

Objective

This tech note outlines the main differences in NetFlow between Cisco® NX-OS Software and Catalyst 6500 Sup720/Sup32 running Cisco IOS® Software. Sample configurations are included for Cisco NX-OS and Cisco IOS Software for some common features to demonstrate the similarities and differences. Please refer to the [NX-OS documentation on Cisco.com](#) for a complete list of supported features.

It should be noted that the Catalyst 6500 range now ships a new supervisor, the sup2T, which supports Flexible NetFlow in a similar manner to the NX-OS Software. More details of this and of the sup2T can be obtained from

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/white_paper_c11-652021.html#wp9000272

NetFlow Overview

NetFlow provides flow-based statistics collection that is useful for troubleshooting, traffic analysis, performance monitoring, and security threat prevention. Cisco NX-OS supports a flexible architecture that allows an administrator collect different data for different applications per interface.

Important Cisco NX-OS and Cisco IOS Software Differences

In Cisco NX-OS:

- The NetFlow feature supports stateful process restarts and In-Service-Software-Upgrades (ISSU) if two supervisors are present in a chassis.
- Non NetFlow features do not have any dependencies on NetFlow. In Cisco IOS Software, Reflexive ACLs, NAT, TCP Intercept, SLB, and WCCP have dependencies on the flow mask configuration.
- NetFlow command-line interface (CLI) configuration and verification commands are not available until you enable the NetFlow feature with the **feature netflow** command.
- Two flow modes are supported: full and sampled for layer-2 and layer-3 NetFlow collection. The NX-OS supports layer-2 NetFlow (MAC accounting), whereas Cisco IOS Software supports Bridged NetFlow (IP accounting in a VLAN).
- Sampled mode supports packet-based sampling (1-64 out of 1-8192).
- In sampled mode, the sampling occurs before the NetFlow cache is populated.
- The M1 series line-card modules support 512,000 NetFlow cache entries (ingress and egress flows). F1 series line-card modules do not support NetFlow.
- The M1 series line-card modules perform the NetFlow Data Export (NDE) packet formatting processing on the local CPU to offload processing from the supervisor module. The supervisor module sends the NDE formatted packet to the NetFlow export destination(s).
- A flexible architecture is used that consist of flow records, flow exports, and flow monitors that allows different NetFlow collection requirements to be applied to different interfaces for ingress and egress traffic flows.
- Cisco NX-OS supports more key and non-key fields (L2 and L3) when creating flow records. It can also collect additional information such as TCP flags, which are useful for security auditing.
- NetFlow collects multicast traffic statistics by default. Cisco IOS software requires the global **ip multicast netflow output-counters** command.
- NetFlow Versions 5 and 9 export formats are supported (Version 9 is recommended for the greatest flexibility and is required for layer-2 NetFlow).
- A source interface must be configured for each flow export.
- Cisco NX-OS defaults to User Datagram Protocol (UDP) port 9995 for NetFlow Data Export. Cisco IOS Software requires the UDP port to be specified.
- A NetFlow export packet can be configured with a specific DSCP QoS value using the **dscp <#>** flow-export command.

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- Cisco NX-OS provides more granular aging timers (session timer and aggressive threshold).
- The default aging timer values are different than in Cisco IOS Software.

Things You Should Know

The following list provides some additional facts about Cisco NX-OS that should be helpful when configuring and managing NetFlow.

- Configuring NetFlow is a four-step process: Configure the record or use a predefined record, configure the exporter, configure the monitor, and apply the monitor to an interface or VLAN.
 - If the **feature netflow** command is removed, all relevant NetFlow configuration information is also removed.
 - NetFlow consumes hardware resources (ternary content-addressable memory [TCAM], CPU, etc.), so understanding the resource utilization on a device is important before enabling NetFlow.
 - NetFlow is processed after the ACL processing on an interface, so an ACL (ingress or egress) will impact what flows are collected.
 - Sampling mode preserves CPU and NetFlow cache entries in high-traffic environments.
 - A traffic direction (**input** or **output**) needs to be specified when a flow monitor is applied to an interface. Layer-2 NetFlow (MAC accounting) only supports the **input** option.
 - Egress NetFlow is supported allowing packets to be captured after they are un-encapsulated.
 - Multiple NetFlow export destinations can be configured per exporter to improve resiliency.
 - NetFlow is VRF aware so exported data can be sent to a collector in a specified VRF instance. This is configured under a flow exporter with the **destination x.x.x.x use-vrf <instance>** command.
 - The active-aging flow timeout is 1800 seconds by default
 - The inactive-aging flow timeout is 15 seconds by default.
 - The fast-aging flow timeout is disabled by default.
 - The aggressive-aging flow threshold is disabled by default.
 - TCP session aging is disabled by default.
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- The **show running-config netflow** command can be used to view the running NetFlow configuration.

Configuration Comparison

The following sample code shows configuration similarities and differences between the Cisco NX-OS and Cisco IOS Software CLIs. There are several significant differences: Cisco NX-OS allows NetFlow to be enabled and disabled globally, and it uses a more flexible architecture that allows different statistics to be collected for different applications, whereas the Cisco IOS Software on the Catalyst 6500 supports one flow mask and export pair for the entire chassis. The Cisco IOS Software syntax shown here is from Cisco IOS Software release 12.2SXH.

Cisco IOS CLI

Enabling the NetFlow Feature

Cisco NX-OS CLI

```
feature netflow
```

Configuring a Layer-3 NetFlow Flow Record (Custom)

```
flow record Netflow-Record-1  
description Custom-Flow-Record  
match ipv4 source address  
match ipv4 destination address  
match transport destination-port  
collect counter bytes  
collect counter packets
```

Configuring a Layer-2 NetFlow Flow Record (Custom)

```
flow record Netflow-Record-1  
description Layer-2-Flow-Record  
match datalink mac source-address  
match datalink mac destination-address  
collect counter bytes  
collect counter packets
```

Configuring a NetFlow Flow Export

```
flow exporter Netflow-Exporter-1  
description Production-Netflow-Exporter  
destination 192.168.11.2  
source Ethernet2/2  
version 9
```

Configuring a NetFlow Monitor with a Custom Record

```
flow monitor Netflow-Monitor-1  
description Applied Inbound-Eth-1/1  
record Netflow-Record-1  
exporter Netflow-Exporter-1
```

Configuring a NetFlow Monitor with an Original Record

```
flow monitor Netflow-Monitor-2
```

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description Use Predefined ?Original-Netflow-Record?

record netflow-original

exporter Netflow-Exporter-1

Adjusting NetFlow Timers

flow timeout active 120

flow timeout inactive 32

flow timeout fast 32 threshold 100

flow timeout session

flow timeout aggressive threshold 75

Configuring a NetFlow Sampler

sampler NF-Sampler-1

description Sampler-for-high-traffic-environment

mode 1 out-of 1000

Applying a NetFlow Monitor to an Interface

interface ethernet 1/1

ip flow monitor Netflow-Monitor-1 input

Applying a NetFlow Monitor to a VLAN

vlan configuration 10

ip flow monitor Netflow-Monitor input

Applying a Layer-2 NetFlow Monitor an Interface

interface etherent 1/1

switchport

switchport access vlan 100

mac packet-classify

layer2-switched flow monitor Netflow-Monitor-L2
input

Applying a NetFlow Sampler to an Interface

interface ethernet 1/1

ip flow monitor Netflow-Monitor-1 input sampler
NF-Sampler-1

Applying a NetFlow Sampler to a VLAN

vlan configuration 10

```
ip flow monitor Netflow-Monitor-1 input sampler
NF-Sampler-1
```

Applying a Layer-2 NetFlow Sampler an Interface

```
interface ethernet 1/1
```

```
switchport
```

```
switchport access vlan 100
```

```
mac packet-classify
```

```
layer2-switched flow monitor Netflow-Monitor-L2
input sampler NF-Sampler-1
```

Verification Command Comparison

The following table compares some useful **show** commands for verifying and troubleshooting NetFlow.

Cisco NX-OS NetFlow	Cisco IOS Software NetFlow	Command Description
show flow exporter	show mls nde	Displays the configured exporter maps
show flow interface	-	Displays interfaces configured for NetFlow
show flow monitor	-	Displays information about monitor maps
show flow record	-	Displays information about record maps
show flow timeout	-	Displays the NetFlow timeout value
show hardware flow aging	show mls netflow aging	Displays the NetFlow table aging timeout value
show hardware flow entry	show mls netflow ip flow	Displays flow-specific information
show hardware flow ip	show mls netflow ip	Displays the IP NetFlow table
show hardware flow l2	-	Displays the Layer-2 NetFlow table
show hardware flow sampler	show mls sampling	Displays the NetFlow sampling configuration
show hardware flow utilization module	show mls netflow table summary	Displays NetFlow table utilization per module
show sampler	show flow-sampler	Displays information about sampler maps