



## CHAPTER 16

# Configuring NetFlow

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This chapter describes how to configure the NetFlow feature on Cisco NX-OS devices.

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## Information About NetFlow

NetFlow identifies packet flows for both ingress and egress IP packets and provides statistics based on these packet flows. NetFlow does not require any change to either the packets themselves or to any networking device.

This section includes the following topics:

- [NetFlow Overview, page 16-1](#)
- [High Availability, page 16-4](#)
- [Virtualization Support, page 16-4](#)

## NetFlow Overview

NetFlow uses flows to provide statistics for accounting, network monitoring, and network planning. A flow is a unidirectional stream of packets that arrives on a source interface (or VLAN) 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.

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Cisco NX-OS supports the Flexible NetFlow feature that enables enhanced network anomalies and security detection. Flexible NetFlow allows you to define an optimal flow record for a particular application by selecting the keys from a large collection of predefined fields. For more information on the flow records, see the [“Flow Records” section on page 16-2](#).

All key values must match for the packet to count in a given flow. A flow might gather other fields of interest, depending on the export record version that you configure. Flows are stored in the NetFlow cache.

You can export the data that NetFlow gathers for your flow by using an exporter and export this data to a remote NetFlow collector. Cisco NX-OS exports a flow as part of a NetFlow export User Datagram Protocol (UDP) datagram under the following circumstances:

- The flow has been inactive or active for too long.
- The flow cache is getting full.
- One of the counters (packets or bytes) has exceeded its maximum value.
- You have forced the flow to export.

For more information on exporters, see the [“Exporters” section on page 16-2](#).

You define the size of the data that you want to collect for a flow using a monitor. The monitor combines the flow record and exporter with the NetFlow cache information. For more information on monitors, see the [“Monitors” section on page 16-3](#).

Cisco NX-OS can gather NetFlow statistics in either full or sampled mode. Cisco NX-OS analyzes all packets on the interface or subinterface for full NetFlow mode. For sampled mode, you configure the sampling algorithm and rate that Cisco NX-OS analyzes packets. For more information on samplers, see the [“Samplers” section on page 16-3](#).

## **Flow Records**

A flow record defines the keys that NetFlow uses to identify packets in the flow as well as other fields of interest that NetFlow gathers for the flow. You can define a flow record with any combination of keys and fields of interest. Cisco NX-OS supports a rich set of keys. A flow record also defines the types of counters gathered per flow. You can configure 32-bit or 64-bit packet or byte counters. Cisco NX-OS enables the following match fields as the defaults when you create a flow record:

- match interface input
- match interface output
- match flow direction

For more information, see the [“Creating a Flow Record” section on page 16-6](#).

## **Exporters**

An exporter contains network layer and transport layer details for the NetFlow export packet. You can configure the following information in an exporter:

- Export destination IP address
- Source interface
- UDP port number (where the collector is listening for NetFlow packets)
- Export format

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**Note**

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

Cisco NX-OS exports data to the collector whenever a timeout occurs or when the flow is terminated (TCP Fin or Rst received, for example). You can configure the following timers to force a flow export:

- Active timeout—Cisco NX-OS does not remove the cache entries from the cache.
- Inactive timeout—Cisco NX-OS removes the cache entries from the cache.

## Export Formats

Cisco NX-OS supports the Version 5 and Version 9 export formats. We recommend that you use the Version 9 export format for the following reasons:

- Variable field specification format
- Support for IPv6, Layer 2, and MPLS fields
- More efficient network utilization

If you configure the Version 5 export format, you have these limitations:

- Fixed field specifications
- No support for IPv6, Layer 2, or MPLS fields
- The `Netflow.InputInterface` and `Netflow.OutputInterface` represent a 16-bit I/O descriptor (IOD) of the interface.

**Note**

The IOD information of the interface can be retrieved using the **`show system internal im info global`** command.

For information about the Version 9 export format, see [RFC 3954](#).

**Note**

Cisco NX-OS supports UDP as the transport protocol for exports to up to two collectors.

## Monitors

A monitor references the flow record and flow exporter. You apply a monitor to an interface.

## Samplers

If you are using sampled mode, you use the sampler to specify the rate at which packets are sampled. On high bandwidth interfaces, applying NetFlow processing to every single packet can result in high CPU utilization. Sampler configuration is for high-speed interfaces. You can configure samples for M out of N. For example, 100 out of every 10,000 packets are sampled.

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## High Availability

Cisco NX-OS supports stateful restarts for NetFlow. After a reboot or supervisor switchover, Cisco NX-OS applies the running configuration.

## Virtualization Support

A virtual device context (VDC) is a logical representation of a set of system resources. Within each VDC, you can configure NetFlow. By default, Cisco NX-OS places you in the default VDC and any flows that you define in this mode are only available for interfaces in the default VDC.

For information about configuring VDCs, see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.x*.

## Licensing Requirements for NetFlow

Product	License Requirement
NX-OS	NetFlow requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme. For more information, see the <i>Cisco NX-OS Licensing Guide</i> .

## Prerequisites for NetFlow

NetFlow has the following prerequisite:

- You must understand the resources required on your device because NetFlow consumes additional memory and CPU resources.

If you configure VDCs, install the Advanced Services license and enter the desired VDC. For more information, see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.x*.

## Guidelines and Limitations

NetFlow has the following configuration guidelines and limitations:

- You must configure a source interface. If you do not configure a source interface, the exporter will remain in a disabled state.
- You must configure a valid record name for every flow monitor.
- A rollback will fail if you try to modify a record that is programmed in the hardware during a rollback.
- Only Layer 2 NetFlow is applied on Layer 2 interfaces, and only Layer 3 NetFlow is applied on Layer 3 interfaces.
- If you add a member to a port channel that is already configured for Layer 2 NetFlow, its NetFlow configuration is removed and the Layer 2 configuration of the port channel is added to it.

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- If you change a Layer 2 interface to a Layer 3 interface, the software removes the Layer 2 NetFlow configuration from the interface.
- Use v9 export to see the full 32-bit SNMP ifIndex values at the NetFlow connector.

## Configuring NetFlow

To configure NetFlow, follow these steps:

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- Step 1** Enable the NetFlow feature (see the “[Enabling the NetFlow Feature](#)” section on page 16-5).
  - Step 2** Define a flow record by specifying keys and fields to the flow (see the “[Creating a Flow Record](#)” section on page 16-6).
  - Step 3** Define an optional flow exporter by specifying the export format, protocol, destination, and other parameters (see the “[Creating a Flow Exporter](#)” section on page 16-9).
  - Step 4** Define a flow monitor based on the flow record and flow exporter (see the “[Creating a Flow Monitor](#)” section on page 16-11).
  - Step 5** Apply the flow monitor to a source interface, subinterface, VLAN interface (see the “[Applying a Flow to an Interface](#)” section on page 16-13), or a VLAN (see the “[Configuring Bridged NetFlow on a VLAN](#)” section on page 16-14).
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This section includes the following topics:

- [Enabling the NetFlow Feature, page 16-5](#)
- [Creating a Flow Record, page 16-6](#)
- [Creating a Flow Exporter, page 16-9](#)
- [Creating a Flow Monitor, page 16-11](#)
- [Creating a Sampler, page 16-12](#)
- [Applying a Flow to an Interface, page 16-13](#)
- [Configuring Bridged NetFlow on a VLAN, page 16-14](#)
- [Configuring Layer 2 NetFlow, page 16-15](#)
- [Configuring NetFlow Timeouts, page 16-17](#)

**Note**

Be aware that the Cisco NX-OS commands for this feature may differ from those used in Cisco IOS.

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## Enabling the NetFlow Feature

You must globally enable NetFlow before you can configure any flows.

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Use the following command in global configuration mode to enable NetFlow:

Command	Purpose
<b>feature netflow</b>	Enables the NetFlow feature.
<b>Example:</b> switch(config)# feature netflow	

Use the following command in global configuration mode to disable NetFlow and remove all flows:

Command	Purpose
<b>no feature netflow</b>	Disables the NetFlow feature. The default is disabled.
<b>Example:</b> switch(config)# no feature netflow	

## Creating a Flow Record

You can create a flow record and add keys to match on and fields to collect in the flow.

### BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

### SUMMARY STEPS

1. **config t**
2. **flow record** *name*
3. **description** *string*
4. **match** *type*
5. **collect** *type*
6. **show flow record** [*name*] [*record-name* | **netflow-original** | **netflow protocol-port** | **netflow** {**ipv4** | **ipv6**} {**original-input** | **original-output**}]
7. **copy running-config startup-config**

### DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.

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	Command	Purpose
Step 2	<b>flow record</b> <i>name</i>  <b>Example:</b> switch(config)# flow record Test switch(config-flow-record)#	Creates a flow record and enters flow record configuration mode.
Step 3	<b>description</b> <i>string</i>  <b>Example:</b> switch(config-flow-record)# description Ipv4Flow	(Optional) Describes this flow record as a maximum 63-character string.
Step 4	<b>match</b> <i>type</i>  <b>Example:</b> switch(config-flow-record)# match transport destination-port	Specifies a match key. See the “ <a href="#">Specifying the Match Parameters</a> ” section on page 16-7 for more information on the <i>type</i> argument.
Step 5	<b>collect</b> <i>type</i>  <b>Example:</b> switch(config-flow-record)# collect counter packets	Specifies the collection field. See the “ <a href="#">Specifying the Collect Parameters</a> ” section on page 16-8 for more information on the <i>type</i> argument.
Step 6	<b>show flow record</b> [ <i>name</i> ] [ <i>record-name</i>   <b>netflow-original</b>   <b>netflow protocol-port</b>   <b>netflow {ipv4   ipv6} {original-input</b>   <b>original-output}</b> ]  <b>Example:</b> switch(config-flow-exporter)# show flow record netflow protocol-port	(Optional) Displays information about NetFlow flow records.
Step 7	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-flow-exporter)# copy running-config startup-config	(Optional) Saves this configuration change.

## Specifying the Match Parameters

You must configure at least one of the following match parameters for flow records:

Command	Purpose
<b>match ip</b> { <i>protocol</i>   <i>tos</i> }  <b>Example:</b> switch(config-flow-record)# match ip protocol	Specifies the IP protocol or ToS fields as keys.
<b>match ipv4</b> { <i>destination address</i>   <i>source</i> <b>address</b> }  <b>Example:</b> switch(config-flow-record)# match ipv4 destination address	Specifies the IPv4 source or destination address as a key.

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Command	Purpose
<pre>match ipv6 {destination address   source address   flow-label   options}</pre> <p><b>Example:</b> switch(config-flow-record)# match ipv6 flow-label</p>	Specifies the IPv6 key.
<pre>match transport {destination-port   source-port}</pre> <p><b>Example:</b> switch(config-flow-record)# match transport destination-port</p>	Specifies the transport source or destination port as a key.
<pre>match datalink {mac source-address   mac destination-address   ethertype   vlan}</pre> <p><b>Example:</b> switch(config-flow-record)# match datalink ethertype</p>	Specifies the Layer 2 attribute as a key.

## Specifying the Collect Parameters

You must configure at least one of the following collect parameters for flow records:

Command	Purpose
<pre>collect counter {bytes   packets} [long]</pre> <p><b>Example:</b> switch(config-flow-record)# collect counter packets</p>	Collects either packet-based or byte counters from the flow. You can optionally specify that 64-bit counters are used.
<pre>collect flow {direction   sampler id}</pre> <p><b>Example:</b> switch(config-flow-record)# collect flow direction</p>	Collects the direction of the flow or the sampler identifier used for the flow.
<pre>collect routing {destination   source} as [peer]</pre> <p><b>Example:</b> switch(config-flow-record)# collect routing destination as</p>	Collects the source or destination AS number of the local device or the peer.
<pre>collect routing forwarding-status</pre> <p><b>Example:</b> switch(config-flow-record)# collect routing forwarding-status</p>	Collects the forwarding status of the packet.
<pre>collect routing next-hop address ipv4 [bgp]</pre> <p><b>Example:</b> switch(config-flow-record)# collect routing next-hop address ipv4</p>	Collects the next-hop IPv4 address.



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Command	Purpose
<b>collect routing next-hop address ipv6</b> <b>[bgp]</b>  <b>Example:</b> switch(config-flow-record)# collect routing next-hop address ipv6	Collects the next-hop IPv6 address.
<b>collect timestamp sys-uptime {first  </b> <b>last}</b>  <b>Example:</b> switch(config-flow-record)# collect timestamp sys-uptime last	Collects the system up time for the first or last packet in the flow.
<b>collect transport tcp flags</b>  <b>Example:</b> switch(config-flow-record)# collect transport tcp flags	Collects the TCP transport layer flags for the packets in the flow.

## Creating a Flow Exporter

You can create a flow export to define the export parameters for a flow.

### BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

### SUMMARY STEPS

1. **config t**
2. **flow exporter** *name*
3. **destination** {*ipv4-address* | *ipv6-address*} [**use-vrf** *name*]
4. **source** *interface-type number*
5. **version** {**5** | **9**}
6. **show flow exporter** [*name*]
7. **copy running-config startup-config**

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## DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	<b>flow exporter name</b>  <b>Example:</b> switch(config)# flow exporter ExportTest switch(config-flow-exporter)#	Creates a flow exporter and enters flow exporter configuration mode.
Step 3	<b>destination {ipv4-address   ipv6-address} [use-vrf name]</b>  <b>Example:</b> switch(config-flow-exporter)# destination 192.0.2.1	Sets the destination IPv4 or IPv6 address for this exporter. You can optionally configure the VRF to use to reach the NetFlow collector.
Step 4	<b>source interface-type number</b>  <b>Example:</b> switch(config-flow-exporter)# source ethernet 2/1	Specifies the interface to use to reach the NetFlow collector at the configured destination.
Step 5	<b>version {5   9}</b>  <b>Example:</b> switch(config-flow-exporter)# version 9 switch(config-flow-exporter-version-9)#	Specifies the NetFlow export version. Version 9 enters the export version configuration submode.
Step 6	<b>show flow exporter [name]</b>  <b>Example:</b> switch(config-flow-exporter)# show flow exporter	(Optional) Displays information about NetFlow flow exporters.
Step 7	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-flow-exporter)# copy running-config startup-config	(Optional) Saves this configuration change.

You can optionally configure the following parameters for flow exporters:

Command	Purpose
<b>description string</b>  <b>Example:</b> switch(config-flow-exporter)# description ExportV9	Describes this flow exporter as a maximum 63-character string.

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Command	Purpose
<b>dscp</b> <i>value</i>  <b>Example:</b> switch(config-flow-exporter)# dscp 0	Specifies the differentiated services codepoint value. The range is from 0 to 63.
<b>transport udp</b> <i>number</i>  <b>Example:</b> switch(config-flow-exporter)# transport udp 200	Specifies the UDP port to use to reach the NetFlow collector. The range is from 0 to 65535.

You can optionally configure the following parameters in flow exporter version configuration submode:

Command	Purpose
<b>option</b> { <b>exporter-stats</b>   <b>interface-table</b>   <b>sampler-table</b> } <b>timeout</b> <i>seconds</i>  <b>Example:</b> switch(config-flow-exporter-version-9)# option exporter-stats timeout 1200	Sets the exporter resend timer. The range is from 1 to 86400 seconds.
<b>template data</b> <b>timeout</b> <i>seconds</i>  <b>Example:</b> switch(config-flow-exporter-version-9)# template data timeout 1200	Sets the template data resend timer. The range is from 1 to 86400 seconds.

## Creating a Flow Monitor

You can create a flow monitor and associate it with a flow record and a flow exporter.

### BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

### SUMMARY STEPS

1. **config t**
2. **flow monitor** *name*
3. **description** *string*
4. **exporter** *name*
5. **record** {*name* | **netflow-original** | **netflow protocol-port** | **netflow** {**ipv4** | **ipv6**} {**original-input** | **original-output**}}
6. **show flow monitor** [*name*]
7. **copy running-config startup-config**

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## DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	<b>flow monitor name</b>  <b>Example:</b> switch(config)# flow monitor MonitorTest switch(config-flow-monitor)#	Creates a flow monitor and enters flow monitor configuration mode.
Step 3	<b>description string</b>  <b>Example:</b> switch(config-flow-monitor)# description Ipv4Monitor	(Optional) Describes the flow monitor with an alphanumeric string up to 63 characters.
Step 4	<b>exporter name</b>  <b>Example:</b> switch(config-flow-monitor)# exporter Exportv9	Associates a flow exporter with this flow monitor.
Step 5	<b>record {name   netflow-original   netflow protocol-port   netflow {ipv4   ipv6} {original-input   original-output}}</b>  <b>Example:</b> switch(config-flow-monitor)# record IPv4Flow	Associates a flow record with the specified flow monitor.
Step 6	<b>show flow monitor [name]</b>  <b>Example:</b> switch(config-flow-monitor)# show flow monitor	(Optional) Displays information about NetFlow flow monitors.
Step 7	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-flow-monitor)# copy running-config startup-config	(Optional) Saves this configuration change.

## Creating a Sampler

You can create a sampler to define the NetFlow sampling rate for a flow.

### BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

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## SUMMARY STEPS

1. **config t**
2. **sampler *name***
3. **description *string***
4. **mode *samples out-of packets***
5. **show sampler [*name*]**
6. **copy running-config startup-config**

## DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	<b>sampler <i>name</i></b>  <b>Example:</b> switch(config)# sampler SampleTest switch(config-flow-sampler)#	Creates a sampler and enters flow sampler configuration mode.
Step 3	<b>description <i>string</i></b>  <b>Example:</b> switch(config-flow-sampler)# description Samples	(Optional) Describes the sampler with an alphanumeric string up to 63 characters.
Step 4	<b>mode <i>samples out-of packets</i></b>  <b>Example:</b> switch(config-flow-sampler)# mode 1 out-of 100	Defines the number of samples to take per the number of packets received. The samples range is from 1 to 64. The packets range is from 1 to 8192 packets.
Step 5	<b>show sampler [<i>name</i>]</b>  <b>Example:</b> switch(config-flow-sampler)# show sampler	(Optional) Displays information about NetFlow samplers.
Step 6	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-flow-sampler)# copy running-config startup-config	(Optional) Saves this configuration change.

## Applying a Flow to an Interface

You can apply a flow monitor and an optional sampler to an interface.

### BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

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## SUMMARY STEPS

1. **config t**
2. **interface** *interface-type number*
3. **ip flow monitor** *name* {input | output} [*sampler name*]
4. **ipv6 flow monitor** *name* {input | output} [*sampler name*]
5. **show flow interface** [*interface-type number*]
6. **copy running-config startup-config**

## DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	<b>interface</b> <i>interface-type number</i>  <b>Example:</b> switch(config)# interface ethernet 2/1 switch(config-if)#	Enters interface configuration mode. The interface type can be Ethernet (including subinterfaces), port channel, VLAN, SVI, or tunnel.
Step 3	<b>ip flow monitor</b> <i>name</i> {input   output} [ <i>sampler name</i> ]  <b>Example:</b> switch(config-if)# ip flow monitor MonitorTest input	Associates an IPv4 flow monitor and an optional sampler to the interface for input or output packets.
Step 4	<b>ipv6 flow monitor</b> <i>name</i> {input   output} [ <i>sampler name</i> ]  <b>Example:</b> switch(config-if)# ipv6 flow monitor MonitorTest input	Associates an IPv6 flow monitor and an optional sampler to the interface for input or output packets.
Step 5	<b>show flow interface</b> [ <i>interface-type number</i> ]  <b>Example:</b> switch(config-if)# show flow interface	(Optional) Displays information about NetFlow on an interface.
Step 6	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

## Configuring Bridged NetFlow on a VLAN

You can apply a flow monitor and an optional sampler to a VLAN.

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## BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

## SUMMARY STEPS

1. **config t**
2. **vlan *vlan-id***
3. **ip flow monitor *name* {input | output} [*sampler name*]**
4. **copy running-config startup-config**

## DETAILED STEPS

	Command	Purpose
Step 1	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	<b>vlan <i>vlan-id</i></b>  <b>Example:</b> switch(config)# vlan 30 switch(config-vlan)#	Enters VLAN configuration mode. The <i>vlan-id</i> range is from 1 to 3967 or from 4048 to 4093.
Step 3	<b>ip flow monitor <i>name</i> {input   output} [<i>sampler name</i>]</b>  <b>Example:</b> switch(config-vlan)# ip flow monitor MonitorTest input	Associates a flow monitor and an optional sampler to the VLAN for input or output packets.
Step 4	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-vlan)# copy running-config startup-config	(Optional) Saves this configuration change.

## Configuring Layer 2 NetFlow

You can define Layer 2 keys in flexible NetFlow records that you can use to capture flows in Layer 2 interfaces. The Layer 2 keys are as follows:

- Source and destination MAC addresses
- Source VLAN ID
- EtherType from the Ethernet frame

You can apply Layer 2 NetFlow to the following interfaces for the ingress direction:

- Switch ports in access mode
- Switch ports in trunk mode
- Layer 2 port channels

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**Note**

You cannot apply Layer 2 NetFlow to VLANs, egress interfaces, or Layer 3 interfaces such as VLAN interfaces.

**BEFORE YOU BEGIN**

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

**SUMMARY STEPS**

1. **config t**
2. **flow record** *name*
3. **match datalink** {*mac source-address* | *mac destination-address* | *ethertype* | *vlan*}
4. **interface** {*ethernet slot/port*} | {*port-channel number*}
5. **switchport**
6. **mac packet-classify**
7. **layer2-switched flow monitor** *flow-name* **input** [**sampler** *sampler-name*]
8. **show flow record netflow layer2-switched** **input**
9. **copy running-config startup-config**

**DETAILED STEPS**

	<b>Command</b>	<b>Purpose</b>
<b>Step 1</b>	<b>config t</b>  <b>Example:</b> switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
<b>Step 2</b>	<b>flow record</b> <i>name</i>  <b>Example:</b> switch(config)# flow record L2_record	Enters flow record configuration mode. For more information about configuring flow records, see the <a href="#">“Creating a Flow Record”</a> section on page 16-6.
<b>Step 3</b>	<b>match datalink</b> { <i>mac source-address</i>   <i>mac destination-address</i>   <i>ethertype</i>   <i>vlan</i> }  <b>Example:</b> switch(config-flow-record)# match datalink ethertype	Specifies the Layer 2 attribute as a key.
<b>Step 4</b>	<b>interface</b> { <i>ethernet slot/port</i> }   { <i>port-channel number</i> }  <b>Example 1:</b> switch(config)# interface ethernet 2/1 switch(config-if)#  <b>Example 2:</b> switch(config)# interface port-channel 8 switch(config-if)#	Enters interface configuration mode. The interface type can be a physical Ethernet port or a port channel.



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	Command	Purpose
Step 5	<b>switchport</b>  <b>Example:</b> switch(config-if)# switchport	Changes the interface to a Layer 2 physical interface. For information about configuring switch ports, see the <i>Cisco Nexus 7000 Series NX-OS Layer 2 Switching Configuration Guide, Release 4.x</i> .
Step 6	<b>mac packet-classify</b>  <b>Example:</b> switch(config-if)# mac packet-classify	Forces MAC classification of packets. For more information about using the <b>mac packet-classify</b> command, see the <i>Cisco Nexus 7000 Series NX-OS Security Configuration Guide, Release 4.x</i> .
Step 7	<b>layer2-switched flow monitor</b> <i>flow-name</i> <b>input</b> [ <b>sampler</b> <i>sampler-name</i> ]  <b>Example:</b> switch(config-vlan)# layer2-switched flow monitor L2_monitor input sampler L2_sampler	Associates a flow monitor and an optional sampler to the switch port input packets. For information about flow monitors, see the “ <a href="#">Creating a Flow Monitor</a> ” section on page 16-11. For information about samplers, see the “ <a href="#">Creating a Sampler</a> ” section on page 16-12.
Step 8	<b>show flow record netflow layer2-switched</b> <b>input</b>  <b>Example:</b> switch(config-if)# show flow record netflow layer2-switched input	(Optional) Displays information about the Layer 2 Netflow default record.
Step 9	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-vlan)# copy running-config startup-config	(Optional) Saves this configuration change.

## Configuring NetFlow Timeouts

You can optionally configure global NetFlow timeouts that apply to all flows.

Use the following commands in global configuration mode to configure NetFlow timeout parameters:

Command	Purpose
<b>flow timeout active</b> <i>seconds</i>  <b>Example:</b> switch(config)# flow timeout active 90	Sets the active timeout value in seconds. The range is from 60 to 4092. The default is 1800.
<b>flow timeout aggressive threshold</b> <i>percent</i>  <b>Example:</b> switch(config)# flow timeout aggressive threshold 90	Enables using a percentage that you want the NetFlow table to be before aggressive aging starts. The range is from 50 to 99. The default is disabled.
<b>flow timeout fast</b> <i>seconds</i> <b>threshold</b> <i>packets</i>  <b>Example:</b> switch(config)# flow timeout fast 40 threshold 1200	Enables using a fast timeout value and the number of packets in a flow before aging begins. The fast timeout range in seconds is from 32 to 512. The packet range is from 1 to 4000. The default is disabled.

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Command	Purpose
<b>flow timeout inactive</b> <i>seconds</i>  <b>Example:</b> switch(config)# flow timeout inactive 900	Sets the inactive timeout value in seconds. The range is from 15 to 4092. The default is 15.
<b>flow timeout session</b>  <b>Example:</b> switch(config)# flow timeout session	Enables TCP session aging. The default is disabled.

## Verifying NetFlow Configuration

To display NetFlow configuration information, perform one of the following tasks:

Command	Purpose
<b>show flow exporter</b> [ <i>name</i> ]	Displays information about NetFlow flow exporters and statistics.
<b>show flow interface</b> [ <i>interface-type number</i> ]	Displays information about NetFlow interfaces.
<b>show flow monitor</b> [ <i>name</i> ] [ <b>cache</b> ] [ <b>detailed</b> ]	Displays information about NetFlow flow monitors and statistics.
<b>show flow record</b> [ <i>name</i> ]	Displays information about NetFlow flow records.
<b>show flow record netflow layer2-switched input</b>	Displays information about the Layer 2 NetFlow configuration.
<b>show flow timeout</b>	Displays information about NetFlow timeouts.
<b>show hardware flow aging</b> [ <b>vdc</b> <i>vdc_id</i> ] [ <b>detail</b> ] [ <b>module</b> <i>module</i> ]	Displays information about NetFlow aging flows in the hardware.
<b>show hardware flow entry address</b> <i>table-address type</i> { <i>ip</i>   <i>ipv6</i> } [ <b>module</b> <i>module</i> ]	Displays information about NetFlow table entries in the hardware.
<b>show hardware flow ip</b> [ <b>interface</b> <i>type number</i>   <b>monitor</b> <i>monitor_name</i>   <b>profile</b> <i>profile-id</i>   <b>vdc</b> <i>vdc_id</i>   <b>vlan</b> <i>vlan_id</i> ] [ <b>detail</b> ] [ <b>module</b> <i>module</i> ]	Displays information about NetFlow IPv4 flows in the hardware.
<b>show hardware flow sampler</b> [ <b>all</b>   <b>count</b>   <b>index</b> <i>number</i>   <b>name</b> <i>sampler-name</i>   <b>vdc</b> <i>vdc_id</i> ] [ <b>detail</b> ] [ <b>module</b> <i>module</i> ]	Displays information about the NetFlow sampler in the hardware.
<b>show hardware flow utilization</b> [ <b>module</b> <i>module</i> ]	Displays information about NetFlow table utilization in the hardware.
<b>show sampler</b> [ <i>name</i> ]	Displays information about NetFlow samplers.

## Monitoring NetFlow

Use the **show flow exporter** command to display NetFlow statistics.

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Use the **clear flow exporter** command to clear NetFlow exporter statistics. Use the **clear flow monitor** command to clear the monitor cache and statistics.

## NetFlow Example Configuration

This example shows how to create a flow and apply it to an interface:

```
feature netflow
flow exporter ee
  version 9
flow record rr
  match ipv4 source address
  match ipv4 destination address
  collect counter bytes
  collect counter packets
flow monitor foo
  record rr
  exporter ee
interface Ethernet2/45
  ip flow monitor foo output
  ip address 10.20.1.1/24
  no shutdown
```

## Default Settings

Table 16-1 lists the default settings for NetFlow parameters.

**Table 16-1** Default NetFlow Parameters

Parameters	Default
Egress and Ingress cache size	512K
Flow active timeout	1800 seconds
Flow timeout aggressive threshold	disabled
Flow timeout fast threshold	disabled
Flow timeout inactive	15 seconds
Flow timeout session aging	disabled

## Additional References

For additional information related to implementing NetFlow, see the following sections:

- [Related Documents, page 16-20](#)
- [Standards, page 16-20](#)

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## Related Documents

Related Topic	Document Title
NetFlow CLI commands	<i>Cisco Nexus 7000 Series NX-OS System Management Command Reference</i>
VDCs and VRFs	<i>Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.x</i>

## Standards

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

## Feature History for NetFlow

[Table 16-2](#) lists the release history for this feature.

**Table 16-2** Feature History for Rollback

Feature Name	Releases	Feature Information
Layer 2 NetFlow	4.2(1)	You can define Layer 2 keys in flexible NetFlow records that you can use to capture flows in Layer 2 interfaces. See the <a href="#">“Guidelines and Limitations”</a> section on page 16-4. See the <a href="#">“Configuring Layer 2 NetFlow”</a> section on page 16-15.
Rollback during NetFlow	4.1(3)	Rollback fails for NetFlow if during rollback, you try to modify a record that is programmed in the hardware. See the <a href="#">“Guidelines and Limitations”</a> section on page 16-4.