-23122025

section title 1

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

section title 2

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

section title 3

There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. **Testing the UI control tag** Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Before you begin

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Procedure

Example:

```
switch-A# scope org org3
switch-A /org # create wwn-pool wwnp1 port-wwn-assignment
switch-A /org/wwn-pool* # commit-buffer
switch-A /org/wwn-pool #
```

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Table 13: Test If then Table

If...	Then...
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.

- test choice

The router extracts pertinent header details from the packets and creates cache entries.

The router extracts pertinent header details from the packets and creates cache entries.

What to do next

The router extracts pertinent header details from the packets and creates cache entries.

- The router extracts pertinent header details from the packets and creates cache entries.

Cluster Port Reference X8.8 Onwards

Table 14: Expressway-C Cluster Database Synchronization and Communications

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Cluster recovery	This peer	30000-35999	TCP	Other peers	4371
Cluster communication	This peer	30000-35999	TLS	Other peers	4372
Bandwidth management	This peer	1719	UDP	Other peers	1719

Table 15: SIP Calls Routed Between Peers (not shown on diagram)

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
SIP TCP Signaling	This peer	25000-29999	TCP	Other peers	5061
SIP TLS Signaling	This peer	25000-29999	TLS	Other peers	5061
RTP/RTCP	This peer	36000-59999	UDP	Other peers	36000-59999
Bandwidth management	This peer	1719	UDP	Other peers	1719



Note Dbxsh is a python script that connects to a cluster database on the local loopback address over port 4370. The Dbxsh does not need to authenticate the database before executing the commands. The port is open for connection and is strictly for internal use only. This is accessible from root only.

ct-concept-23122025

The NetFlow Options Template serves as *Testing the var tag* a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the *testing the varname* NetFlow process itself. **Testing the UI control tag** There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also **Testing the cmd name tag** exports the VRF (Virtual Routing and Forwarding) table.

- The router extracts pertinent header details *testing the codeph* from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent **testing the menucascade test** > header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the *testing the cite tag* line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from **testing the kwd tag** the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival `testing the codeph tag` of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Test ref title

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
- The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

1. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
2. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
3. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a

packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

4. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.
5. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

- Item: Description

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 16: Comparison Table Title

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 17: Contrast Table Title

Head-1	Head-2
With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Table 18: Look up Table Title

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Head-1	Head-2	Head-3
The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.	The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



Note The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

Version 1.1

Version 1.2

Version 1.3

Version 1.4

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

ct-reference-18112025

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.
- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Table 19: Test lookup table title

Head-1	Head-2	Head-3	Head-4
NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

Head-1	Head-2	Head-3	Head-4
NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.	NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

- NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.
- NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record.

Table 20: Test look up table

Head-1	Head-2	Head-3	Head-4
NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.
NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.	NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it.

Table 21: Test comp table title

Head-1	Head-2	Head-3
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.
Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.	Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Note Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Warning Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Tip Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.



Caution Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface.

```
switch-A# scope fc-uplink
switch-A /fc-uplink # create vsan vs2 6 10
switch-A /fc-uplink/vsan* # commit-buffer
switch-A /fc-uplink/vsan #
```

ct-task-18112025

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. **Testing the UI control tag** Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There

are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Before you begin

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Procedure

Example:

```
switch-A# scope org org3
switch-A /org # create wwn-pool wwnp1 port-wwn-assignment
switch-A /org/wwn-pool* # commit-buffer
switch-A /org/wwn-pool #
```

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Table 22: Test If then Table

If...	Then...
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.
The router extracts pertinent header details from the packets and creates cache entries.	The router extracts pertinent header details from the packets and creates cache entries.

- test choice

The router extracts pertinent header details from the packets and creates cache entries.

The router extracts pertinent header details from the packets and creates cache entries.

What to do next

The router extracts pertinent header details from the packets and creates cache entries.

- The router extracts pertinent header details from the packets and creates cache entries.

Cluster Connections X8.8 Onwards

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal

control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Cluster Port Reference Before X8.8

Table 23: Cluster Synchronization and Communications

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Cluster database synchronization (IPSec AH)	This peer	N/A	51	Other peers	N/A
Key exchange between peers (ISAKMP)	This peer	500	UDP	Other peers	500
Cluster recovery	This peer	30000-35999	UDP	Other peers	4371
Cluster communication	This peer	30000-35999	TCP	Other peers	4369-4380
Bandwidth management (Expressway-C cluster only)	This peer	1719	UDP	Other peers	1719



PART II

g_netflow_configuration_wrapper

- [Netflow Config Short Desc, on page 53](#)
- [rendering-test-wrapper, on page 79](#)



CHAPTER 4

Netflow Config Short Desc

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table. The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

- [NetFlow Essential Concepts and Terms, on page 53](#)
- [How NetFlow Works, on page 54](#)
- [Key Attributes Within IP and MPLS Packets, on page 56](#)
- [Interface Types Supported with NetFlow, on page 56](#)
- [NetFlow Guidelines and Limitations, on page 57](#)
- [Comparative Overview of NetFlow Version 9 and Version 10 \(IPFIX\), on page 58](#)
- [NetFlow Version 9 , on page 58](#)
- [IPFIX \(NetFlow Version 10\), on page 67](#)
- [NetFlow v9 and NetFlow v10 \(IPFIX\), on page 68](#)
- [Flow Filter, on page 73](#)
- [Destination-based NetFlow Accounting, on page 75](#)

NetFlow Essential Concepts and Terms

- **Data source:** Specific locations within the router, such as physical interfaces and VLANs, where traffic measurements can be taken.
- **Flow:** Indicates a collection of IP or MPLS packets traversing the router during a time period. All packets belonging to a particular Flow share common attributes derived from the packet's data
- **Flow record:** Is a set of key and non-key NetFlow field values used to characterize flows in the NetFlow cache. It is generated by examining packet headers, and adding a description of packet details in the NetFlow cache.

- **Exporter:** Positioned within the router that has NetFlow enabled, an Exporter monitors incoming packets, and generates Flows from them. The Exporter transmits information derived from these Flows, encapsulates as Flow Records, to the NetFlow Collector.
- **Collector:** An external device designed to receive Flow Records from one or multiple Exporters. The Collector processes the incoming export packets, and stores the associated Flow record details. Optionally, Flow records can undergo aggregation before storing it onto the hard disk.
- **NetFlow Cache:** The Cache is a segment of memory that stores flow entries prior to their exportation to an external collector. This includes two cache types: the normal cache and the permanent cache.
- **Netflow Analyser:** Is an external device or an application responsible for collecting and scrutinizing flow records to furnish valuable insights.
- **Collector address:** This comprises the IP address and a UDP port number. By default, the designated destination port number is 2055.

How NetFlow Works

NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it. This protocol provides [Basic Networking - Expressway, on page 5](#) comprehensive insights into network flows, including details such as source and destination IP addresses, ports, and packet counts. It's commonly applied for traffic analysis, capacity planning, and network troubleshooting.

[This is parent topic](#)

Table 24: Basic Networking Ports for Expressway-E

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
Administrator SSH	Admin PCs	1024-65535	TCP	Expressway-E private IP	22
Administrator HTTP	Admin PCs	1024-65535	TCP	Expressway-E private IP	80
Administrator HTTPS	Admin PCs	1024-65535	TLS	Expressway-E private IP	443
Internal name resolution (DNS)*	Expressway-E private IP	30000-35999	UDP & TCP	Internal name server	53
External name resolution (DNS)	Expressway-E public IP	30000-35999	UDP & TCP	External name server	53
Internal time synchronization (NTP)*	Expressway-E private IP	123	UDP	Internal time server	123

Purpose	Src. IP	Src. Ports	Protocol	Dest. IP	Dest. Ports
External time synchronization (NTP)	Expressway-E public IP	123	UDP	External time server	123

Element ID	Field Name	Value
48	SamplerID	This ID is assigned to the sampler. It is used by the collector to retrieve information about the sampler for a data flow record.
49	SamplerMode	This field indicates the mode in which the sampling has been performed.
50	SamplerRandomInterval	This field indicates the rate at which the sampling is performed.
84	SamplerName	This field indicates the name of the sampler.

Recording of Packet Flows in NetFlow

The packet in NetFlow is recorded as follows:

In NetFlow, the focus is on recording and collecting full packet flows in the network traffic data. When NetFlow is configured on the router, the router collects flow data by extracting key field attributes from the packet streams, and generates a flow record. This record, along with accounting information, is stored in the database or NetFlow Cache. The extracted records, once sampled, are exported to one or more NetFlow collectors via the UDP transport layer protocol. This exported data has several purpose: enterprise accounting and ISP billing, and so on.

Here's how NetFlow handles the recording of packet flows:

1. **Flow Creation:** NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.

When the expiry of the set timer occurs, the NetFlow is generated. There are timers (two of them) running for flow aging.

- The active timer signifies the maximum allowable duration for a particular cache entry's existence, even if matched by received sampled packets.
- The inactive timer represents the duration without receipt of a sampled packet corresponding to a specific cache entry.

2. **Datagram Generation:** The NetFlow agent generates NetFlow datagrams that contain information about the packets. These datagrams include details such as source and destination IP addresses, port numbers, protocol information, and various flow statistics.

3. **Data Export:** The NetFlow datagrams are periodically exported from the NetFlow agent to a designated NetFlow collector or analyzer. The export can be done using protocols like UDP or TCP, and the datagrams are typically sent in a structured format like IPFIX or JSON.

A flow record is sent to the NetFlow collector in the following scenarios:

- The flow has been inactive or active for an extended period.
 - The user triggers the export of the flow.
 - The flow concludes, which is particularly relevant when TCP connections are terminated.
4. **Analysis and Reporting:** Upon receiving the NetFlow data, the NetFlow collector or analyzer processes and analyzes the information. It aggregates the sampled data to provide statistical insights into network traffic, including top talkers, protocol distribution, traffic patterns, and other metrics.

Key Attributes Within IP and MPLS Packets

NetFlow extends its support to IPv4, IPv6, and MPLS flow types, providing the capacity to monitor a diverse range of packet information. These encompass, and extend beyond:

- Source and Destination IP Addresses
- Source and Destination MAC Addresses
- Source and Destination Ports for TCP/User Datagram Protocol (UDP) ports
- Differentiated Services Code Point (DSCP)
- Layer 3 Protocol
- Type of Service (ToS) Byte
- Traffic receiving Interface
- Complete IPv4 Header fields, including IP-ID and TTL, among others
- Routing information (next-hop address, source autonomous system (AS) number, destination AS number, source prefix mask, destination prefix mask, BGP Next Hop, BGP Policy Accounting traffic index)
- Counts for Packets and Bytes
- Full Spectrum of IPv6 Header fields, encompassing Flow Label and Option Header, among others
- Flow timestamps
- MPLS labels

Interface Types Supported with NetFlow

- Physical main interfaces
- L3 interfaces
- L3 subinterfaces

- L2 interfaces
- Bundle interfaces
- Bundle sub-interfaces
- PW-Ether interfaces

NetFlow Guidelines and Limitations

- NetFlow is configured only in the ingress direction.
- Netflow exporter packet does not transport support TCP.
- A source interface or source address must be configured to enable the exporter. If you do not configure a source interface, the exporter remains in a disabled state. If both a source interface and a source address are configured, the source address takes precedence.
- NetFlow supports export format Version 9 and IPFIX.
- NetFlow filtering using ACL is not supported.
- A valid record type such as IPv4, IPv6, or MPLS must be configured for every flow monitor map.
- NetFlow is not supported on Bridge Virtual Interface (BVI).
- Destination-based NetFlow accounting is not supported.
- Output interface field is not updated in data and flow records when the traffic is routed through ACL-based forwarding (ABF).
- The data and flow records for GRE transit traffic do not have the output interface, source, and destination prefix lengths fields set.
- Full Packet Capture (FPC) feature is not supported.
- We do not recommend using the management interface to export the NetFlow packets.
We do not recommend using the management interface to export the NetFlow packets.
- If IPFIX 315 is enabled on a line card, then all the ports on that line card should have IPFIX315 configured.
- IPFIX 315 is supported on main interface only. The traffic on all sub-interfaces (on which netflow is enabled) under the main interface is exported.
- The incoming and outgoing interface will have information of main interface and not the sub-interface even if the packet is routed via sub-interface. Incase of bundles it will point to bundle main interface for IPFIX 315.
- IPFIX 315 sampling rate for bundles is per member-link and not per bundle interface.
- For IPFIX 315, the outgoing interface information may not be correct incase of packets that are multicasted or broadcasted on multiple ports.

Comparative Overview of NetFlow Version 9 and Version 10 (IPFIX)

Multiple versions of the NetFlow protocol exist. This section provides a comprehensive overview of the distinct versions within the NetFlow monitoring protocol, including NetFlow v9 and NetFlow v10 (IPFIX). It highlights the variations between these protocols.

NetFlow Version 9

NetFlow Version 9 is a template-based approach that provides flexibility in the record format. It enables enhancements to NetFlow services without concurrently altering the basic flow-record format.

NetFlow Options Template

The NetFlow Options Template serves as a distinctive template record designed to communicate the format of data associated with the NetFlow operation. Instead of sharing details about IP flows, these options serve the purpose of providing metadata pertaining to the NetFlow process itself. There are distinct options templates: the sampler options template and the interface options template. The NetFlow process exports these two tables. Furthermore, the NetFlow process also exports the VRF (Virtual Routing and Forwarding) table.

Sampler Table

The Sampler Table and Interface Option Templates play a significant role in organizing information.

The Sampler Options Template consists of a sampler table, while the Interface Option Templates consists of an interface table. Enabling these options for the sampler and interface tables simplifies the process for the collector to determine data flow information.

The sampler table offers insights into active samplers. Its primary purpose is to aid the collector in estimating the sampling rate for individual data flows. The sampler table provides the following information for each sampler:

Element ID	Field Name	Value
48	SamplerID	This ID is assigned to the sampler. It is used by the collector to retrieve information about the sampler for a data flow record.
49	SamplerMode	This field indicates the mode in which the sampling has been performed.
50	SamplerRandomInterval	This field indicates the rate at which the sampling is performed.
84	SamplerName	This field indicates the name of the sampler.

Interface Table

The interface table, contains data about interfaces that are monitored for data flow. With this data, the collector derives the interface names linked to the data flow. The interface table contains 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 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 [Another chapter wrapper](#) consists mapping of VRF IDs to the VRF names. Using this information, the collector [Another chapter nested topic](#) determines the name of the [Same chapter parent topic](#) required VRF.

The VRF table is [Another chapter parent topic](#) exported at intervals specified by the optional **timeout** keyword that can be [Another chapter wrapper](#) configured manually. The default value is [Same chapter nested topic](#) 1800 seconds.

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 has the VRFID value ingressVRFID. The value "default" indicates that the interface is not assigned explicitly to a VRF.

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

Configure NetFlow Version 9

Let's consider the following topology to configure NetFlow.

To monitor traffic, you must configure one or more and associate it to a Flow Monitor and enable NetFlow on the interface either in egress or ingress direction. Optionally, you can configure a to set the sampling rate for flow samples.

Procedure

Step 1 First, let's gather the required details to enable NetFlow on a router:

- The IP address of the source : 2001:db8::0003
- The IP address of the NetFlow Collector (Destination address): 2001:db8::0002
- Interface of the router where we will enable Netflow: HundredGigE 0/0/0/24
- NetFlow version used to transport the data to the collector: version 9

Step 2 Configure a Flow Exporter using the command to specify where and how the packets should be exported.

```

Router# configure
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table configure the port To monitor traffic
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Exp01
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9

```

```

Router(config-fem-ver)# options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Expol
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Expol
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Expol
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Expol
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exitRouter# configure configure the port To monitor traffic
Router(config)# flow exporter-map Expol
Router(config-fem)# source-address 2001:db8::0003
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# transport udp 1024
Router(config-fem)# version v9
Router(config-fem-ver)# options interface-table options interface-table options interface-table
Router(config-fem-ver)# commit
Router(config-fem-ver)# root
Router(config)#exit

```

Verify the Flow Exporter configuration using the command.

```
Router#show flow exporter-map Expol
```

```

Flow Exporter Map : Exp01
-----
Id                : 1
Packet-Length     : 1468
DestinationIpAddr : 2001:db8::2
VRFName           : default
SourceIfName      :
SourceIpAddr      : 2001:db8::3
DSCP              : 0
TransportProtocol : UDP
TransportDestPort : 1024
Do Not Fragment   : Not Enabled

Export Version: 9
  Common Template Timeout : 1800 seconds
  Options Template Timeout : 1800 seconds
  Data Template Timeout : 1800 seconds
  Interface-Table Export Timeout : 1800 seconds
  Sampler-Table Export Timeout : 0 seconds
  VRF-Table Export Timeout : 0 seconds

```

Step 3 Create a Flow Monitor using the command to define the type of traffic to be monitored. You can include one or more exporter maps in the monitor map. A single flow monitor map can support up to eight exporters.

The record type specifies the type of packets that are sampled as the packets pass through the router. MPLS, IPv4, and IPv6 packet sampling is supported.

```

Router#configure
Router(config)# flow monitor-map fmm-ipv6
Router(config-fmm)# record ipv6
Router(config-fmm)# cache entries 500000
Router(config-fmm)# cache timeout active 60
Router(config-fmm)# cache timeout inactive 20
Router(config-fmm)# exporter Exp01
outer(config-fmm)# commit
Router(config-fmm)# root
Router(config)#exit

```

Verify the Flow Monitor configuration using the command.

```

Router#show flow monitor-map fmm-ipv6

Flow Monitor Map : fmm-ipv6
-----
Id:                1
RecordMapName:     ipv6
ExportMapName:     Exp01
CacheAgingMode:    Normal
CacheMaxEntries:   500000
CacheActiveTout:   60 seconds
CacheInactiveTout: 20 seconds
CacheUpdateTout:   N/A
CacheRateLimit:    2000
HwCacheExists:     False
HwCacheInactTout:  50

```

Here are additional examples to record MPLS packets, BGP packets.

In this example, you create a flow monitor map to record the MPLS packets.

```

Router(config)#flow monitor-map fmm-mpls-ipv6
Router(config-fmm)#record mpls ipv6-fields labels 3
Router(config-fmm)#exporter Exp01

```

```
Router(config-fmm)#cache entries 2000000
Router(config-fmm)#cache permanent
Router(config-fmm)#exit
```

In this example, you create a flow monitor map to record the BGP packets with the permanent cache.

```
Router(config)# router bgp 50
Router(config-bgp)# address-family ipv6 unicast
Router(config-bgp-af)# bgp attribute-download
Router(config-bgp-af)#root
Router(config)#flow monitor-map fmm-bgp
Router(config-fmm)#record ipv6 peer-as
Router(config-fmm)#exporter Expol
Router(config-fmm)#cache entries 2000000
Router(config-fmm)#exit
```

Step 4 Configure a Flow Sampler using the command to define the rate at which the packet sampling should be performed at the interface where NetFlow is enabled. Use the same sampler map configuration on the sub-interfaces and physical interfaces under a port.

```
Router(config)# configure
Router(config)# sampler-map fsm1
Router(config-sm)# random 1 out-of 262144
Router(config)# exit
Router(config)#commit
Router(config)#exit
Router#
```

Verify the sampler map configuration using the command.

```
Router#show sampler-map fsm1

Sampler Map : fsm1
-----
Id:          1
Mode:       Random (1 out of 262144 Pkts)
Router#
```

Step 5 Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router. You can choose to enable IPv4, IPv6, MPLS-aware NetFlow on the interface. Enable NetFlow in the ingress direction to monitor the incoming packets and enable NetFlow in the egress direction to monitor egress traffic.

Note

Consider these points before applying the sampler map:

- Remove any existing Netflow or sFlow configurations before applying a new Flow sampler on an interface using the no form of the command.
- Use the same sampler map configuration on the sub-interfaces and physical interfaces under a port.

```
Router#configure
Router(config)#interface HundredGigE 0/0/0/24
Router(config-if)#flow ipv6 monitor fmm-ipv6 sampler fsm1 ingress
Router(config-if)#commit
Router(config-if)#root
Router(config)#exit
```

Step 6 View the running configuration to verify the configuration that you have configured.

```
Router# show run
```

```
flow exporter-map Expol
  version v9
  options interface-table
  !
  transport udp 1024
  source-address 2001:db8::3
  destination 2001:db8::2
  !
flow monitor-map fmm-ipv6
  record ipv6
  exporter Expol
  cache entries 500000
  cache timeout active 60
  cache timeout inactive 20
  !
sampler-map fsm1
  random 1 out-of 262144
  !

interface HundredGigE0/0/0/24
  shutdown
  flow ipv6 monitor fmm-ipv6 sampler fsm1 ingress
  !
end
```

Step 7 Verify the flows captured using the command.

In the following example, you can verify the amount of flows added and exported.

```
Router#show flow monitor fmm-ipv6 cache summary location 0/0/CPU0
Cache summary for Flow Monitor monitor1:
Cache size: 1000000
Current entries: 295
Flows added: 184409
Flows not added: 0
Ager Polls: 9824
- Active timeout 183855
- Inactive timeout 259
- Immediate 0
- TCP FIN flag 0
- Emergency aged 0
- Counter wrap aged 0
- Total 184114
Periodic export:
- Counter wrap 0
- TCP FIN flag 0
Flows exported 184114
```

This verifies that the data is successfully exported to the collector.

What to do next

You can now analyse the exported data using a NetFlowAnalyser.

Configure MPLS-Aware NetFlow

Let's consider this topology where the PE1 router is configured with MPLS NetFlow, while the traffic flow is from Traffic Generator 2 to Traffic Generator 1.

Procedure

Step 1 Create a Flow Monitor using the command to define the type of traffic to be monitored.

```
Router#configure
Router(config)# fmm-mpls-ipv4-ipv6
Router(config-fmm)# record mpls ipv6-fields labels 3
Router(config-fmm)# cache entries 500000
Router(config-fmm)# cache timeout active 60
Router(config-fmm)# cache timeout inactive 20
Router(config-fmm)# commit
Router(config-fmm)# root
Router(config)#exit
```

Verify the Flow Monitor configuration using the command.

```
Router#show flow monitor-map fmm-ipv6
```

```
Flow Monitor Map : fmm-ipv6
```

```
-----
Id:                1
RecordMapName:     ipv6
ExportMapName:     Expol
CacheAgingMode:    Normal
CacheMaxEntries:   500000
CacheActiveTout:   60 seconds
CacheInactiveTout: 20 seconds
CacheUpdateTout:   N/A
CacheRateLimit:    2000
HwCacheExists:     False
HwCacheInactTout: 50
```

Step 2 Configure a Flow Sampler using the command to define the rate at which the packet sampling should be performed at the interface where NetFlow is enabled. Use the same sampler map configuration on the sub-interfaces and physical interfaces under a port.

```
Router(config)# configure
Router(config)# sampler-map fsm1
Router(config-sm)# random 1 out-of 262144
Router(config)# exit
Router(config)#commit
Router(config)#exit
Router#
```

Verify the sampler map configuration using the command.

```
Router#show sampler-map fsm1
```

```
Sampler Map : fsm1
```

```
-----
Id:                1
Mode:              Random (1 out of 262144 Pkts)
Router#
```

Step 3 Apply a Flow Monitor Map and a Flow Sampler to a physical interface using the command to enable NetFlow on the router.

```
Router#configure
Router(config)#interface HundredGigE 0/0/0/24
Router(config-if)#flow mpls monitor fmm-mpls-ipv4-ipv6 sampler fsm1 ingress
Router(config-if)#commit
Router(config-if)#root
Router(config)#exit
```

Step 4 Verify the OutputInterface value is 0 in last two rows for captured ingress netflow records on PW-tail end node; the command is executed on the PE1 router:

```
Router#show flow monitor fmm-mpls-ipv4-ipv6 cache location 0/0/cPU0
Cache summary for Flow Monitor fmm-mpls-ipv4-ipv6:
Cache size:                10000
Current entries:           20
Flows added:               20
Flows not added:          0
Ager Polls:               77
- Active timeout           0
- Inactive timeout        0
- TCP FIN flag             0
- Emergency aged          0
- Counter wrap aged       0
- Total                   0
Periodic export:
- Counter wrap            0
- TCP FIN flag            0
Flows exported             0
```

LabelType	Prefix/Length	Label1-EXP-S	Label2-EXP-S	Label3-EXP-S	Label4-EXP-S
Label5-EXP-S	Label6-EXP-S	InputInterface	OutputInterface	ForwardStatus	FirstSwitched
LastSwitched	ByteCount	PacketCount	Dir	SamplerID	InputVRFID
Unknown	0.0.0.0/0	0-0-0	16001-0-1	-	-
-	-	AT0/1/1/2.1	Gi0/0/0/0	Fwd	00 00:50:37:458
00 00:50:48:947	69078	1047	Egr 3	default	default
Unknown	0.0.0.0/0	0-0-0	16057-0-1	-	-
-	-	AT0/1/1/2.58	Gi0/0/0/0	Fwd	00 00:50:37:464
00 00:50:48:953	69078	1047	Egr 3	default	default
Unknown	0.0.0.0/0	0-0-0	16059-0-1	-	-
-	-	AT0/1/1/2.6	Gi0/0/0/0	Fwd	00 00:50:37:459
00 00:50:48:947	69078	1047	Egr 3	default	default
Unknown	0.0.0.0/0	0-0-0	16022-0-1	-	-
-	-	AT0/1/1/2.26	Gi0/0/0/0	Fwd	00 00:50:42:339
00 00:50:48:950	39336	596	Egr 3	default	default
Unknown	0.0.0.0/0	0-0-0	16041-0-1	-	-
-	-	Gi0/0/0/0	0	Fwd	00 00:50:42:340
00 00:50:48:951	39336	596	Ing 1	default	0
Unknown	0.0.0.0/0	0-0-0	16023-0-1	-	-
-	-	Gi0/0/0/0	0	Fwd	00 00:50:42:339
00 00:50:48:950	39336	596	Ing 1	default	

This verifies that the data is successfully exported to the collector.

What to do next

You can now analyse the exported data using a NetFlowAnalyser.

Modify NetFlow Configuration

You can modify only the following flow attributes that is already applied to an interface for a monitor map, exporter map, or a sampler map.

Note that when you modify the flow attributes, the cache counters are cleared and results in resetting of the counters. As a result there could be flow accounting mismatch.

Table 25: Flow Entities and Flow Attributes that can be altered

Flow Entity	Flow Attribute	Command
Monitor map	cache timeout	
	<ul style="list-style-type: none"> • active • inactive • update • rate-limit 	
	exporter	
	cache entries	
	cache permanent	
	options outphysint bgstrings	
Exporter Map	source <source interface>	
	destination <destinaiton address>	
	dscp <dscp_value>	
	version v9 ipfix	
Sampler Map	sampling interval	

IPFIX (NetFlow Version 10)

Internet Protocol Flow Information Export (IPFIX) has been standardized by the Internet Engineering Task Force (IETF) as an export protocol for transmitting NetFlow packets. Building upon NetFlow version 9, IPFIX introduces efficient flow data formatting through templates, ensuring scalability and adaptability to diverse network environments. Utilizing UDP as the transport protocol, IPFIX facilitates the seamless transfer of NetFlow information from exporters to collectors. With native support for IPv6 flow records, the inclusion of optional data fields, and the ability to send data to multiple collectors, IPFIX proves to be a versatile and powerful solution for network administrators, enabling comprehensive traffic analysis, monitoring, and enhanced visibility into network behavior.

IPFIX 315

The Internet Engineering Task Force (IETF) has standardized Internet Protocol Flow Information Export (IPFIX) as an export protocol for sending IP flow information. Router supports the IPFIX 315 format for exporting flow information. The IPFIX 315 format enables the transmission of 'n' octets of frame information starting from the Ethernet header up to the transport header of the traffic flow over the network. IPFIX 315 supports the sending of variable-sized packet records with variable payload information, such as IPv4, IPv6, MPLS, and nested packets like OuterIP-GRE-InnerIP, and more. The process involves sampling and exporting the traffic flow information. Also, along with the Ethernet frame information, the IPFIX 315 format exports the information of the incoming and outgoing interfaces of the sampled packet.

The information of the packets flowing through a device is used for a variety of purposes, including network monitoring, capacity planning, traffic management, and more.

When exporting packets, a special cache-type called Immediate Aging is used. Immediate Aging ensures that the flows are exported as soon as they are added to the cache.

Sampling and Exporting Information

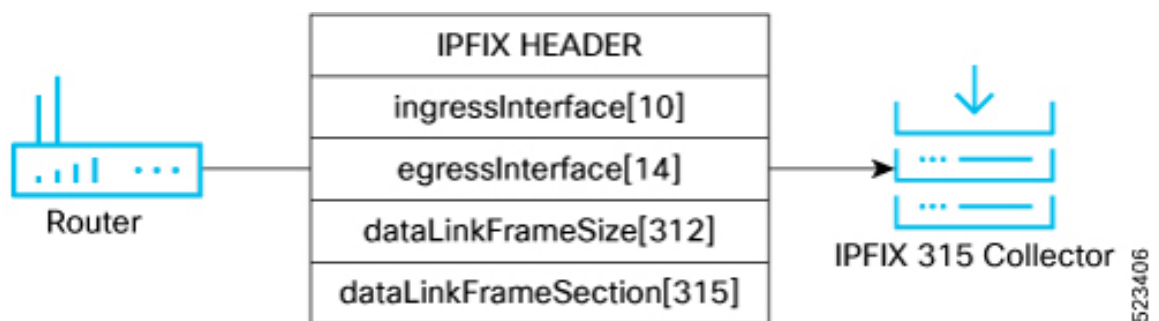
To sample the traffic flow information, configure a sampler-map that specifies the rate at which packets (one out of every 'n' packets) are sampled. Not all packets flowing through a device are exported; only the packets selected based on the sampling rate are exported.

The size of the exported packet depends on the sampled packet size and the location of the L4 header. The exported packet size is determined as follows:

- If the sampled packet size is more than 160 bytes and the L4 header is not obtained within the first 160 bytes, the exported packet size is 160 bytes.
- If the L4 header is within the first 160 bytes, the exported packet size is equal to the length of the sampled packet until the L4 header.
- If the packet size is less than 160 bytes and the L4 header isn't within the first 160 bytes, the exported packet size is equal to the length of the packet.

This figure *IPFIX 315 Export Packet Format* shows exported packet information.

Figure 6: IPFIX 315 Export Packet Format



NetFlow v9 and NetFlow v10 (IPFIX)

This section helps you understand the NetFlow v9 and NetFlow v10 (IPFIX) based on the following factors:

Table 26: NetFlow v9 and NetFlow v10 (IPFIX)

Factor	NetFlow v9	NetFlow v10 (IPFIX)
Transport	Typically uses UDP	Supports both UDP and TCP transport protocols
Compatibility	Compatible with older NetFlow versions	Backward-compatible with NetFlow v9
Flexibility	Fixed set of predefined fields	More flexible with variable-length information elements and custom-defined attribute
Information Elements	Limited set of predefined fields	Extensive list of predefined elements

Configure IPFIX

Let's consider the following topology to configure IPFIX:

To monitor traffic, you must configure one or more and associate it to a and enable IPFIX on the interface either in egress or ingress direction. Optionally, you can configure a to set the sampling rate for flow samples.

Procedure

Step 1 First, let's gather the required details to enable IPFIX on a router:

- The IP address of the source : 2001:db8::0001
- The IP address of the IPFIX Collector (Destination address): 2001:db8::0002
- Interface of the router where we will enable IPFIX: HundredGigE 0/0/0/24
- NetFlow version used to transport the data to the collector: IPFIX

Step 2 Configure a Flow Exporter using the command to specify where and how the packets should be exported.

```
Router(config)# flow exporter-map fem_ipfix
Router(config-fem)# destination 2001:db8::0002
Router(config-fem)# source Loopback 0
Router(config-fem)# transport udp 9001
Router(config-fem)# exit
Router(config-fem)# version ipfix
Router(config-fem-ipfix)# template data timeout 600
Router(config-fem-ipfix)# options interface-table
Router(config-fem-ipfix)# exit
```

Verify the Flow Exporter configuration using the command.

```
Router#show exporter-map fem_ipfix
Flow Exporter Map : fem_ipfix
-----
Id                : 1
Packet-Length     : 1468
DestinationIpAddr : 2001:db8::2
```

```

VRFName          : default
SourceIfName     :
SourceIpAddr     : 2001:db8::3
DSCP             : 0
TransportProtocol : UDP
TransportDestPort : 1024
Do Not Fragment  : Not Enabled

```

```

Export Version: IPFIX
  Common Template Timeout : 1800 seconds
  Options Template Timeout : 1800 seconds
  Data Template Timeout : 1800 seconds
  Interface-Table Export Timeout : 1800 seconds
  Sampler-Table Export Timeout : 0 seconds
  VRF-Table Export Timeout : 0 seconds

```

Step 3 Create a Flow Monitor using the command to define the type of traffic to be monitored. You can include one or more exporter maps in the monitor map. A single flow monitor map can support up to eight exporters.

The record type specifies the type of packets that are sampled as the packets pass through the router. MPLS, IPv4, and IPv6 packet sampling is supported.

```

Router(config)# flow monitor-map fmm1
Router(config-fmm)# record ipv6
Router(config-fmm)# option filtered
Router(config-fmm)# exporter fem_ipfix
Router(config-fmm)# cache entries 65535
Router(config-fmm)# cache timeout active 1800
Router(config-fmm)# cache timeout inactive 15
Router(config-fmm)# exit

```

Verify the Flow Monitor configuration using the command.

```
Router#show flow monitor-map fmm1
```

```
Flow Monitor Map : fmm1
```

```

-----
Id:                1
RecordMapName:    ipv6
ExportMapName:    Exp01
CacheAgingMode:   Normal
CacheMaxEntries:  500000
CacheActiveTout:  60 seconds
CacheInactiveTout: 20 seconds
CacheUpdateTout:  N/A
CacheRateLimit:   2000
HwCacheExists:    False
HwCacheInactTout: 50

```

Step 4 Configure a Flow Sampler using the command. Use the same sampler map configuration on the sub-interfaces and physical interfaces under a port.

```

Router(config)# configure
Router(config)# sampler-map fsm1
Router(config-sm)# random 1 out-of 4000
Router(config)# exit
Router(config)#commit
Router(config)#exit
Router#

```

Verify the sampler map configuration using the command.

```
Router#show sampler-map fsm1
```

```

Sampler Map : fsm1
-----
Id:      1
Mode:    Random (1 out of 4000 Pkts)
Router#

```

Step 5 View the running configuration to verify the configuration that you have configured.

```

Router#show run
Thu Nov  9 06:40:07.296 UTC
Building configuration...

flow exporter-map fem_ipfix
  version ipfix
  options interface-table
  template data timeout 600
  !
  transport udp 9001
  source Loopback0
  destination 2001:db8::2
  !
flow monitor-map fmm1
  record ipv6
  option filtered
  exporter fem_ipfix
  cache entries 65535
  cache timeout active 1800
  cache timeout inactive 1
  !
sampler-map fsm1
  random 1 out-of 4000
  !
interface FourHundredGigE0/0/0/1
  shutdown
  !
interface HundredGigE0/0/0/24
  shutdown
  flow ipv4 monitor fmm1 sampler fsm1 ingress
  flow ipv6 monitor fmm-ipv6 sampler fsm1 ingress
  !
end

```

Step 6 Apply a Monitor Map and a Sampler Map to a physical interface using the command to enable IPFIX on the router.

```

Router(config)#interface HundredGigE 0/0/0/24
Router(config-if)#flow ipv4 monitor fmm1 sampler fsm1 ingress
Router(config-if)#exit

```

Configure IPFIX 315

This section provides you instructions to enable IPFIX 315 on Cisco IOS XR Software.

Procedure

Step 1 Enable IPFIX 315 for flow monitoring.

```
Router(config)# hw-module profile netflow ipfix315-enable
```

Step 2 Configure an exporter map with IPFIX as the exporter version using the [flow exporter-map](#) command in global configuration mode to specify where and how the packets should be exported.

```
Router(config)# flow exporter-map ipfix_exp
Router(config-fem)# version ipfix
Router(config-fem-ipfix)# template data timeout 10
Router(config-fem)# dscp 63
Router(config-fem)# transport udp 12000
Router(config-fem)# source Loopback 0
Router(config-fem)# destination 100.10.1.159
Router(config-fem)# exit
```

Step 3 Create a flow monitor using the [flow monitor-map](#) command in global configuration mode to define the type of traffic to be monitored. You can include one or more exporter maps in the monitor map.

```
Router(config)# flow monitor-map ipfix_mon
Router(config-fmm)# record datalinksectiondump
Router(config-fmm)# exporter ipfix_exp
Router(config-fmm)# cache immediate
Router(config-fmm)# exit
```

Step 4 Configure a sampler map using the [sampler-map](#) command to define the rate at which the packet sampling should be performed at the interface where IPFIX is enabled.

```
Router# sampler-map ipfix_sm
Router(config-sm)# random 1 out-of 32000
Router(config)# exit
```

Step 5 Apply a monitor map and a Sampler Map to a physical interface using the [flow](#) command to enable IPFIX on the router.

```
Router(config)#interface 10GE0/0/0/5
Router(config-if)#ipv4 address 192.1.108.2 255.255.255.0
Router(config-if)#ipv6 address 1:108::2/64
Router(config-if)#flow datalinkframesection monitor ipfix_mon sampler ipfix_sm ingress
Router(config-if)#encapsulation dot1q 139
```

Step 6 Verify the sampled and exported flow statistics using the [show flow platform producer statistics location](#) command.

In this show output, you can see that the system has actively received and monitored a total of 630,478 IPFIX 315 packets.

```
Router#show flow platform producer statistics location 0/0/0/5
Netflow Platform Producer Counters:
IPv4 Ingress Packets: 0
IPv4 Egress Packets: 0
IPv6 Ingress Packets: 0
IPv6 Egress Packets: 0
MPLS Ingress Packets: 0
MPLS Egress Packets: 0
IPFIX315 Ingress Packets: 630478
IPFIX315 Egress Packets: 0
Drops (no space): 0
Drops (other): 0
Unknown Ingress Packets: 0
```

```
Unknown Egress Packets: 0
Worker waiting: 2443
```

Step 7 Verify the flow monitor stats statistics using the `show flow monitor cache location` command.

This example shows that there were 50399 flows added to the cache and exported.

```
Router#show flow monitor ipfix_mon cache location 0/0/0/5
Cache summary for Flow Monitor ipfix_mon:
Cache size: 65535
Current entries: 0
Flows added: 50399
Flows not added: 0
Ager Polls: 2784
- Active timeout 0
- Inactive timeout 0
- Immediate 50399
- TCP FIN flag 0
- Emergency aged 0
- Counter wrap aged 0
- Total 50399
Periodic export:
- Counter wrap 0
- TCP FIN flag 0
Flows exported 50399
Matching entries: 0
```

Flow Filter

NetFlow offers detailed traffic statistics per flow within a router. The router collects NetFlow statistics for all flows in a cache and sends them to an external *Testing the Var tags* device for further analysis. However, there might be instances where you specifically wish to **testing the UI control tag** gather NetFlow data for a selected subset of flows. Flow filter uses ACL *testing the codeph tag* bits to filter NetFlow data and then the data is sent to the collector for further analysis.

In cases where both a security ACL and a **testing the cmd name tag** Netflow filtering ACL are configured on an interface, the security ACL takes precedence over the Netflow filtering ACL. You can apply flow filter on interfaces in *testing the varname* ingress or egress directions.

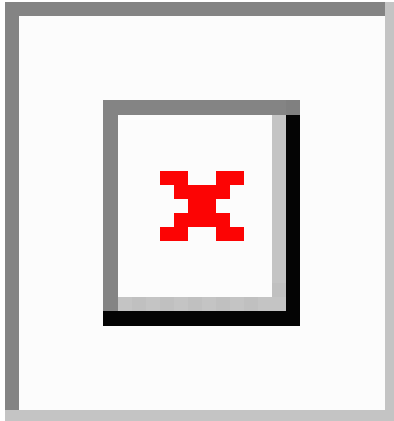
Supported Features and Limitations for Flow Filter

- NetFlow v9 and **testing the menucascade tag** > IPFIX export formats.
- Yang data model for *testing the cite tag* dynamic provisioning.
- Flow filter is supported only on the Cisco **testing the synph kwd** ASR 9000 Third Generation High Density Ethernet LCs.
- testing the **testing the bold tag** test testing

Configure Flow Filter

Let's consider a topology where Service Provider cloud is connected to a Provider Edge through gigabit ethernet interface.

Figure 7: Flow Filter Configuration



Procedure

Step 1 First, let's gather the required details to enable Flow Filter on a router:

- The IP address of the source : 192.168.1.1/24
- The IP address of the flow filter Collector (Destination address): 2001:db8::0002
- IPv4 ACL name: nf_ex

Step 2 Configure ACLs to capture specific traffic like using `flow exporter-map` commands, sets rules for capturing specific traffic.

```
Router# configure
Router(config)# ipv4 access-list nf_ex
Router(config)# 10 permit ipv4 192.168.1.1/24 any capture
```

Step 3 Create a Flow Monitor and exporter map using the `and` command respectively, to define the type of traffic to be monitored and exported.

The flow monitor-map configures NetFlow to capture IPv4 traffic with selective filtering, exporting it using the **fem1** exporter.

```
Router(config)# flow monitor-map fmm1
Router(config-fmm)# record ipv4
Router(config-fmm)# option filtered
Router(config-fmm)# exporter fem1
Router(config-fmm)# cache entries 10000
Router(config-fmm)# cache timeout active 1800
Router(config-fmm)# cache timeout inactive 15
Router(config-fmm)# exit
```

Step 4 Configure a Flow Sampler using the `command`. Use the same sampler map configuration on the sub-interfaces and physical interfaces under a port.

```
Router(config)# configure
Router(config)# sampler-map fsm1
```

```
Router(config-sm)# random 1 out-of 65535
Router(config)# exit
Router#
```

Step 5 Configure a Flow Exporter using the command to specify where and how the packets should be exported.

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

Step 6 Apply the NetFlow settings to the interface. .

```
Router(config)# interface HundredGigE 0/0/0/24
Router(config-if)# flow ipv4 monitor fmml sampler fsm1 ingress
Router(config-if)# exit
```

Step 7 Verify the flow monitor map settings on the provider edge router.

```
Router# show flow monitor fmml location 0/0/CPU0
```

```
Flow Monitor :          fmml
-----
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
```

This validates the successful application of the flow filter configuration.

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 neighborhood 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.

DBA is supported on ASR9000 Gigabit Ethernet and ASR9000 Enhanced Gigabit Ethernet linecards.

The following parameters are collected and exported to destination:

- Destination peer AS number
- BGP next-hop IP address
- Ingress interface
- Egress interface
- Forwarding status
- Incoming IPv4 TOS
- Counter of packets in the flow
- Counter of bytes in the flow
- Timestamp for the first and last packets in the flow
- Counter of packets in the flow (64 bits)
- Counter of bytes in the flow (64 bits)
- Timestamp for the first and last packet in the flow. This is the timestamp when the flow is reported from hardware to the NetFlow server.

Supported features

Destination-based NetFlow accounting supports the following features.

- IPv4 and IPv6 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)
- Normal and permanent cache type (active and inactive timeout aged flow records)

Limitations

The following are the limitations for Destination-based NetFlow accounting.

- MPLS IPv4 and IPv6
- Configuration for individual Modular QoS Command-Line Interface (MQC) classes
- Simultaneous configuration of destination-based NetFlow accounting with IPv4 and IPv6 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).
- Immediate cache type

Configuring Destination-based NetFlow Accounting

To track and record traffic according to its destination using destination-based NetFlow accounting, you must configure a Flow Monitor and enable NetFlow on the interface.

Procedure

Step 1 Create a Flow Monitor using the command to define the type of traffic to be monitored.

The record type specifies the type of packets that are sampled as the packets pass through the router. For enabling Destination based NetFlow accounting, use the record type.

```
Router#configure
Router(config)# flow monitor-map fmm-ipv4
Router(config-fmm)# record ipv4 destination-tos
Router(config-fmm)# exit
```

Step 2 Apply a Flow Monitor Map to a physical interface using the command to enable NetFlow on the router.

```
Router#configure
Router(config)#interface POS 0/1/0/0
Router(config-if)#flow ipv4 monitor fmm-ipv4 ingress
Router(config-if)#commit
Router(config-if)#root
Router(config)#exit
```

Step 3 View the running configuration to verify the configuration that you have configured.

```
Router# show run

flow monitor-map fmm-ipv4
  record ipv4 destination-tos
!
interface preconfigure POS0/1/0/0
  flow ipv4 monitor fmm-ipv4 ingress
!
end
```

Step 4 Verify the Flow Monitor configuration using the command.

```
Router#show flow monitor-map fmm-ipv4

Flow Monitor Map : fmm-ipv4
-----
Id:                1
RecordMapName:    ipv4-destination-tos
CacheAgingMode:   Normal
CacheMaxEntries:  65535
CacheActiveTout:  1800 seconds
```

```
CacheInactiveTout: 15 seconds
CacheUpdateTout:   N/A
CacheRateLimit:    2000
HwCacheExists:     False
HwCacheInactTout: 50
RP/0/RSP0/CPU0:ios#
```



CHAPTER 5

rendering-test-wrapper

- [my-topic-33](#), on page 79

my-topic-33

NetFlow serves as a network monitoring protocol that facilitates the logging of metadata for each flow that traverses the router, both entering or leaving it. This protocol provides comprehensive insights into network flows, including details such as source and destination IP addresses, ports, and packet counts. It's commonly applied for traffic analysis, capacity planning, and network troubleshooting.

NetFlow creates flow records by monitoring network traffic passing through the router. As a packet stream traverses a router interface, the packets are collected and an internal header is appended. These packets are dispatched to the line card's CPU, which generate [Interface Table, on page 31](#) a flow record. The router extracts pertinent header details from the packets and creates cache entries. The packets are subject to a policer, which helps protect the internal control plane. With each subsequent arrival of a packet from the same flow, the cache entry is updated. Flow records persist within the line card's cache until they age out due to timer expiration.



APPENDIX **A**

Glossary

Attendant

A person to whom the Cisco Unified MeetingPlace Express system administrator has given privileges to reschedule all meetings and end all meetings via the Meeting Details web page. Attendants can perform limited system administrator tasks, such as viewing alarms and reports, in the Administration Center.

audience

One of three permission levels in a web meeting room. A person who has audience privileges has limited permissions during a meeting. In the full meeting room, audience members can also view shared content, chat messages, and notes, and send chat messages. Moderators and presenters can restrict audience chat messages.

No participant has this permission level by default. However, moderators can demote participants to this permission level during a meeting to restrict the activity of those participants.

Billing Code

The code your company or department uses if it performs bill-backs.

