



Configuring NetFlow Aggregation Caches

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This module contains information about and instructions for configuring NetFlow aggregation caches. The NetFlow main cache is the default cache used to store the data captured by NetFlow. By maintaining one or more extra caches, called *aggregation caches*, the NetFlow Aggregation feature allows limited aggregation of NetFlow data export streams on a router. The aggregation scheme that you select determines the specific kinds of data that are exported to a remote host.

NetFlow is a Cisco IOS application that provides statistics on packets flowing through the router. It is emerging as a primary network accounting and security technology.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “[Feature Information for Configuring NetFlow Aggregation Caches](#)” section on page 36.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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Prerequisites for Configuring NetFlow Aggregation Caches

NetFlow Aggregation Caches

Before you enable NetFlow you must:

- Configure the router for IP routing
- Ensure that one of the following is enabled on your router, and on the interfaces that you want to configure NetFlow on: Cisco Express Forwarding (CEF), distributed CEF, or fast switching
- Understand the resources required on your router because NetFlow consumes additional memory and CPU resources

If you intend to use Version 8 export format with an aggregation cache, configure Version 5 export format for the main cache.

If you need autonomous system (AS) information from the aggregation, make sure to specify either the **peer-as** or **origin-as** keyword in your export command if you have not configured an export format version.

You must explicitly enable each NetFlow aggregation cache by entering the **enabled** keyword from aggregation cache configuration mode.

Router-based aggregation must be enabled for minimum masking.

Restrictions for Configuring NetFlow Aggregation Caches

Cisco IOS Releases 12.2(14)S, 12.0(22)S, or 12.2(15)T

If your router is running a version of Cisco IOS prior to releases 12.2(14)S, 12.0(22)S, or 12.2(15)T the **ip route-cache flow** command is used to enable NetFlow on an interface.

If your router is running Cisco IOS release 12.2(14)S, 12.0(22)S, 12.2(15)T, or later the **ip flow ingress** command is used to enable NetFlow on an interface.

Memory Impact

During times of heavy traffic, the additional flows can fill up the global flow hash table. If you need to increase the size of the global flow hash table, increase the memory of the router.

Performance Impact

Configuring Egress NetFlow accounting with the **ip flow egress** command might adversely affect network performance because of the additional accounting-related computation that occurs in the traffic-forwarding path of the router.

NetFlow Data Export

Restrictions for NetFlow Version 9 Data Export

- Backward compatibility—Version 9 is not backward-compatible with Version 5 or Version 8. If you need Version 5 or Version 8, you must configure it.
- Export bandwidth—Export bandwidth use increases for Version 9 (because of template flowsets) versus Version 5. The increase in bandwidth usage versus Version 5 varies with the frequency with which template flowsets are sent. The default is to resend templates every 20 packets, which has a bandwidth cost of about 4 percent. If necessary, you can lower the resend rate with the **ip flow-export template refresh-rate packets** command.
- Performance impact—Version 9 slightly decreases overall performance, because generating and maintaining valid template flowsets require additional processing.

Restrictions for NetFlow Version 8 Export Format

Version 8 export format is available only for aggregation caches, and it cannot be expanded to support new features.

Information About Configuring NetFlow Aggregation Caches

Before configuring the NetFlow main cache, NetFlow aggregation caches and NetFlow aggregation schemes, you should understand the following information:

- [NetFlow Aggregation Caches, page 2](#)
- [NetFlow Data Export Format Versions 9, and 8 for NetFlow Aggregation Caches: Overview, page 24](#)

NetFlow Aggregation Caches

- [NetFlow Cache Aggregation Benefits, page 4](#)
- [NetFlow Cache Aggregation Schemes, page 4](#)
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- [NetFlow AS Aggregation Scheme, page 7](#)
- [NetFlow AS-ToS Aggregation Scheme, page 8](#)
- [NetFlow Destination Prefix Aggregation Scheme, page 9](#)
- [NetFlow Destination Prefix-ToS Aggregation Scheme, page 11](#)
- [NetFlow Prefix Aggregation Scheme, page 12](#)
- [NetFlow Prefix-Port Aggregation Scheme, page 14](#)
- [NetFlow Prefix-ToS Aggregation Scheme, page 16](#)
- [NetFlow Protocol Port Aggregation Scheme, page 18](#)
- [NetFlow Protocol-Port-ToS Aggregation Scheme, page 19](#)
- [NetFlow Source Prefix Aggregation Scheme, page 20](#)
- [NetFlow Source Prefix-ToS Aggregation Scheme, page 22](#)

NetFlow Cache Aggregation Benefits

Aggregation of export data is typically performed by NetFlow collection tools on management workstations. Router-based aggregation allows limited aggregation of NetFlow export records to occur on the router. Thus, you can summarize NetFlow export data on the router before the data is exported to a NetFlow data collection system, which has the following benefits:

- Reduces the bandwidth required between the router and the workstations
- Reduces the number of collection workstations required
- Improves performance and scalability on high flow-per-second routers

NetFlow Cache Aggregation Schemes

Cisco IOS NetFlow aggregation maintains one or more extra caches with different combinations of fields that determine which flows are grouped together. These extra caches are called aggregation caches. The combinations of fields that make up an aggregation cache are referred to as schemes. As flows expire from the main cache, they are added to each enabled aggregation cache.

You can configure each aggregation cache with its individual cache size, cache age timeout parameter, export destination IP address, and export destination UDP port. As data flows expire in the main cache (depending on the aggregation scheme configured), relevant information is extracted from the expired flow and the corresponding flow entry in the aggregation cache is updated. The normal flow age process runs on each active aggregation cache the same way it runs on the main cache. On-demand aging is also supported. Each aggregation cache contains different field combinations that determine which data flows are grouped. The default aggregation cache size is 4096 bytes.

You configure a cache aggregation scheme through the use of arguments to the **ip flow-aggregation cache** command. NetFlow supports the following five non-ToS based cache aggregation schemes:

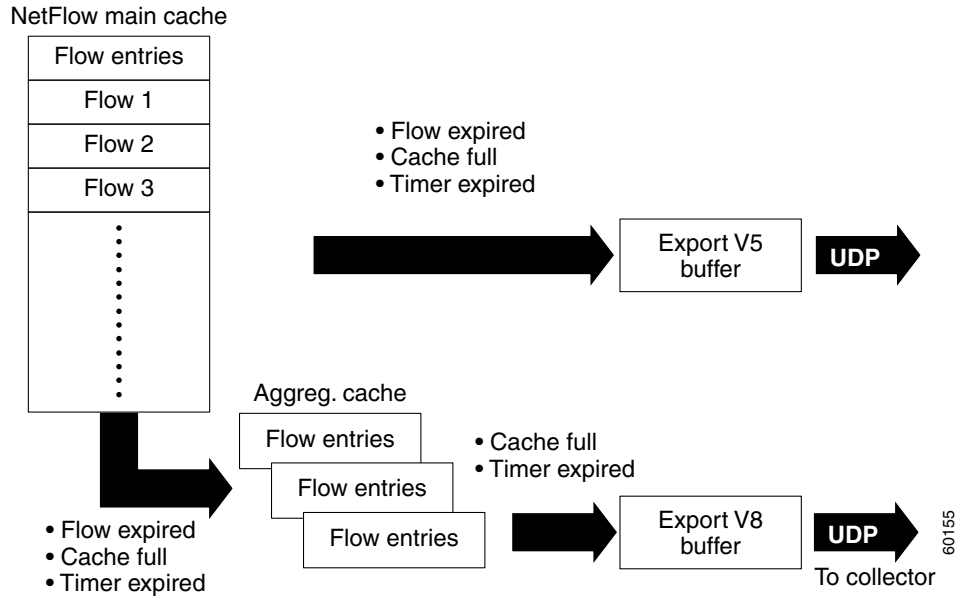
- Autonomous system (AS) aggregation scheme
- Destination prefix aggregation scheme
- Prefix aggregation scheme
- Protocol port aggregation scheme
- Source prefix aggregation scheme

The NetFlow Type of Service (ToS)-Based Router Aggregation feature introduced support for additional cache aggregation schemes, all of which include the ToS byte as one of the fields in the aggregation cache. The following are the six ToS-based aggregation schemes:

- AS-ToS aggregation scheme
- Destination prefix-ToS aggregation scheme
- Prefix-port aggregation scheme
- Prefix-ToS aggregation scheme
- Protocol-port-ToS aggregation scheme
- Source prefix-ToS aggregation scheme

[Figure 1](#) shows an example of how the main NetFlow cache can be aggregated into multiple aggregation caches based upon user-configured aggregation schemes.

Figure 1 Building a NetFlow Aggregation Cache



Note

Figure 2 through Figure 12 illustrate the Version 8 export formats of the aggregation schemes listed above. Additional export formats (for instance, Version 9) are also supported. If you are using Version 9, the formats will be different from those shown in the figures. For more information about Version 9 export formats, see [Configuring NetFlow and NetFlow Data Export](#).

NetFlow Aggregation Scheme Fields

Each cache aggregation scheme contains field combinations that differ from any other cache aggregation scheme. The combination of fields determines which data flows are grouped and collected when a flow expires from the main cache. A flow is a set of packets that has common fields, such as the source IP address, destination IP address, protocol, source and destination ports, type-of-service, and the same interface on which the flow is monitored. To manage flow aggregation on your router, you need to configure the aggregation cache scheme that groups and collects the fields from which you want to examine data. Table 1 and Table 2 show the NetFlow fields that are grouped and collected for non-ToS and ToS based cache aggregation schemes.

Table 1 shows the NetFlow fields used in the non-TOS based aggregation schemes.

Table 1 NetFlow Fields Used in the Non-ToS Based Aggregations Schemes

| Field | AS | Protocol Port | Source Prefix | Destination Prefix | Prefix |
|-------------------------|----|---------------|---------------|--------------------|--------|
| Source prefix | | | X | | X |
| Source prefix mask | | | X | | X |
| Destination prefix | | | | X | X |
| Destination prefix mask | | | | X | X |
| Source app port | | X | | | |
| Destination app port | | X | | | |

Table 1 *NetFlow Fields Used in the Non-ToS Based Aggregations Schemes (continued)*

| Field | AS | Protocol Port | Source Prefix | Destination Prefix | Prefix |
|-------------------|----|---------------|---------------|--------------------|--------|
| Input interface | X | | X | | X |
| Output interface | X | | | X | X |
| IP protocol | | X | | | |
| Source AS | X | | X | | X |
| Destination AS | X | | | X | X |
| First time stamp | X | X | X | X | X |
| Last time stamp | X | X | X | X | X |
| Number of flows | X | X | X | X | X |
| Number of packets | X | X | X | X | X |
| Number of bytes | X | X | X | X | X |

Table 2 shows the NetFlow fields used in the TOS based aggregation schemes.

Table 2 *NetFlow Fields Used in the ToS Based Aggregation Schemes*

| Field | AS-ToS | Protocol Port-ToS | Source Prefix-ToS | Destination Prefix-ToS | Prefix-ToS | Prefix-Port |
|-------------------------|--------|-------------------|-------------------|------------------------|------------|-------------|
| Source prefix | | | X | | X | X |
| Source prefix mask | | | X | | X | X |
| Destination prefix | | | | X | X | X |
| Destination prefix mask | | | | X | X | X |
| Source app port | | X | | | | X |
| Destination app port | | X | | | | X |
| Input interface | X | X | X | | X | X |
| Output interface | X | X | | X | X | X |
| IP protocol | | X | | | | X |
| Source AS | X | | X | | X | |
| Destination AS | X | | | X | X | |
| ToS | X | X | X | X | X | X |
| First time stamp | X | X | X | X | | X |
| Last time stamp | X | X | X | X | | X |
| Number of flows | X | X | X | X | | X |
| Number of packets | X | X | X | X | | X |
| Number of bytes | X | X | X | X | | X |

NetFlow AS Aggregation Scheme

The NetFlow AS aggregation scheme reduces NetFlow export data volume substantially and generates AS-to-AS traffic flow data. The scheme groups data flows that have the same source BGP AS, destination BGP AS, input interface, and output interface.

The aggregated NetFlow data export records report the following:

- Source and destination BGP AS
- Number of packets summarized by the aggregated record
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Source interface
- Destination interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

Figure 2 shows the data export format for the AS aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 3.

Figure 2 Data Export Format for AS Aggregation Scheme

| | | |
|----|------------------|-----------------------|
| 0 | Flows | |
| 4 | Packets | |
| 8 | Bytes | |
| 12 | First time stamp | |
| 16 | Last time stamp | |
| 20 | Source AS | Destination AS |
| 24 | Source interface | Destination interface |

Table 3 lists definitions for the data export record fields used in the AS aggregation scheme.

Table 3 Data Export Record Field Definitions for AS Aggregation Scheme

| Field | Definition |
|------------------|--|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |

Table 3 Data Export Record Field Definitions for AS Aggregation Scheme (continued)

| Field | Definition |
|-----------------------|--|
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |

NetFlow AS-ToS Aggregation Scheme

The NetFlow AS-ToS aggregation scheme groups flows that have the same source BGP AS, destination BGP AS, source and destination interfaces, and ToS byte. The aggregated NetFlow export record based on the AS-ToS aggregation scheme reports the following:

- Source BGP AS
- Destination BGP AS
- ToS byte
- Number of flows summarized by the aggregated record
- Number of bytes summarized by this aggregated record
- Number of packets summarized by this aggregation record
- Source and destination interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for generating AS-to-AS traffic flow data, and for reducing NetFlow export data volume substantially. [Figure 3](#) show the data export format for the AS-ToS aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see [Table 4](#).

Figure 3 Data Export Format for AS-ToS Aggregation Scheme

| | | | |
|----|------------------|-----------------------|----------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Source AS | Destination AS | |
| 24 | Source interface | Destination interface | |
| 28 | ToS | PAD | Reserved |

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Table 4 lists definitions for the data export record terms used in the AS-ToS aggregation scheme.

Table 4 Data Export Record Term Definitions for AS-ToS Aggregation Scheme

| Term | Definition |
|-----------------------|--|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |
| ToS | Type of service byte |
| PAD | Zero field |
| Reserved | Zero field |

NetFlow Destination Prefix Aggregation Scheme

The destination prefix aggregation scheme generates data so that you can examine the destinations of network traffic passing through a NetFlow-enabled device. The scheme groups data flows that have the same destination prefix, destination prefix mask, destination BGP AS, and output interface.

The aggregated NetFlow data export records report the following:

- Destination prefix
- Destination prefix mask
- Destination BGP AS
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Output interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

Figure 4 shows the data export format for the destination prefix aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 5.

Figure 4 Destination Prefix Aggregation Data Export Record Format

| | | | |
|----|-----------------------|-----|----------------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Destination prefix | | |
| 24 | Destination mask bits | PAD | Destination AS |
| 28 | Destination interface | | Reserved |

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Table 5 lists definitions for the data export record terms used in the destination prefix aggregation scheme.

Table 5 Data Export Record Term Definitions for Destination Prefix Aggregation Scheme

| Term | Definition |
|-----------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Destination prefix | Destination IP address ANDed with the destination prefix mask |
| Destination mask bits | Number of bits in the destination prefix |

Table 5 *Data Export Record Term Definitions for Destination Prefix Aggregation Scheme*

| Term | Definition |
|-----------------------|--|
| PAD | Zero field |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |
| Destination interface | SNMP index of the output interface |
| Reserved | Zero field |

NetFlow Destination Prefix-ToS Aggregation Scheme

The NetFlow destination prefix-ToS aggregation scheme groups flows that have the same destination prefix, destination prefix mask, destination BGP AS, ToS byte, and output interface. The aggregated NetFlow export record reports the following:

- Destination IP address
- Destination prefix mask
- Destination AS
- ToS byte
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Output interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for capturing data with which you can examine the destinations of network traffic passing through a NetFlow-enabled device. [Figure 5](#) shows the data export format for the Destination prefix-ToS aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see [Table 6](#).

Figure 5 Data Export Format for Destination Prefix-ToS Aggregation Scheme

| | | | |
|----|-----------------------|-----|----------------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Destination prefix | | |
| 24 | Destination mask bits | ToS | Destination AS |
| 28 | Destination interface | | Reserved |

Table 6 lists definitions for the data export record terms used in the destination prefix-ToS aggregation scheme.

Table 6 Data Export Record Term Definitions for Destination Prefix-ToS Aggregation Scheme

| Term | Definition |
|-----------------------|--|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Destination prefix | Destination IP address ANDed with the destination prefix mask |
| Dest mask bits | Number of bits in the destination prefix |
| ToS | Type of service byte |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |
| Destination interface | SNMP index of the output interface |
| Reserved | Zero field |

NetFlow Prefix Aggregation Scheme

The NetFlow prefix aggregation scheme generates data so that you can examine the sources and destinations of network traffic passing through a NetFlow-enabled device. The scheme groups data flows that have the same source prefix, destination prefix, source prefix mask, destination prefix mask, source BGP AS, destination BGP AS, input interface, and output interface. See Figure 6.

The aggregated NetFlow data export records report the following:

- Source and destination prefix
- Source and destination prefix mask
- Source and destination BGP AS
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Input and output interfaces
- Time stamp when the first packet is switched and time stamp when the last packet is switched

Figure 6 shows the data export format for the prefix aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 7.

Figure 6 Data Export Format for Prefix Aggregation Scheme

| | | | |
|----|-----------------------|------------------|-----------------------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Source prefix | | |
| 24 | Destination prefix | | |
| 28 | Destination mask bits | Source mask bits | Reserved |
| 32 | Source AS | | Destination AS |
| 36 | Source interface | | Destination interface |

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Table 7 lists definitions for the data export record terms used in the prefix aggregation scheme.

Table 7 Data Export Record Terms and Definitions for Prefix Aggregation Scheme

| Term | Definition |
|-----------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source prefix | Source IP address ANDed with the source prefix mask, or the prefix to which the source IP address of the aggregated flows belongs |
| Destination prefix | Destination IP address ANDed with the destination prefix mask |
| Destination mask bits | Number of bits in the destination prefix |
| Source mask bits | Number of bits in the source prefix |
| Reserved | Zero field |
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |

NetFlow Prefix-Port Aggregation Scheme

The NetFlow prefix-port aggregation scheme groups flows that have a common source prefix, source mask, destination prefix, destination mask, source port and destination port when applicable, input interface, output interface, protocol, and ToS byte. The aggregated NetFlow export record reports the following:

- Source prefix
- Source prefix mask
- Destination prefix
- Destination prefix mask
- Source port
- Destination port
- Source interface
- Destination interface
- Protocol
- ToS byte
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregation record

- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for capturing data with which you can examine the sources and destinations of network traffic passing through a NetFlow-enabled device. Figure 7 shows the data export record for the prefix-port aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 8.

Figure 7 Data Export Record for Prefix-Port Aggregation Scheme

| | | | | |
|----|-----------------------|------------------|-----------------------|----------|
| 0 | Flows | | | |
| 4 | Packets | | | |
| 8 | Bytes | | | |
| 12 | First time stamp | | | |
| 16 | Last time stamp | | | |
| 20 | Source prefix | | | |
| 24 | Destination prefix | | | |
| 28 | Destination mask bits | Source mask bits | ToS | Protocol |
| 32 | Source port | | Destination port | |
| 36 | Source interface | | Destination interface | |

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Table 8 lists definitions for the data export record terms used in the prefix-port aggregation scheme.

Table 8 Data Export Record Term Definitions for Prefix-Port Aggregation Scheme

| Term | Definition |
|-----------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source prefix | Source IP address ANDed with the source prefix mask, or the prefix to which the source IP address of the aggregated flows belongs |
| Destination prefix | Destination IP address ANDed with the destination prefix mask |
| Destination mask bits | Number of bits in the destination prefix |
| Source mask bits | Number of bits in the source prefix |

Table 8 Data Export Record Term Definitions for Prefix-Port Aggregation Scheme (continued)

| Term | Definition |
|-----------------------|---|
| ToS | Type of service byte |
| Protocol | IP protocol byte |
| Source port | Source UDP or TCP port number if applicable |
| Destination port | Destination User Datagram Protocol (UDP) or TCP port number |
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |

NetFlow Prefix-ToS Aggregation Scheme

The NetFlow prefix-tos aggregation scheme groups together flows that have a common source prefix, source mask, destination prefix, destination mask, source BGP AS, destination BGP AS, input interface, output interface, and ToS byte. The aggregated NetFlow export record reports the following:

- Source prefix
- Source prefix mask
- Destination prefix
- Destination prefix mask
- Source AS
- Destination AS
- Source interface
- Destination interface
- ToS byte
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for capturing data so that you can examine the sources and destinations of network traffic passing through a NetFlow-enabled device. [Figure 8](#) displays the data export format for the prefix-tos aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see [Table 9](#).

Figure 8 Data Export Format for Prefix-ToS Aggregation Scheme

| | | | | |
|----|-----------------------|------------------|-----------------------|-----|
| 0 | Flows | | | |
| 4 | Packets | | | |
| 8 | Bytes | | | |
| 12 | First time stamp | | | |
| 16 | Last time stamp | | | |
| 20 | Source prefix | | | |
| 24 | Destination prefix | | | |
| 28 | Destination mask bits | Source mask bits | ToS | PAD |
| 32 | Source AS | | Destination AS | |
| 36 | Source interface | | Destination interface | |

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Table 9 lists definitions for the data export record terms used in the prefix-ToS aggregation scheme.

Table 9 Data Export Record Term Definitions for Prefix-ToS Aggregation Scheme

| Term | Definition |
|-----------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source prefix | Source IP address ANDed with the source prefix mask, or the prefix to which the source IP address of the aggregated flows belongs |
| Destination prefix | Destination IP address ANDed with the destination prefix mask |
| Destination mask bits | Number of bits in the destination prefix |
| Source mask bits | Number of bits in the source prefix |
| ToS | Type of service byte |
| Pad | Zero field |
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Destination AS | Autonomous system of the destination IP address (peer or origin) |

Table 9 Data Export Record Term Definitions for Prefix-ToS Aggregation Scheme (continued)

| Term | Definition |
|-----------------------|------------------------------------|
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |

NetFlow Protocol Port Aggregation Scheme

The NetFlow protocol port aggregation scheme captures data so that you can examine network usage by traffic type. The scheme groups data flows with the same IP protocol, source port number, and (when applicable) destination port number.

The aggregated NetFlow data export records report the following:

- Source and destination port numbers
- IP protocol (where 6 = TCP, 17 = UDP, and so on)
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Time stamp when the first packet was switched and time stamp when the last packet was switched

Figure 9 shows the data export format for the protocol port aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 10.

Figure 9 Data Export Format for Protocol Port Aggregation Scheme

| | | | |
|----|------------------|-----|------------------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Protocol | PAD | Reserved |
| 24 | Source port | | Destination port |

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Table 10 lists definitions for the data export record terms used in the protocol port aggregation scheme.

Table 10 *Data Export Record Term Definitions for Protocol Port Aggregation Scheme*

| Term | Definition |
|------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Protocol | IP protocol byte |
| PAD | Zero field |
| Reserved | Zero field |
| Source port | Source UDP or TCP port number if applicable |
| Destination port | Destination User Datagram Protocol (UDP) or TCP port number |

NetFlow Protocol-Port-ToS Aggregation Scheme

The NetFlow protocol-port-tos aggregation scheme groups flows that have a common IP protocol, ToS byte, source and (when applicable) destination port numbers, and source and destination interfaces. The aggregated NetFlow Export record reports the following:

- Source application port number
- Destination port number
- Source and destination interface
- IP protocol
- ToS byte
- Number of flows summarized by the aggregated record
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregation record
- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for capturing data so that you can examine network usage by type of traffic. [Figure 10](#) shows the data export format for the protocol-port-tos aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see [Table 11](#).

Figure 10 Data Export Format for Protocol-Port-ToS Aggregation Scheme

| | | | |
|----|------------------|-----|-----------------------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Protocol | ToS | Reserved |
| 24 | Source port | | Destination port |
| 28 | Source interface | | Destination interface |

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Table 11 lists definitions for the data export record terms used in the protocol-port-ToS aggregation scheme.

Table 11 Data Export Record Term Definitions for Protocol-Port-ToS Aggregation Scheme

| Term | Definition |
|-----------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Protocol | IP protocol byte |
| ToS | Type of service byte |
| Reserved | Zero field |
| Source port | Source UDP or TCP port number if applicable |
| Destination port | Destination User Datagram Protocol (UDP) or TCP port number |
| Source interface | SNMP index of the input interface |
| Destination interface | SNMP index of the output interface |

NetFlow Source Prefix Aggregation Scheme

The NetFlow source prefix aggregation scheme captures data so that you can examine the sources of network traffic passing through a NetFlow-enabled device. The scheme groups data flows that have the same source prefix, source prefix mask, source BGP AS, and input interface.

The aggregated NetFlow data export records report the following:

- Source prefix
- Source prefix mask
- Source BGP AS
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregated record
- Input interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

Figure 11 show the data export format for the source prefix aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see Table 12.

Figure 11 Data Export Format for Source Prefix Aggregation Scheme

| | | | |
|----|------------------|-----|-----------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Source prefix | | |
| 24 | Source mask bits | PAD | Source AS |
| 28 | Source interface | | Reserved |

Table 12 lists definitions for the data export record terms used in the source prefix aggregation scheme.

Table 12 Data Export Record Term Definitions for Source Prefix Aggregation Scheme

| Term | Definition |
|------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source prefix | Source IP address ANDed with the source prefix mask, or the prefix to which the source IP address of the aggregated flows belongs |

Table 12 Data Export Record Term Definitions for Source Prefix Aggregation Scheme

| Term | Definition |
|------------------|---|
| Source mask bits | Number of bits in the source prefix |
| PAD | Zero field |
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Source interface | SNMP index of the input interface |
| Reserved | Zero field |

NetFlow Source Prefix-ToS Aggregation Scheme

The NetFlow source prefix-ToS aggregation scheme groups flows that have a common source prefix, source prefix mask, source BGP AS, ToS byte, and input interface. The aggregated NetFlow export record reports the following:

- Source prefix
- Source prefix mask
- Source AS
- ToS byte
- Number of bytes summarized by the aggregated record
- Number of packets summarized by the aggregation record
- Input interface
- Time stamp when the first packet was switched and time stamp when the last packet was switched

This aggregation scheme is particularly useful for capturing data so that you can examine the sources of network traffic passing through a NetFlow-enabled device. [Figure 12](#) show the data export format for the source prefix-ToS aggregation scheme. For a definition of the data export terms used in the aggregation scheme, see [Table 13](#).



Note

When a router does not have a prefix for the source IP address in the flow, NetFlow uses 0.0.0.0 with 0 mask bits rather than making /32 entries. This prevents DOS attacks that use random source addresses from thrashing the aggregation caches. This is also done for the destination in the destination prefix-ToS, the prefix-ToS, and prefix-port aggregation schemes.

Figure 12 Data Export Format for Source Prefix-ToS Aggregation Scheme

| | | | |
|----|------------------|-----|-----------|
| 0 | Flows | | |
| 4 | Packets | | |
| 8 | Bytes | | |
| 12 | First time stamp | | |
| 16 | Last time stamp | | |
| 20 | Source prefix | | |
| 24 | Source mask bits | ToS | Source AS |
| 28 | Source interface | | Reserved |

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Table 13 lists definitions for the data export record terms used in the source prefix-ToS aggregation scheme.

Table 13 Data Export Record Term Definitions for Source Prefix-ToS Aggregation Scheme

| Term | Definition |
|------------------|---|
| Flows | Number of main cache flows that were aggregated |
| Packets | Number of packets in the aggregated flows |
| Bytes | Number of bytes in the aggregated flows |
| First time stamp | System uptime when the first packet was switched |
| Last time stamp | System uptime when the last packet was switched |
| Source prefix | Source IP address ANDed with the source prefix mask, or the prefix to which the source IP address of the aggregated flows belongs |
| Source mask bits | Number of bits in the source prefix |
| ToS | Type of service byte |
| Source AS | Autonomous system of the source IP address (peer or origin) |
| Source interface | SNMP index of the input interface |
| Reserved | Zero field |

NetFlow Data Export Format Versions 9, and 8 for NetFlow Aggregation Caches: Overview

Export formats available for NetFlow aggregation caches are the Version 9 export format and the Version 8 export format.

- **Version 9**—A flexible and extensible format, which provides the versatility needed for support of new fields and record types. This format accommodates new NetFlow-supported technologies such as Multicast, Multiprotocol Label Switching (MPLS), and Border Gateway Protocol (BGP) next hop. Version 9 export format enables you to use the same version for main and aggregation caches, and the format is extendable, so you can use the same export format with future features.
- **Version 8**—A format added to support data export from aggregation caches. Export datagrams contain a subset of the usual Version 5 export data, which is valid for the particular aggregation cache scheme. Version 8 is the default export version for aggregation caches when data export is configured.

The Version 9 export format is flexible and extensible, which provides the versatility needed for the support of new fields and record types. You can use the Version 9 export format for both main and aggregation caches.

The Version 8 export format was added to support data export from aggregation caches. This format allows export datagrams to contain a subset of the Version 5 export data that is valid for the cache aggregation scheme.

Refer to the [NetFlow Data Export](#) section for more details.

How to Configure NetFlow Aggregation Caches

This section is broken down into the following subsections:

- [Configuring NetFlow Aggregation Caches, page 25](#) (required)
- [Verifying the Aggregation Cache Configuration, page 28](#) (optional)

Configuring NetFlow Aggregation Caches

Perform the steps in this required to enable NetFlow and configure a NetFlow aggregation cache.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip flow-aggregation cache** { **as** | **as-tos** | **bgp-nexthop-tos** | **destination-prefix** | **destination-prefix-tos** | **prefix** | **prefix-port** | **prefix-tos** | **protocol-port** | **protocol-port-tos** | **source-prefix** | **source-prefix-tos** }
4. **cache entries** *number*
5. **cache timeout active** *minutes*
6. **cache timeout inactive** *seconds*
7. **export destination** { { *ip-address* | *hostname* } *udp-port* }
8. Repeat Step 7 once to configure a second export destination
9. **export version** [9 | 8]
10. **enabled**
11. **exit**
12. **interface** *interface-type interface-number*
13. **ip flow** { **ingress** | **egress** }
14. **exit**
15. Repeat Steps 12 through 14 to enable NetFlow on other interfaces
16. **end**

DETAILED STEPS

| | Command or Action | Purpose |
|--------|---|---|
| Step 1 | <p>enable</p> <p>Example: Router> enable</p> | <p>(Required) Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted. |
| Step 2 | <p>configure terminal</p> <p>Example: Router# configure terminal</p> | <p>(Required) Enters global configuration mode.</p> |
| Step 3 | <p>ip flow-aggregation cache {as as-tos bgp-nexthop-tos destination-prefix destination-prefix-tos prefix prefix-port prefix-tos protocol-port protocol-port-tos source-prefix source-prefix-tos}</p> <p>Example: Router(config)# ip flow-aggregation cache destination-prefix</p> | <p>(Required) Specifies the aggregation cache scheme and enables aggregation cache configuration mode.</p> <ul style="list-style-type: none"> The as keyword configures the AS aggregation cache. The as-tos keyword configures the AS ToS aggregation cache. The bgp-nexthop-tos keyword configures the BGP nexthop aggregation cache. The destination-prefix keyword configures the destination prefix aggregation cache. The destination-prefix-tos keyword configures the destination prefix ToS aggregation cache. The prefix keyword configures the prefix aggregation cache. The prefix-port keyword configures the prefix port aggregation cache. The prefix-tos keyword configures the prefix ToS aggregation cache. The protocol-port keyword configures the protocol port aggregation cache. The protocol-port-tos keyword configures the protocol port ToS aggregation cache. The source-prefix keyword configures the source prefix aggregation cache. The source-prefix-tos keyword configures the source prefix ToS aggregation cache. |
| Step 4 | <p>cache entries number</p> <p>Example: Router(config-flow-cache)# cache entries 2048</p> | <p>(Optional) Configures aggregation cache operational parameters.</p> <ul style="list-style-type: none"> The entries number keyword-argument pair is the number of cached entries allowed in the aggregation cache. The range is from 1024 to 524288. The default is 4096. |

| | Command or Action | Purpose |
|---------|--|---|
| Step 5 | <p>cache timeout active <i>minutes</i></p> <p>Example: Router(config-flow-cache)# cache timeout active 15</p> | <p>(Optional) Configures aggregation cache operational parameters.</p> <ul style="list-style-type: none"> The timeout keyword dissolves the session in the aggregation cache. The active <i>minutes</i> keyword-argument pair specifies the number of minutes that an entry is active. The range is from 1 to 60 minutes. The default is 30 minutes. |
| Step 6 | <p>cache timeout inactive <i>seconds</i></p> <p>Example: Router(config-flow-cache)# cache timeout inactive 300</p> | <p>(Optional) Configures aggregation cache operational parameters.</p> <ul style="list-style-type: none"> The timeout keyword dissolves the session in the aggregation cache. The inactive <i>seconds</i> keyword-argument pair specifies the number of seconds that an inactive entry stays in the aggregation cache before the entry times out. The range is from 10 to 600 seconds. The default is 15 seconds. |
| Step 7 | <p>export destination {{<i>ip-address</i> <i>hostname</i>} <i>udp-port</i>}</p> <p>Example: Router(config-flow-cache)# export destination 172.30.0.1 991</p> | <p>(Optional) Enables the exporting of information from NetFlow aggregation caches.</p> <ul style="list-style-type: none"> The <i>ip-address</i> <i>hostname</i> argument is the destination IP address or hostname. The <i>port</i> argument is the destination UDP port. |
| Step 8 | Repeat Step 7 once to configure a second export destination. | (Optional) You can configure a maximum of two export destinations for each NetFlow aggregation cache. |
| Step 9 | <p>export version [9 8]</p> <p>Example: Router(config-flow-cache)# export version 9</p> | <p>(Optional) Specifies data export format Version.</p> <ul style="list-style-type: none"> The version 9 keyword specifies that the export packet uses the Version 9 format. |
| Step 10 | <p>enabled</p> <p>Example: Router(config-flow-cache)# enabled</p> | (Required) Enables the aggregation cache. |
| Step 11 | <p>exit</p> <p>Example: Router(config-if)# exit</p> | (Required) Exits NetFlow aggregation cache configuration mode and returns to global configuration mode. |
| Step 12 | <p>interface <i>interface-type</i> <i>interface-number</i></p> <p>Example: Router(config)# interface ethernet 0/0</p> | (Required) Specifies the interface that you want to enable NetFlow on and enters interface configuration mode. |

| | Command or Action | Purpose |
|---------|--|---|
| Step 13 | <p><code>ip flow {ingress egress}</code></p> <p>Example: Router(config-if)# ip flow ingress or</p> <p>Example: Router(config-if)# ip flow egress</p> | <p>(Required) Enables NetFlow on the interface.</p> <ul style="list-style-type: none"> • ingress—captures traffic that is being received by the interface • egress—captures traffic that is being transmitted by the interface. |
| Step 14 | <p><code>exit</code></p> <p>Example: Router(config-if)# exit</p> | <p>(Optional) Exits interface configuration mode and returns to global configuration mode.</p> <p>Note You only need to use this command if you want to enable NetFlow on another interface.</p> |
| Step 15 | Repeat Steps 12 through 14 to enable NetFlow on other interfaces | (Optional) — |
| Step 16 | <p><code>end</code></p> <p>Example: Router(config-if)# <code>end</code></p> | Exits the current configuration mode and returns to privileged EXEC mode. |

Verifying the Aggregation Cache Configuration

Perform the steps in this optional task to verify that:

- The NetFlow aggregation cache is operational
- NetFlow Data Export for the aggregation cache is operational
- To view the aggregation cache statistics.

SUMMARY STEPS

1. `show ip cache [ip-address-prefix prefix-mask] flow aggregation {as | as-tos | bgp-nexthop-tos | destination-prefix | destination-prefix-tos | prefix | prefix-port | prefix-tos | protocol-port | protocol-port-tos | source-prefix | source-prefix-tos}`
2. `show ip flow export`

DETAILED STEPS

- Step 1** `show ip cache flow aggregation {as | as-tos | bgp-nexthop-tos | destination-prefix | destination-prefix-tos | prefix | prefix-port | prefix-tos | protocol-port | protocol-port-tos | source-prefix | source-prefix-tos}`

Use the `show ip cache flow aggregation destination-prefix` command to verify the configuration of an destination-prefix aggregation cache. For example:

```
Router# show ip cache flow aggregation destination-prefix
```

```
IP Flow Switching Cache, 139272 bytes
 5 active, 2043 inactive, 9 added
841 ager polls, 0 flow alloc failures
```

```

Active flows timeout in 15 minutes
Inactive flows timeout in 300 seconds
IP Sub Flow Cache, 11144 bytes
 5 active, 507 inactive, 9 added, 9 added to flow
 0 alloc failures, 0 force free
 1 chunk, 2 chunks added

Dst If      Dst Prefix      Msk AS    Flows Pkts B/Pk  Active
Null        0.0.0.0         /0  0        5    13   52   138.9
Et0/0.1     172.16.6.0     /24 0        1     1   56    0.0
Et1/0.1     172.16.7.0     /24 0         3   31K 1314  187.3
Et0/0.1     172.16.1.0     /24 0        16  104K 1398  188.4
Et1/0.1     172.16.10.0    /24 0         9   99K 1412  183.3
Router#

```

Use the **show ip cache verbose flow aggregation source-prefix** command to verify the configuration of a source-prefix aggregation cache. For example:

```

Router# show ip cache verbose flow aggregation source-prefix

IP Flow Switching Cache, 278544 bytes
 4 active, 4092 inactive, 4 added
 51 ager polls, 0 flow alloc failures
 Active flows timeout in 30 minutes
 Inactive flows timeout in 15 seconds
IP Sub Flow Cache, 21640 bytes
 4 active, 1020 inactive, 4 added, 4 added to flow
 0 alloc failures, 0 force free
 1 chunk, 1 chunk added

Src If      Src Prefix      Msk AS    Flows Pkts B/Pk  Active
Et1/0.1     172.16.10.0     /24 0         4   35K 1391   67.9
Et0/0.1     172.16.6.0     /24 0         2     5   88   60.6
Et1/0.1     172.16.7.0     /24 0         2  3515 1423   58.6
Et0/0.1     172.16.1.0     /24 0         2   20K 1416   71.9
Router#

```

Use the **show ip cache verbose flow aggregation protocol-port** command to verify the configuration of a protocol-port aggregation cache. For example:

```

Router# show ip cache verbose flow aggregation protocol-port

IP Flow Switching Cache, 278544 bytes
 4 active, 4092 inactive, 4 added
 158 ager polls, 0 flow alloc failures
 Active flows timeout in 30 minutes
 Inactive flows timeout in 15 seconds
IP Sub Flow Cache, 21640 bytes
 0 active, 1024 inactive, 0 added, 0 added to flow
 0 alloc failures, 0 force free
 1 chunk, 1 chunk added

Protocol  Source Port  Dest Port  Flows  Packets  Bytes/Packet  Active
0x01     0x0000      0x0000     6      52K      1405          104.3
0x11     0x0208      0x0208     1         3         52           56.9
0x01     0x0000      0x0800     2       846      1500          59.8
0x01     0x0000      0x0B01     2         10         56           63.0
Router#

```

Step 2 show ip flow export

Use the **show ip flow export** command to verify that NetFlow Data Export is operational for the aggregation cache. For example:

```

Router# show ip flow export
Flow export v1 is disabled for main cache
Version 1 flow records
Cache for protocol-port aggregation:
  Exporting flows to 172.16.20.4 (991) 172.30.0.1 (991)
  Exporting using source IP address 172.16.6.2
Cache for source-prefix aggregation:
  Exporting flows to 172.16.20.4 (991) 172.30.0.1 (991)
  Exporting using source IP address 172.16.6.2
Cache for destination-prefix aggregation:
  Exporting flows to 172.16.20.4 (991) 172.30.0.1 (991)
  Exporting using source IP address 172.16.6.2
40 flows exported in 20 udp datagrams
0 flows failed due to lack of export packet
20 export packets were sent up to process level
0 export packets were dropped due to no fib
0 export packets were dropped due to adjacency issues
0 export packets were dropped due to fragmentation failures
0 export packets were dropped due to encapsulation fixup failures

Router#

```

Configuration Examples for Configuring NetFlow Aggregation Caches

This section provides the following examples for configuring an aggregation cache:

- [Configuring an AS Aggregation Cache: Example, page 30](#)
- [Configuring a Destination Prefix Aggregation Cache: Example, page 31](#)
- [Configuring a Prefix Aggregation Cache: Example, page 31](#)
- [Configuring a Protocol Port Aggregation Cache: Example, page 31](#)
- [Configuring a Source Prefix Aggregation Cache: Example, page 32](#)
- [Configuring an AS-ToS Aggregation Cache: Example, page 32](#)
- [Configuring a Prefix-ToS Aggregation Cache: Example, page 32](#)
- [Configuring the Minimum Mask of a Prefix Aggregation Scheme: Example, page 33](#)
- [Configuring the Minimum Mask of a Destination Prefix Aggregation Scheme: Example, page 33](#)
- [Configuring the Minimum Mask of a Source Prefix Aggregation Scheme: Example, page 33](#)
- [Configuring NetFlow Version 9 Data Export for Aggregation Caches: Example, page 33](#)
- [Configuring NetFlow Version 8 Data Export for Aggregation Caches: Example, page 34](#)

Configuring an AS Aggregation Cache: Example

The following example shows how to configure an AS aggregation cache with a cache size of 2046, an inactive timeout of 200 seconds, a cache active timeout of 45 minutes, an export destination IP address of 10.42.42.1, and a destination port of 9992:

```

configure terminal
!
ip flow-aggregation cache as

```

```
cache entries 2046
cache timeout inactive 200
cache timeout active 45
export destination 10.42.42.1 9992
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end
```

Configuring a Destination Prefix Aggregation Cache: Example

The following example shows how to configure a destination prefix aggregation cache with a cache size of 2046, an inactive timeout of 200 seconds, a cache active timeout of 45 minutes, an export destination IP address of 10.42.42.1, and a destination port of 9992:

```
configure terminal
!
ip flow-aggregation cache destination-prefix
cache entries 2046
cache timeout inactive 200
cache timeout active 45
export destination 10.42.42.1 9992
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end
```

Configuring a Prefix Aggregation Cache: Example

The following example shows how to configure a prefix aggregation cache with a cache size of 2046, an inactive timeout of 200 seconds, a cache active timeout of 45 minutes, an export destination IP address of 10.42.42.1, and a destination port of 9992:

```
configure terminal
!
ip flow-aggregation cache prefix
cache entries 2046
cache timeout inactive 200
cache timeout active 45
export destination 10.42.42.1 9992
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end
```

Configuring a Protocol Port Aggregation Cache: Example

The following example shows how to configure a protocol port aggregation cache with a cache size of 2046, an inactive timeout of 200 seconds, a cache active timeout of 45 minutes, an export destination IP address of 10.42.42.1, and a destination port of 9992:

```
configure terminal
!
ip flow-aggregation cache protocol-port
```

```

cache entries 2046
cache timeout inactive 200
cache timeout active 45
export destination 10.42.42.1 9992
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end

```

Configuring a Source Prefix Aggregation Cache: Example

The following example shows how to configure a source prefix aggregation cache with a cache size of 2046, an inactive timeout of 200 seconds, a cache active timeout of 45 minutes, an export destination IP address of 10.42.42.1, and a destination port of 9992:

```

configure terminal
!
ip flow-aggregation cache source-prefix
cache entries 2046
cache timeout inactive 200
cache timeout active 45
export destination 10.42.42.1 9992
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end

```

Configuring an AS-ToS Aggregation Cache: Example

The following example shows how to configure an AS-ToS aggregation cache with a cache active timeout of 20 minutes, an export destination IP address of 10.2.2.2, and a destination port of 9991:

```

configure terminal
!
ip flow-aggregation cache as-tos
cache timeout active 20
export destination 10.2.2.2 9991
enabled
!
interface Ethernet0/0
 ip flow ingress
!
end

```

Configuring a Prefix-ToS Aggregation Cache: Example

The following example shows how to configure a prefix-ToS aggregation cache with an export destination IP address of 10.4.4.4 and a destination port of 9995:

```

configure terminal
!
ip flow-aggregation cache prefix-tos
export destination 10.4.4.4 9995
enabled
!
interface Ethernet0/0

```

```
ip flow ingress
!  
end
```

Configuring the Minimum Mask of a Prefix Aggregation Scheme: Example

The following example shows how to configure the minimum mask for a prefix aggregation scheme:

```
configure terminal
!  
ip flow-aggregation cache prefix  
mask source minimum 24  
mask destination minimum 28  
enabled  
!  
interface Ethernet0/0  
ip flow ingress  
!  
end
```

Configuring the Minimum Mask of a Destination Prefix Aggregation Scheme: Example

The following example shows how to configure the minimum mask for a destination prefix aggregation scheme:

```
configure terminal
!  
ip flow-aggregation cache destination-prefix  
mask destination minimum 32  
enabled  
!  
interface Ethernet0/0  
ip flow ingress  
!  
end
```

Configuring the Minimum Mask of a Source Prefix Aggregation Scheme: Example

The following example shows how to configure the minimum mask for a source prefix aggregation scheme:

```
configure terminal
!  
ip flow-aggregation cache source-prefix  
mask source minimum 30  
enabled  
!  
interface Ethernet0/0  
ip flow ingress  
!  
end
```

Configuring NetFlow Version 9 Data Export for Aggregation Caches: Example

The following example shows how to configure NetFlow Version 9 data export for an AS aggregation cache scheme:

```
configure terminal
```

```

!
ip flow-aggregation cache as
export destination 10.42.42.2 9991
export template refresh-rate 10
export version 9
export template timeout-rate 60
enabled
!
interface Ethernet0/0
ip flow ingress
!
end

```

Configuring NetFlow Version 8 Data Export for Aggregation Caches: Example

The following example shows how to configure NetFlow Version 8 data export for an AS aggregation cache scheme:

```

configure terminal
!
ip flow-aggregation cache as
export destination 10.42.42.2 9991
export destination 10.42.41.1 9991
export version 8
enabled
!
interface Ethernet0/0
ip flow ingress
!
end

```

Additional References

The following sections provide references related to configuring NetFlow aggregation caches and schemes.

Related Documents

| Related Topic | Document Title |
|--|--|
| Overview of Cisco IOS NetFlow | Cisco IOS NetFlow Overview |
| List of the features documented in the <i>Book Title</i> configuration guide | Cisco IOS NetFlow Features Roadmap |
| The minimum information about and tasks required for configuring NetFlow and NetFlow Data Export | Getting Started with Configuring NetFlow and NetFlow Data Export |
| Tasks for configuring NetFlow to capture and export network traffic data | Configuring NetFlow and NetFlow Data Export |
| Tasks for configuring Configuring MPLS Aware NetFlow | Configuring MPLS Aware NetFlow |
| Tasks for configuring MPLS egress NetFlow accounting | Configuring MPLS Egress NetFlow Accounting and Analysis |

| Related Topic | Document Title |
|---|---|
| Tasks for configuring NetFlow input filters | Using NetFlow Filtering or Sampling to Select the Network Traffic to Track |
| Tasks for configuring Random Sampled NetFlow | Using NetFlow Filtering or Sampling to Select the Network Traffic to Track |
| Tasks for configuring NetFlow BGP next hop support | Configuring NetFlow BGP Next Hop Support for Accounting and Analysis |
| Tasks for configuring NetFlow multicast support | Configuring NetFlow Multicast Accounting |
| Tasks for detecting and analyzing network threats with NetFlow | Detecting and Analyzing Network Threats With NetFlow |
| Tasks for configuring NetFlow Reliable Export With SCTP | NetFlow Reliable Export With SCTP |
| Tasks for configuring NetFlow Layer 2 and Security Monitoring Exports | NetFlow Layer 2 and Security Monitoring Exports |
| Tasks for configuring the SNMP NetFlow MIB | Configuring SNMP and using the NetFlow MIB to Monitor NetFlow Data |
| Tasks for configuring the NetFlow MIB and Top Talkers feature | Configuring NetFlow Top Talkers using Cisco IOS CLI Commands or SNMP Commands |
| Information for installing, starting, and configuring the CNS NetFlow Collection Engine | Cisco CNS NetFlow Collection Engine Documentation |

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. | — |

MIBs

| MIBs | MIBs Link |
|---|--|
| No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature. | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs |

RFCs

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

Technical Assistance

| Description | Link |
|---|---|
| The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | http://www.cisco.com/techsupport |

Feature Information for Configuring NetFlow Aggregation Caches

[Table 14](#) lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 12.2(1) or 12.0(3)S or a later version appear in the table.

Not all commands may be available in your Cisco IOS software release. For details on when support for a specific command was introduced, see the command reference documentation.

For information on a feature in this technology that is not documented here, see the [Cisco IOS NetFlow Features Roadmap](#).

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.



Note

[Table 14](#) lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 14 **Feature Information for Configuring NetFlow Aggregation Caches**

| Feature Name | Releases | Feature Configuration Information |
|--------------------------------------|--|---|
| NetFlow ToS-Based Router Aggregation | 12.0(15)S, 12.2(4)T, 12.2(14)S Cisco IOS XE Release 2.1 | <p>The NetFlow ToS-Based Router Aggregation feature enables you to limit router-based type of service (ToS) aggregation of NetFlow export data. The aggregation of export data provides a summarized NetFlow export data that can be exported to a collection device. The result is lower bandwidth requirements for NetFlow export data and reduced platform requirements for NetFlow data collection devices.</p> <p>In Cisco IOS XE Release 2.1, this feature was introduced on Cisco ASR 1000 Series Routers.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • NetFlow Cache Aggregation Benefits, page 4 • NetFlow Cache Aggregation Schemes, page 4 • NetFlow Data Export Format Versions 9, and 8 for NetFlow Aggregation Caches: Overview, page 24 • NetFlow Aggregation Scheme Fields, page 5 • NetFlow AS-ToS Aggregation Scheme, page 8 • NetFlow Destination Prefix-ToS Aggregation Scheme, page 11 • NetFlow Prefix-Port Aggregation Scheme, page 14 • NetFlow Prefix-ToS Aggregation Scheme, page 16 • NetFlow Protocol-Port-ToS Aggregation Scheme, page 19 • NetFlow Source Prefix-ToS Aggregation Scheme, page 22 • Configuring NetFlow Aggregation Caches, page 25 <p>The following commands were modified by this feature: ip flow-aggregation cache, show ip cache verbose flow aggregation, and show ip flow export.</p> |

Table 14 Feature Information for Configuring NetFlow Aggregation Caches (continued)

| Feature Name | Releases | Feature Configuration Information |
|--|---|--|
| NetFlow Minimum Prefix Mask for Router-Based Aggregation | 12.0(11)S, 12.1(2)T Cisco IOS XE Release 2.1 | <p>The NetFlow Minimum Prefix Mask for Router-Based Aggregation feature allows you to set a minimum mask size for prefix aggregation, destination prefix aggregation, and source prefix aggregation schemes.</p> <p>In Cisco IOS XE Release 2.1, this feature was introduced on Cisco ASR 1000 Series Routers.</p> <p>The following sections provide configuration information about this feature:</p> <ul style="list-style-type: none"> • NetFlow Destination Prefix Aggregation Scheme, page 9 • NetFlow Destination Prefix-ToS Aggregation Scheme, page 11 • NetFlow Destination Prefix Aggregation Scheme, page 9 • NetFlow Prefix Aggregation Scheme, page 12 • NetFlow Prefix-ToS Aggregation Scheme, page 16 <p>The following commands were modified by this feature: ip flow-aggregation cache, mask destination, mask source, and show ip cache flow aggregation.</p> |

Glossary

AS—autonomous system. A collection of networks under a common administration sharing a common routing strategy. Autonomous systems are subdivided by areas. An autonomous system must be assigned a unique 16-bit number by the Internet Assigned Numbers Authority (IANA).

CEF—Cisco Express Forwarding. A Layer 3 IP switching technology that optimizes network performance and scalability for networks with large and dynamic traffic patterns.

dCEF—Distributed Cisco Express Forwarding. Type of CEF switching in which line cards maintain an identical copy of the forwarding information base (FIB) and adjacency tables. The line cards perform the express forwarding between port adapters; this relieves the Route Switch Processor of involvement in the switching operation.

export packet—Type of packet built by a device (for example, a router) with NetFlow services enabled. The packet contains NetFlow statistics and is addressed to another device (for example, the NetFlow Collection Engine). The other device processes the packet (parses, aggregates, and stores information on IP flows).

flow—A set of packets with the same source IP address, destination IP address, protocol, source/destination ports, and type-of-service, and the same interface on which flow is monitored. Ingress flows are associated with the input interface, and egress flows are associated with the output interface.

flowset—Collection of flow records that follow the packet header in an export packet. A flowset contains information that must be parsed and interpreted by the NetFlow Collection Engine. There are two different types of flowsets: template flowsets and data flowsets. An export packet contains one or more flowsets, and both template and data flowsets can be mixed in the same export packet.

NetFlow—Cisco IOS accounting feature that maintains per-flow information.

NetFlow Aggregation—A NetFlow feature that lets you summarize NetFlow export data on an IOS router before the data is exported to a NetFlow data collection system such as the NetFlow Collection Engine. This feature lowers bandwidth requirements for NetFlow export data and reduces platform requirements for NetFlow data collection devices.

NetFlow Collection Engine (formerly NetFlow FlowCollector)—Cisco application that is used with NetFlow on Cisco routers and Catalyst series switches. The NetFlow Collection Engine collects packets from the router that is running NetFlow and decodes, aggregates, and stores them. You can generate reports on various aggregations that can be set up on the NetFlow Collection Engine.

NetFlow v9—NetFlow export format Version 9. A flexible and extensible means for carrying NetFlow records from a network node to a collector. NetFlow Version 9 has definable record types and is self-describing for easier NetFlow Collection Engine configuration.

QoS—quality of service. A measure of performance for a transmission system that reflects its transmission quality and service availability.

template flowset—One or more template records that are grouped in an export packet.

ToS—type of service. The second byte in the IP header. It indicates the desired quality of service (QoS) for a particular datagram.

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