



# Configuring VXLAN-Aware Flexible Netflow

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## Restrictions for VXLAN-Aware Flexible NetFlow

Traffic capture using VXLAN-aware Flexible NetFlow is limited to unicast traffic.

## Information About VXLAN-Aware Flexible NetFlow

Flexible NetFlow (FNF) uses flows to provide statistics for accounting, network monitoring, and network planning. VXLAN-aware FNF provides information about the VXLAN-encapsulated IPV4 and IPV6 packets in the network. VXLAN-aware FNF captures the VXLAN flow information for both bridged and routed traffic.

A flow is a unidirectional stream of packets that arrives on a source interface and has the same values for the keys. A key is an identified value for a field within the packet. You create a flow using a flow record to define the unique keys for your flow. FNF allows you to define an optimal flow record for a particular application by selecting the keys from a large collection of predefined fields. All key values must match for the packet to count in a given flow. Flows are stored in the FNF cache. You can export the data FNF gathers for your flow by using an exporter.

In a BGP EVPN VXLAN fabric, an FNF monitor is configured on the NVE interface on a VTEP and on the physical interface on a spine switch. For more information about FNF, see *Configuring Flexible NetFlow* module of the *Network Management Configuration Guide*.

## How to Configure VXLAN-Aware Flexible NetFlow

To configure VXLAN-aware FNF, perform these steps:

1. Create a flow record by specifying key fields and non-key fields to the flow.
2. Create a flow exporter by specifying the export protocol and transport destination port, source, and other parameters.

3. Create a flow monitor based on the flow record and flow exporter.
4. Apply the flow monitor to the network virtualization edge (NVE) interface on the VTEPs.



**Note** The commands listed in this section are applicable only to VXLAN-aware FNF. For detailed steps to configure FNF, see *How to Configure Flexible Netflow* section in the *Configuring Flexible NetFlow* module of the *Network Management Configuration Guide*.

## Configuring a Flow Record

To configure a flow record for VXLAN-aware FNF, perform the following steps:



**Note** All the **match** commands listed in this configuration task are mandatory.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>flow record</b> <i>flow-record-name</i> <b>Example:</b> Device(config)# <b>flow record</b> <b>vxlan_nf_record_input</b>	Creates a flow record and enters flow record configuration mode. This command also allows you to modify an existing flow record. <b>Note</b> We recommend that you configure a unique flow record for each address family (IPv4 and IPv6) and also for each traffic direction (input and output). Ensure that the flow record for ingress traffic has the <b>match</b> commands configured with the <b>input</b> keyword. Ensure that the flow record for egress traffic has the <b>match</b> commands configured with the <b>output</b> keyword.

	Command or Action	Purpose
<b>Step 4</b>	<b>match datalink vlan {input   output}</b> <b>Example:</b> Device(config-flow-record)# <b>match datalink vlan output</b>	Configures the VLAN ID (for input or output traffic) as a key field for the FNF flow record.  <b>Note</b> Ensure that you configure the <b>vlan input</b> and <b>vlan output</b> fields. These fields are required for VXLAN-aware FNF to work on EVPN input and output traffic flows.
<b>Step 5</b>	<b>match routing vrf input</b> <b>Example:</b> Device(config-flow-record)# <b>match routing vrf input</b>	Configures the VRF ID (for input or output traffic) as a key field for the FNF flow record.  <b>Note</b> Ensure that you configure the <b>vrf input</b> field. This field is required for VXLAN-aware FNF to work on EVPN input and output traffic flows.
<b>Step 6</b>	<b>match vxlan vtep {input   output}</b> <b>Example:</b> Device(config-flow-record)# <b>match vxlan vtep output</b>	Configures the VTEP ID as a key field for the FNF flow record.  The <b>input</b> keyword shows the VTEP source IP address in the captured flow.  The <b>output</b> keyword shows the VTEP destination IP address in the captured flow
<b>Step 7</b>	<b>match vxlan vnid</b> <b>Example:</b> Device(config-flow-record)# <b>match vxlan vnid</b>	Configures the VXLAN VNI ID as a key field for the FNF flow record.
<b>Step 8</b>	<b>end</b> <b>Example:</b> Device(config-flow-record)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring Flow Exporter

To configure flow exporter for VXLAN-aware FNF, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode.  Enter your password, if prompted.

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>flow exporter</b> <i>flow-exporter-name</i> <b>Example:</b> Device(config)# <b>flow exporter e1</b>	Creates a flow exporter and enters flow exporter configuration mode.
<b>Step 4</b>	<b>destination</b> <i>ipv4-address</i> <b>Example:</b> Device(config-flow-exporter)# <b>destination 172.16.103.2</b>	Sets the IPv4 destination address or hostname for the exporter.
<b>Step 5</b>	<b>source</b> <i>interface-type interface-number</i> <b>Example:</b> Device(config-flow-exporter)# <b>source TenGigabitEthernet1/5/0/3</b>	Specifies the interface to use to reach the NetFlow collector at the configured destination. Ensure that the source IP address is unique per fabric. <b>Note</b> We recommend that you configure a unique Loopback on each VTEP. <b>Note</b> Flow exporter does not support unnumbered IP interface as source interface.
<b>Step 6</b>	<b>ttl</b> <i>seconds</i> <b>Example:</b> Device(config-flow-exporter)# <b>ttl 4</b>	Configures the time-to-live (TTL) value for datagrams sent by the exporter. The range is from 1 to 255 seconds. The default is 255.
<b>Step 7</b>	<b>transport udp</b> <i>port-number</i> <b>Example:</b> Device(config-flow-exporter)# <b>transport udp 2055</b>	Specifies the UDP port to use to reach the NetFlow collector.
<b>Step 8</b>	<b>export-protocol</b> { <b>ipfix</b>   <b>netflow-v9</b> } <b>Example:</b> Device(config-flow-exporter)# <b>export-protocol ipfix</b>	Specifies the version of the NetFlow export protocol used by the exporter.
<b>Step 9</b>	<b>end</b> <b>Example:</b> Device(config-flow-exporter)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring a Flow Monitor

To configure a flow monitor for VXLAN-aware FNF, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>flow monitor</b> <i>flow-monitor-name</i> <b>Example:</b> Device(config)# <b>flow monitor</b> <b>vxlان_nf_monitor_input</b>	Creates a flow monitor and enters flow monitor configuration mode. This command also allows you to modify an existing flow monitor.
<b>Step 4</b>	<b>exporter</b> <i>flow-exporter-name</i> <b>Example:</b> Device(config-flow-monitor)# <b>exporter e1</b>	Specifies the name of the flow exporter that was created previously and associates it with the specified flow monitor.
<b>Step 5</b>	<b>record</b> <i>flow-record-name</i> <b>Example:</b> Device(config-flow-monitor)# <b>record</b> <b>vxlان_nf_record_input</b>	Specifies the record for the flow monitor.
<b>Step 6</b>	<b>end</b> <b>Example:</b> Device(config-flow-monitor)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring Flexible NetFlow on an NVE Interface

To configure VXLAN-aware FNF on the NVE interface of a VTEP, perform the following steps:

### Procedure

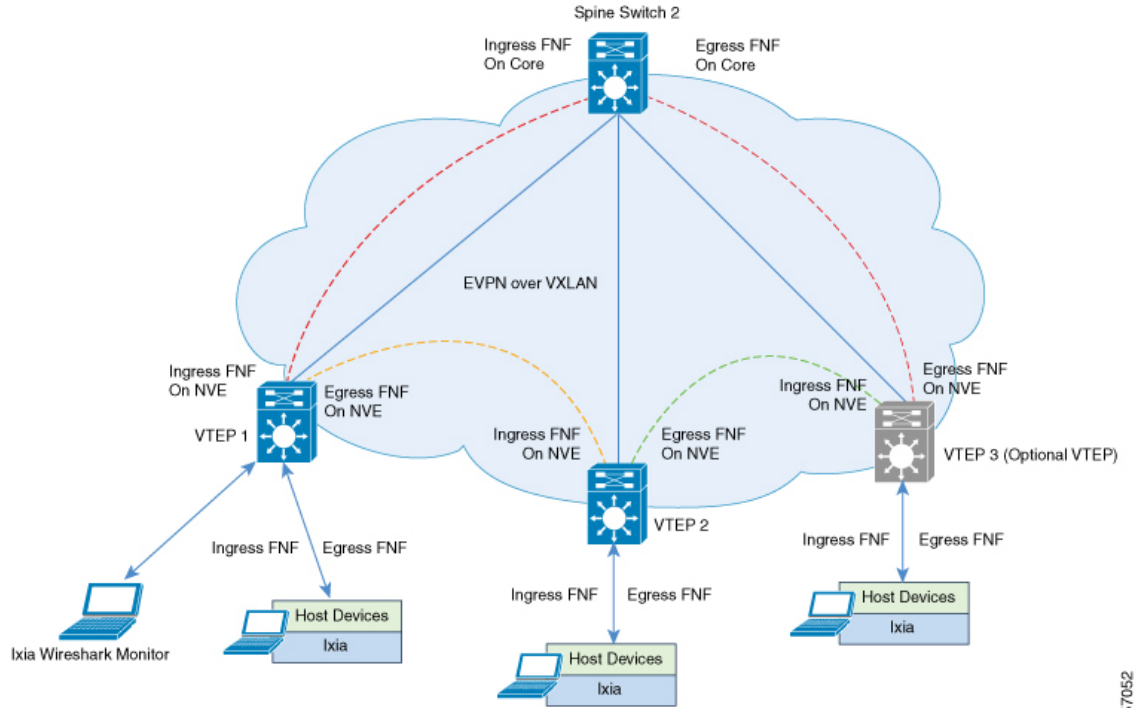
	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <code>configure terminal</code>	Enters global configuration mode.
<b>Step 3</b>	<b>interface <i>nve-interface-number</i></b> <b>Example:</b> Device(config)# <code>interface nve1</code>	Specifies the network virtualization edge (NVE) interface number and enters interface configuration mode.
<b>Step 4</b>	<b>ip flow monitor <i>flow-monitor-name</i> {input   output}</b> <b>Example:</b> Device(config-if)# <code>ip flow monitor vxlan_nf_monitor_input input</code>	Associates the IPv4 flow monitor to the NVE interface for input or output packets.
<b>Step 5</b>	<b>ipv6 flow monitor <i>flow-monitor-name</i> {input   output}</b> <b>Example:</b> Device(config-if)# <code>ipv6 flow monitor vxlan_nf_v6monitor_input input</code>	Associates the IPv6 flow monitor to the NVE interface for input or output packets.
<b>Step 6</b>	<b>end</b> <b>Example:</b> Device(config-if)# <code>end</code>	Returns to privileged EXEC mode.

## Configuration Examples for VXLAN-Aware Flexible NetFlow

This section provides configuration examples for VXLAN-aware FNF using the following topology:

Figure 1: EVPN VXLAN Topology with VXLAN-Aware Flexible NetFlow



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### Configuring VTEP 1 to enable VXLAN-Aware Flexible NetFlow

The following table provides a sample configuration for VTEP 1 to enable VXLAN-aware FNF:

**Table 1: Configuring VTEP 1 to enable VXLAN-Aware Flexible NetFlow**

VTEP 1
<pre>Leaf-01# show running-config  &lt;snip: only config relevant to vxlan netflow is shown&gt; flow record vxlan_nf_record_input  match datalink vlan input  match datalink mac source address input  match datalink mac destination address input  match routing vrf input  match ipv4 ttl  match ipv4 protocol  match ipv4 source address  match ipv4 destination address  match transport source-port  match transport destination-port  match transport icmp ipv4 type  match transport icmp ipv4 code  match transport igmp type  match interface input  match flow direction  match vxlan vnid  match vxlan vtep input  match vxlan vtep output  collect counter bytes long  collect counter packets long  collect timestamp absolute first  collect timestamp absolute last ! flow record vxlan_nf_record_output  match datalink mac destination address output  match ipv4 protocol  match ipv4 source address  match ipv4 destination address  match transport source-port  match transport destination-port  match datalink vlan output  match vxlan vnid  match vxlan vtep input  match vxlan vtep output  collect counter bytes long  collect counter packets long  collect timestamp absolute first  collect timestamp absolute last !</pre>



**VTEP 1**

```
flow record vxlan_nf_v6record_input
 match datalink vlan input
 match routing vrf input
 match ipv6 protocol
 match ipv6 source address
 match ipv6 destination address
 match transport source-port
 match transport destination-port
 match vxlan vnid
 match vxlan vtep input
 match vxlan vtep output
 collect counter bytes long
 collect counter packets long
 collect timestamp absolute first
 collect timestamp absolute last
!
flow record vxlan_nf_v6record_output
 match datalink vlan output
 match ipv6 protocol
 match ipv6 source address
 match ipv6 destination address
 match transport source-port
 match transport destination-port
 match vxlan vnid
 match vxlan vtep input
 match vxlan vtep output
 collect counter bytes long
 collect counter packets long
 collect timestamp absolute first
 collect timestamp absolute last
!
flow exporter e1
 destination 172.16.103.2
 source TenGigabitEthernet1/5/0/3
 ttl 4
 transport udp 2055
 export-protocol ipfix
!
flow monitor vxlan_nf_monitor_input
 exporter e1
 cache timeout inactive 100
 cache timeout active 100
 record vxlan_nf_record_input
!
!
flow monitor vxlan_nf_monitor_output
 exporter e1
 cache timeout inactive 100
 cache timeout active 100
 record vxlan_nf_record_output
!
!
flow monitor vxlan_nf_v6monitor_input
 exporter e1
 cache timeout inactive 100
 cache timeout active 100
 record vxlan_nf_v6record_input
!
!
```

```

VTEP 1

flow monitor vxlan_nf_v6monitor_output
  exporter e1
  cache timeout inactive 100
  cache timeout active 100
  record vxlan_nf_v6record_output
!
interface nve1
 ip flow monitor vxlan_nf_monitor_input input
 ip flow monitor vxlan_nf_monitor_output output
 ipv6 flow monitor vxlan_nf_v6monitor_input input
 ipv6 flow monitor vxlan_nf_v6monitor_output output
!
Leaf-01#
    
```

### Checking IPv4 Input Flow Monitor Cache Output

The following example provides a sample output to check the IPv4 input flow monitor cache output on VTEP 1:

```

Leaf-01# configure terminal
Leaf-01(config)# show flow monitor vxlan_nf_monitor_input cache format table

Cache type:                          Normal (Platform cache)
Cache size:                           10000
Current entries:                       4

Flows added:                          8
Flows aged:                            4
- Inactive timeout ( 100 secs)        4

```

DATALINK	VLAN	INPUT	DATALINK	MAC	SRC	ADDR	INPUT	DATALINK	MAC	DST	ADDR	INPUT	IP	VRF	ID
INPUT			IPV4	SRC	ADDR	IPV4	DST	ADDR	TRNS	SRC	PORT	TRNS	DST	PORT	ICMP
IPV4	TYPE	ICMP	IPV4	CODE	IGMP	TYPE	INTF	INPUT	FLOW	DIRN	VXLAN	VXLAN	VNID		
	VXLAN	VXLAN	VTEP	INPUT	VXLAN	VXLAN	VTEP	OUTPUT	IP	PROT	IP	TTL		bytes	long
	pkts	long	time	abs	first	time	abs	last							
13	AAAA.CCCC.1003								AAAA.BBBB.1003					3	
(13vni5001)	192.168.13.3		192.168.13.2							0			0		
0	0	0	Null						Input				10013		
2.2.2.2	1.1.1.1								61	64			43517376		
43172	14:00:41.391		14:01:34.391												
11	AAAA.CCCC.1001								AAAA.BBBB.1001				2		
(13vni5000)	192.168.11.3		192.168.11.2							0			0		
0	0	0	Null						Input				10011		
2.2.2.2	1.1.1.1								61	64			43517376		
43172	14:00:41.391		14:01:34.391												
10	AAAA.CCCC.1002								AAAA.BBBB.1002				2		
(13vni5000)	192.168.10.3		192.168.10.2							0			0		
0	0	0	Null						Input				10010		
2.2.2.2	1.1.1.1								61	64			43517376		
43172	14:00:41.391		14:01:34.391												

```

12 AAAA.CCCC.1004 AAAA.BBBB.1004 3
(13vni5001) 192.168.12.3 192.168.12.2 0 0
0 0 0 Null Input 10012
2.2.2.2 1.1.1.1 61 64 43517376
43172 14:00:41.391 14:01:34.391

Leaf-01#

```

### Checking IPv4 Output Flow Monitor Cache Output

The following example provides a sample output to check the IPv4 output flow monitor cache output on VTEP 1:

```

Leaf-01# configure terminal
Leaf-01(config)# show flow monitor vxlan_nf_monitor_output cache format table

Cache type: Normal (Platform cache)

Cache size: 10000

Current entries: 4

Flows added: 8

Flows aged: 4

- Inactive timeout ( 100 secs) 4

DATALINK MAC DST ADDR OUTPUT IPV4 SRC ADDR IPV4 DST ADDR TRNS SRC PORT TRNS DST
PORT DATALINK VLAN OUTPUT VXLAN VXLAN VNID VXLAN VXLAN VTEP INPUT VXLAN VXLAN VTEP
OUTPUT IP PROT bytes long pkts long time abs first time abs last
=====
=====
=====
=====
=====
AAAA.CCCC.1002 192.168.10.2 192.168.10.3 0
0 10 10010 1.1.1.1 2.2.2.2
61 44812536 43172 14:00:41.391 14:01:34.391
AAAA.CCCC.1004 192.168.12.2 192.168.12.3 0
0 12 10012 1.1.1.1 2.2.2.2
61 44812536 43172 14:00:41.391 14:01:34.391
AAAA.CCCC.1003 192.168.13.2 192.168.13.3 0
0 13 10013 1.1.1.1 2.2.2.2
61 44812536 43172 14:00:41.391 14:01:34.391
AAAA.CCCC.1001 192.168.11.2 192.168.11.3 0
0 11 10011 1.1.1.1 2.2.2.2
61 44812536 43172 14:00:41.391 14:01:34.391

Leaf-01#

```

### Checking IPv6 Input Flow Monitor Cache Output

The following example provides a sample output to check the IPv6 input flow monitor cache output on VTEP 1:

```

Leaf-01# configure terminal
Leaf-01(config)# show flow monitor vxlan_nf_v6monitor_input cache format table

Cache type: Normal (Platform cache)

Cache size: 10000

```

```

Current entries:                            4

Flows added:                                8

Flows aged:                                4

- Inactive timeout    (   100 secs)        4
IPV6 SRC ADDR                                IPV6 DST ADDR
   TRNS SRC PORT   TRNS DST PORT           VXLAN VXLAN VNID  VXLAN VXLAN VTEP INPUT  VXLAN VXLAN
VTEP OUTPUT  IP PROT                   bytes long              pkts long time abs first time abs
last
=====
=====  

=====
=====  

=====
192:168:12::3                0                    0                192:168:12::2
                                  10012  2.2.2.2                    1.1.1.1
14:01:34.391                 59                   43517376        43172            14:00:41.391
192:168:10::3                0                    0                192:168:10::2
                                  10010  2.2.2.2                    1.1.1.1
14:01:34.391                 59                   43517376        43172            14:00:41.391
192:168:13::3                0                    0                192:168:13::2
                                  10013  2.2.2.2                    1.1.1.1
14:01:34.391                 59                   43517376        43172            14:00:41.391
192:168:11::3                0                    0                192:168:11::2
                                  10011  2.2.2.2                    1.1.1.1
14:01:34.391                 59                   43517376        43172            14:00:41.391

Leaf-01#
    
```