Configuring VXLAN-Aware Flexible Netflow

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Restrictions for VXLAN-Aware Flexible NetFlow

VXLAN-Aware Flexible NetFlow is not supported on the Cisco Catalyst 9500X Series Switches.

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
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**flow record** *flow-record-name* **Example:** `Device(config)# flow record vxlan_nf_record_input`	Creates a flow record and enters flow record configuration mode. This command also allows you to modify an existing flow record. **Note** 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 **match** commands configured with the **input** keyword. Ensure that the flow record for egress traffic has the **match** commands configured with the **output** keyword.

	Command or Action	Purpose
Step 4	**match datalink vlan** {**input** | **output**} **Example:** `Device(config-flow-record)# match datalink vlan output`	Configures the VLAN ID (for input or output traffic) as a key field for the FNF flow record. **Note** Ensure that you configure the **vlan input** and **vlan output** fields. These fields are required for VXLAN-aware FNF to work on EVPN input and output traffic flows.
Step 5	**match routing vrf input** **Example:** `Device(config-flow-record)# match routing vrf input`	Configures the VRF ID (for input or output traffic) as a key field for the FNF flow record. **Note** Ensure that you configure the **vrf input** field. This field is required for VXLAN-aware FNF to work on EVPN input and output traffic flows.
Step 6	**match vxlan vtep** {**input** | **output**} **Example:** `Device(config-flow-record)# match vxlan vtep output`	Configures the VTEP ID as a key field for the FNF flow record. The **input** keyword shows the VTEP source IP address in the captured flow. The **output** keyword shows the VTEP destination IP address in the captured flow
Step 7	**match vxlan vnid** **Example:** `Device(config-flow-record)# match vxlan vnid`	Configures the VXLAN VNI ID as a key field for the FNF flow record.
Step 8	**end** **Example:** `Device(config-flow-record)# end`	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
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**flow exporter** *flow-exporter-name* **Example:** `Device(config)# flow exporter e1`	Creates a flow exporter and enters flow exporter configuration mode.
Step 4	**destination** *ipv4-address* **Example:** `Device(config-flow-exporter)# destination 172.16.103.2`	Sets the IPv4 destination address or hostname for the exporter.
Step 5	**source** *interface-type interface-number* **Example:** `Device(config-flow-exporter)# source TenGigabitEthernet1/5/0/3`	Specifies the interface to use to reach the NetFlow collector at the configured destination. Ensure that the source IP address is unique per fabric. **Note** We recommend that you configure a unique Loopback on each VTEP. **Note** Flow exporter does not support unnumbered IP interface as source interface.
Step 6	**ttl** *seconds* **Example:** `Device(config-flow-exporter)# ttl 4`	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.
Step 7	**transport udp** *port-number* **Example:** `Device(config-flow-exporter)# transport udp 2055`	Specifies the UDP port to use to reach the NetFlow collector.
Step 8	**export-protocol** {**ipfix** | **netflow-v9**} **Example:** `Device(config-flow-exporter)# export-protocol ipfix`	Specifies the version of the NetFlow export protocol used by the exporter.
Step 9	**end** **Example:** `Device(config-flow-exporter)# end`	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
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**flow monitor** *flow-monitor-name* **Example:** `Device(config)# flow monitor vxlan_nf_monitor_input`	Creates a flow monitor and enters flow monitor configuration mode. This command also allows you to modify an existing flow monitor.
Step 4	**exporter** *flow-exporter-name* **Example:** `Device(config-flow-monitor)# exporter e1`	Specifies the name of the flow exporter that was created previously and associates it with the specified flow monitor.
Step 5	**record** *flow-record-name* **Example:** `Device(config-flow-monitor)# record vxlan_nf_record_input`	Specifies the record for the flow monitor.
Step 6	**end** **Example:** `Device(config-flow-monitor)# end`	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

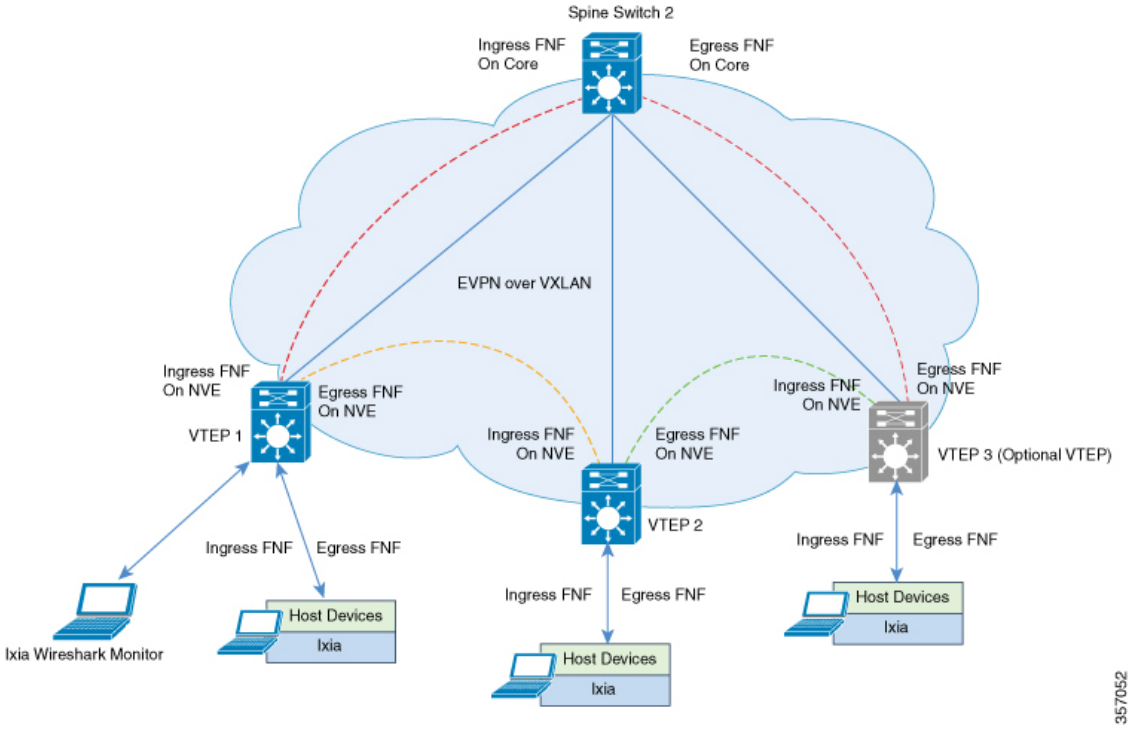
	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.

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



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

```
Leaf-01# show running-config

<snip: only config relevant to vxlan netflow is shown>
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
!
```

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
(l3vni5001)         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
(l3vni5000)         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
(l3vni5000)         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
(l3vni5001)         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                                192:168:12::2
                 0              0                10012  2.2.2.2                1.1.1.1
                     59              43517376                43172    14:00:41.391
14:01:34.391
192:168:10::3                                192:168:10::2
                 0              0                10010  2.2.2.2                1.1.1.1
                     59              43517376                43172    14:00:41.391
14:01:34.391
192:168:13::3                                192:168:13::2
                 0              0                10013  2.2.2.2                1.1.1.1
                     59              43517376                43172    14:00:41.391
14:01:34.391
192:168:11::3                                192:168:11::2
                 0              0                10011  2.2.2.2                1.1.1.1
                     59              43517376                43172    14:00:41.391
14:01:34.391

Leaf-01#
```