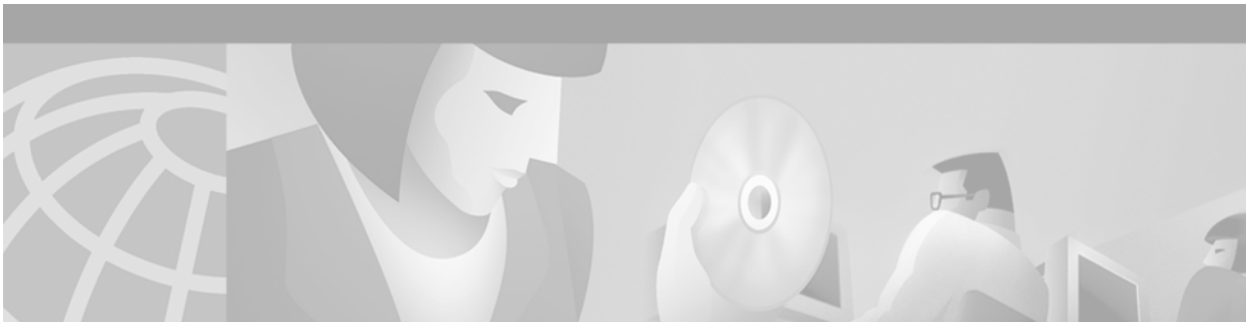

Cisco IOS Switching Commands

This chapter documents commands used to configure switching and NetFlow features in Cisco IOS software. For guidelines on configuring switching and NetFlow features, refer to the *Cisco IOS Switching Services Configuration Guide*.

Note Beginning with Cisco IOS Release 11.3, all commands supported on the Cisco 7500 series routers are also supported on Cisco 7000 series routers.

clear ip cache

To delete entries in the routing table cache used to fast switch IP traffic, use the **clear ip cache** command in the privileged EXEC mode.

clear ip cache [*prefix mask*]

Syntax Description

prefix mask	(Optional) Deletes only the entries in the cache that match the prefix and mask combination.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use this command to clear routes from the routing table cache. You can remove all entries in the routing cache or you can remove only those entries associated with a specified prefix and mask.

Examples

The following command shows how to delete entire in the routing table cache:

```
Router# clear ip cache
```

The following command show how to delete entries in the router table associated with the prefix and mask 192.168.32.0 255.255.255.0:

```
Router# clear ip cache 192.168.32.0 255.255.255.0
```

Related Commands

Command	Description
ip route-cache	Controls the use of high-speed switching caches for IP routing.
show ip cache	Displays the routing table cache used to fast switch IP traffic.

clear ip flow stats

To clear the NetFlow statistics, use the **clear ip flow stats** EXEC command.

clear ip flow stats

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

The **show ip cache flow** command displays the NetFlow statistics. Use the **clear ip flow stats** command to clear the NetFlow statistics.

Examples

The following example clears the NetFlow statistics on the router:

```
clear ip flow stats
```

Related Commands

Command	Description
show ip cache	Displays the routing table cache used to fast switch IP traffic.

encapsulation isl

Use the **encapsulation isl** subinterface configuration command to enable the Inter-Switch Link (ISL). ISL is a Cisco protocol for interconnecting multiple switches and routers, and for defining VLAN topologies.

encapsulation isl *vlan-identifier*

Syntax Description

vlan-identifier	Virtual LAN identifier. The allowed range is 1 to 1000.

Defaults

Disabled

Command Modes

Subinterface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

ISL encapsulation is configurable on Fast Ethernet interfaces.

ISL encapsulation adds a 26-byte header to the beginning of the Ethernet frame. The header contains a 10-bit VLAN identifier that conveys VLAN membership identities between switches.

Examples

The following example enables ISL on Fast Ethernet subinterface 2/1.20:

```
interface FastEthernet 2/1.20
 encapsulation isl 400
```

Related Commands

Command	Description
bridge-group	Assigns each network interface to a bridge group.
show bridge vlan	Displays virtual LAN subinterfaces.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show vlans	Displays virtual LAN subinterfaces.

encapsulation sde

Use the **encapsulation sde** subinterface configuration command to enable IEEE 802.10 encapsulation of traffic on a specified subinterface in virtual LANs. IEEE 802.10 is a standard protocol for interconnecting multiple switches and routers, and for defining VLAN topologies.

encapsulation sde *said*

Syntax Description

said	Security association identifier. This value is used as the virtual LAN identifier. The valid range is 0 through 0xFFFFFFFE.

Defaults

Disabled

Command Modes

Subinterface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

SDE encapsulation is configurable only on the following interface types:

IEEE 802.10 Routing	IEEE 802.10 Transparent Bridging
• FDDI	• Ethernet • FDDI • HDLC Serial • Transparent mode • Token Ring

Examples

The following example enables SDE on FDDI subinterface 2/0.1 and assigns a VLAN identifier of 9999:

```
interface fddi 2/0.1
 encapsulation sde 9999
```

Related Commands

Command	Description
bridge-group	Assigns each network interface to a bridge group.
show bridge vlan	Displays virtual LAN subinterfaces.

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show vlans	Displays virtual LAN subinterfaces.

encapsulation tr-isl

Use the **encapsulation tr-isl** subinterface configuration command to enable TRISL, a Cisco proprietary protocol for interconnecting multiple routers and switches and maintaining VLAN information as traffic goes between switches.

encapsulation tr-isl trbrf-vlan *vlan-id* **bridge-num** *bridge-number*

Syntax Description

vlan-id	Number identifying the VLAN.
bridge-num	Keyword that specifies the identification number of the bridge number on the ISL trunk. Possible values are 01 to 4095.

Command Modes

Subinterface configuration

Command History

Release	Modification
11.3(4)T	This command was introduced.

Examples

In the following example, TRISL is enabled on a Fast Ethernet interface:

```
interface FastEthernet4/0.2
 encapsulation tr-isl trbrf-vlan 999 bridge-num 14
```

Related Commands

Command	Description
clear drip counters	Clears DRiP counters.
clear vlan statistics	Removes virtual LAN statistics from any statically or system configured entries.
multiring	Enables collection and use of RIF information.
multiring trcrf-vlan	Creates a pseudo-ring to terminate the RIF for source-routed traffic and assigns it to a VLAN.
show drip	Displays the status of the DRiP database.
show vlans	Displays virtual LAN subinterfaces.
source-bridge trcrf-vlan	Attaches a TrCRF VLAN to the virtual ring of the router.

ip cache-invalidate-delay

To control the invalidation rate of the IP route cache, use the **ip cache-invalidate-delay** global configuration command. To allow the IP route cache to be immediately invalidated, use the **no** form of this command.

ip cache-invalidate-delay [*minimum maximum quiet threshold*]

no ip cache-invalidate-delay

Syntax Description

minimum	(Optional) Minimum time (in seconds) between invalidation request and actual invalidation. The default is 2 seconds.
maximum	(Optional) Maximum time (in seconds) between invalidation request and actual invalidation. The default is 5 seconds.
quiet	(Optional) Length of quiet period (in seconds) before invalidation.
threshold	(Optional) Maximum number of invalidation requests considered to be quiet.

Defaults

minimum = 2 seconds
maximum = 5 seconds, and 3 seconds with no more than zero invalidation requests

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

All cache invalidation requests are honored immediately.

This command should typically not be used except under the guidance of technical support personnel. Incorrect settings can seriously degrade network performance.

The IP fast-switching and autonomous-switching features maintain a cache of IP routes for rapid access. When a packet is to be forwarded and the corresponding route is not present in the cache, the packet is process-switched and a new cache entry is built. However, when routing table changes occur (such as when a link or an interface goes down), the route cache must be flushed so that it can be rebuilt with up-to-date routing information.

This command controls how the route cache is flushed. The intent is to delay invalidation of the cache until after routing has settled down. Because route table changes tend to be clustered in a short period of time, and the cache may be flushed repeatedly, a high CPU load might be placed on the router.

When this feature is enabled, and the system requests that the route cache be flushed, the request is held for at least *minimum* seconds. Then the system determines whether the cache has been "quiet" (that is, less than *threshold* invalidation requests in the last *quiet* seconds). If the cache has been quiet, the cache is then flushed. If the cache does not become quiet within *maximum* seconds after the first request, it is flushed unconditionally.

Manipulation of these parameters trades off CPU utilization versus route convergence time. Timing of the routing protocols is not affected, but removal of stale cache entries is affected.

Examples

The following example sets a minimum delay of 5 seconds, a maximum delay of 30 seconds, and a quiet threshold of no more than 5 invalidation requests in the previous 10 seconds:

```
ip cache-invalidate-delay 5 30 10 5
```

Related Commands

Command	Description
ip route-cache	Configures the router to export the flow cache entry to a workstation when a flow expires.
show ip cache	Displays the routing table cache used to fast switch IP traffic.

ip flow-export

To enable the exporting of information in NetFlow cache entries, use the **ip flow-export** global configuration command. To disable the exporting of information, use the **no** form of this command.

ip flow-export *ip-address udp-port* [**version 1** | **version 5** [**origin-as** | **peer-as**]]

no ip flow-export

Syntax Description

ip-address	IP address of the workstation to which you want to send the NetFlow information.
udp-port	UDP protocol-specific port number.
version 1	(Optional) Specifies that the export packet uses the version 1 format. This is the default. The version field occupies the first two bytes of the export record. The number of records stored in the datagram is a variable between 1 and 24 for version 1.
version 5	(Optional) Specifies export packet uses the version 5 format. The number of records stored in the datagram is a variable between 1 and 30 for version 5.
origin-as	(Optional) Specifies that export statistics includes the origin autonomous system (AS) for the source and destination.
peer-as	(Optional) Specifies that export statistics includes the peer AS for the source and destination.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

There is a lot of information in a NetFlow cache entry. When NetFlow is enabled with the **ip route-cache flow** command, you can use the **ip flow-export** command to configure the router to export the flow cache entry to a workstation when a flow expires. This feature can be useful for purposes of statistics, billing, and security.

Version 5 format includes the source and destination AS addresses, source and destination prefix masks, and a sequence number. Because this change may appear on your router as a maintenance release, support for version 1 format is maintained with the **version 1** keyword.

Caution Entering the **ip flow-export** or **no ip flow-export** command on the Cisco 12000 Series Internet Routers and specifying any version format other than version 1 (in other words, entering the **ip flow-export** or **no ip flow-export** command and specifying the **version 5** keyword) causes packet forwarding to stop

for a few seconds while NetFlow reloads the route processor and line card CEF tables. To avoid interruption of service to a live network, apply this command during a change window, or include it in the startup-config file to be executed during a router reboot.

For more information on version 1 and version 5 data format, refer to the "NetFlow Data Format" section in the "Configuring NetFlow" chapter of the *Cisco IOS Switching Services Configuration Guide*.

Examples

The following example configures the router to export the NetFlow cache entry to UDP port 125 on the workstation at 134.22.23.7 when the flow expires using version 1 format:

```
ip flow-export 134.22.23.7 125
```

The following example configures the router to export the NetFlow cache entry to UDP port 2048 on the workstation at 134.22.23.7 when the flow expires using version 5 format and including the peer AS information:

```
ip flow-export 134.22.23.7 2048 version 5 peer-as
```

Related Commands

Command	Description
ip route-cache flow	Enables NetFlow for IP routing.

ip flow-export source

To specify the source interface IP address used in the NetFlow export datagram, use the **ip flow-export source** command in global configuration mode. To remove the source address, use the **no** form of this command.

ip flow-export source *interface*

no ip flow-export source

Syntax Description

interface	Interface from which the router gets the source IP address for the packet.

Defaults

No source interface is specified.

Command Modes

Global configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

After you configure NetFlow data export, you can also specify the source interface used in the UDP datagram containing the export data. The NetFlow Collector on the workstation uses the IP address of the source interface to determine which router sent the information. The NetFlow Collector also performs SNMP queries to the router using the IP address of the source interface. Because the IP address of the source interface can change (for example, the interface might flap so a different interface is used to send the data), we recommend you configure a loopback source interface. A loopback interface is always up and can respond to SNMP queries from the NetFlow Collector on the workstation.

Examples

The following example shows the configuration for a loopback source interface. The loopback interface has the IP address 4.0.0.1 and is used by the serial interface in slot 5, port 0.

```
Router# configure terminal
Router(config)# interface loopback0
Router(config-if)# ip address 4.0.0.1 255.0.0.0
Router(config-if)# exit
Router(config)# interface serial 5/0:0
Router(config-if)# ip unnumbered loopback0
Router(config-if)# no ip mroute-cache
Router(config-if)# encapsulation ppp
Router(config-if)# ip route-cache flow
Router(config-if)# exit
Router(config)# ip flow-export source loopback0
Router(config)# exit
```

Related Commands

Command	Description
ip flow-cache	Enables the exporting of information in NetFlow cache entries.

ip route-cache

Use the **ip route-cache** interface configuration command to control the use of high-speed switching caches for IP routing. To disable any of these switching modes, use the **no** form of this command.

ip route-cache [**cbus**]

no ip route-cache [**cbus**]

ip route-cache same-interface

no `ip route-cache` **same-interface**

ip route-cache [**flow**]

no ip route-cache [**flow**]

ip route-cache distributed

no ip route-cache distributed

Syntax Description

cbus	(Optional) Enables both autonomous switching and fast switching.
same-interface	Enables fast-switching packets back out the interface on which they arrived.
flow	(Optional) Enables NetFlow on the interface.
distributed	Enables VIP distributed switching on the interface. This feature can be enabled on Cisco 7500 series routers with an RSP and Versatile Interface Processor (VIP) controllers..

Defaults

IP autonomous switching is disabled.

Fast switching varies by interface and media.

Distributed switching is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.2	The **distributed** keyword was added.

Usage Guidelines

Using the route cache is often called *fast switching*. The route cache allows outgoing packets to be load-balanced on a *per-destination* basis.

The **ip route-cache** command with no additional keywords enables fast switching.

Cisco routers generally offer better packet transfer performance when fast switching is enabled, with one exception. On networks using slow serial links (64K and below), disabling fast switching to enable the per-packet load sharing is usually the best choice.

You can enable IP fast switching when the input and output interfaces are the same interface, using the **ip route-cache same-interface** command. This normally is not recommended, though it is useful when you have partially meshed media, such as Frame Relay or you are running Web Cache Communication Protocol (WCCP) redirection. You could use this feature on other interfaces, although it is not recommended because it would interfere with redirection of packets to the optimal path.

On Cisco 7500 series routers with RSP and Versatile Interface Processor (VIP) controllers, the VIP hardware can be configured to switch packets received by the VIP with no per-packet intervention on the part of the RSP. When VIP distributed switching is enabled, the input VIP interface tries to switch IP packets instead of forwarding them to the RSP for switching. Distributed switching helps decrease the demand on the RSP.

Not all switching methods are available on all platforms. Refer to the *Cisco Product Catalog* for information about features available on the platform you are using.

Examples

The following example enables both fast switching and autonomous switching:

```
ip route-cache cbus
```

The following example disables both fast switching and autonomous switching:

```
no ip route-cache
```

The following example turns off autonomous switching only:

```
no ip route-cache cbus
```

The following example enables VIP distributed switching and NetFlow on the interface:

```
interface ethernet 0/5/0
 ip address 17.252.245.2 255.255.255.0
 ip route-cache distributed
 ip route-cache flow
```

The following example returns the system to its defaults (fast switching enabled; autonomous switching disabled):

```
ip route-cache
```

Related Commands

Command	Description
ip cache-invalidate-delay	Controls the invalidation rate of the IP route cache.
show ip cache	Displays the routing table cache used to fast switch IP traffic.

ip route-cache flow

To enable NetFlow for IP routing, use the **ip route-cache flow** interface configuration command. To disable NetFlow, use the **no** form of this command.

ip route-cache flow

no ip route-cache flow

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

NetFlow captures a rich set of traffic statistics. These traffic statistics include user, protocol, port, and type of service information that can be used for a wide variety of purposes such as network analysis and planning, accounting, and billing. To export NetFlow data, use the **ip flow-export** global configuration command.

NetFlow is supported on IP and IP encapsulated traffic over all interface types and encapsulations except for ISL/VLAN, ATM and Frame Relay interfaces when more than one input access control list is used on the interface, and ATM LANE.

A network flow is identified as a unidirectional stream of packets between a source and destination—both defined by a network-layer IP address and transport-layer port number. Specifically, a flow is identified as the combination of the following fields:

- source IP address
- destination IP address
- source port number
- destination port number
- protocol type
- type of service
- input interface

NetFlow operates by creating a flow cache. The cache includes entries for traffic statistics. Flow information is maintained within the NetFlow cache for all active flows.

NetFlow does not involve any connection-setup protocol either between routers or to any other networking device or end station and does not require any change externally—either to the traffic or packets themselves or to any other networking device. Thus, NetFlow is completely transparent to the

existing network, including end stations and application software and network devices like LAN switches. Also, because NetFlow is performed independently on each internetworking device, it does not need to be operational on each router in the network. Network planners can selectively invoke NetFlow (and NetFlow data export) on a router/interface basis to gain traffic performance, control, or accounting benefits in specific network locations.

Note NetFlow does consume additional memory and CPU resources; therefore, it is important to understand the resources required on your router before enabling NetFlow.

Examples

The following example enables NetFlow on the interface:

```
interface ethernet 0/5/0
 ip address 17.252.245.2 255.255.255.0
 ip route-cache flow
```

The following example returns the interface to its defaults (fast switching enabled; autonomous switching disabled):

```
interface ethernet 0/5/0
 ip route-cache
```

Related Commands

Command	Description
ip flow-export	Enables the exporting of information in NetFlow cache entries.
show ip cache	Displays the routing table cache used to fast switch IP traffic.

ip route-cache policy

To enable fast-switch Policy Based Routing (PBR), use the **ip route-cache policy** command in interface configuration mode. To disable fast-switched PBR, use the **no** form of this command.

[no] ip route-cache policy

Syntax Description

This command has no arguments or keywords.

Defaults

Not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.0	This command was introduced.

Usage Guidelines

1. If Cisco Express Forwarding (CEF) is already enabled, the present command isn't needed, because PBR packets are CEF switched by default.
2. Before you can enable fast-switch PBR, PBR itself must be configured.
3. FSPBR supports all of PBR's **match** commands and most of PBR's **set** commands, with the following restrictions:
   - The **set ip default next-hop** and **set default interface** commands are not supported.
   - The **set interface** command is supported only over point-to-point links, unless a route cache entry exists using the same interface specified in the **set interface** command in the route map. Also, at the process level, the routing table is consulted to determine if the interface is on a reasonable path to the destination. During fast switching, the software does not make this check. Instead, if the packet matches, the software blindly forwards the packet to the specified interface.

Examples

The following example enables fast-switch Policy Based Routing on an Ethernet interface:

```
Router# config t
    Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# int e 1/3
Router(config-if)# ip route-cache policy
Router(config-if)# end
```

Related Commands

Command	Description
show ip cache policy	Displays cache entries in the policy route-cache.

show ip cache

To display the routing table cache used to fast switch IP traffic, use the **show ip cache** EXEC command.

show ip cache [*prefix mask*] [*type number*]

Syntax Description

prefix	(Optional) Display only the entries in the cache that match the prefix and mask combination.
mask	(Optional) Display only the entries in the cache that match the prefix and mask combination.
type	(Optional) Display only the entries in the cache that match the interface type and number combination.
number	(Optional) Display only the entries in the cache that match the interface type and number combination.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The **show ip cache** display shows MAC headers up to 92 bytes.

Examples

The following is sample output from the **show ip cache** command:

```
Router# show ip cache

IP routing cache version 4490, 141 entries, 20772 bytes, 0 hash overflows
Minimum invalidation interval 2 seconds, maximum interval 5 seconds,
   quiet interval 3 seconds, threshold 0 requests
Invalidation rate 0 in last 7 seconds, 0 in last 3 seconds
Last full cache invalidation occurred 0:06:31 ago

Prefix/Length       Age       Interface       MAC Header
131.108.1.1/32      0:01:09   Ethernet0/0     AA0004000134000000C0357430800
131.108.1.7/32      0:04:32   Ethernet0/0     00000C01281200000C0357430800
131.108.1.12/32     0:02:53   Ethernet0/0     00000C029FD000000C0357430800
131.108.2.13/32     0:06:22   Fddi2/0         00000C05A3E000000C035753AAAA0300
                                              00000800
131.108.2.160/32    0:06:12   Fddi2/0         00000C05A3E000000C035753AAAA0300
                                              00000800
131.108.3.0/24      0:00:21   Ethernet1/2     00000C026BC600000C03574D0800
131.108.4.0/24      0:02:00   Ethernet1/2     00000C026BC600000C03574D0800
131.108.5.0/24      0:00:00   Ethernet1/2     00000C04520800000C03574D0800
131.108.10.15/32    0:05:17   Ethernet0/2     00000C025FF500000C0357450800
131.108.11.7/32     0:04:08   Ethernet1/2     00000C010E3A00000C03574D0800
131.108.11.12/32    0:05:10   Ethernet0/0     00000C01281200000C0357430800
131.108.11.57/32    0:06:29   Ethernet0/0     00000C01281200000C0357430800
```

Table 92 describes significant fields shown in the display.

Table 92 show ip cache Field Descriptions

Field	Description
IP routing cache version	Version number of this table. This number is incremented any time the table is flushed.
entries	Number of valid entries.
bytes	Number of bytes of processor memory for valid entries.
hash overflows	Number of times autonomous switching cache overflowed.
Minimum invalidation interval	Minimum time delay between cache invalidation request and actual invalidation.
maximum interval	Maximum time delay between cache invalidation request and actual invalidation.
quiet interval	Length of time between cache flush requests before the cache will be flushed.
threshold *n* requests	Maximum number of requests that can occur while the cache is considered quiet.
Invalidation rate *n* in last *m* seconds	Number of cache invalidations during the last *m* seconds.
0 in last 3 seconds	Number of cache invalidation requests during the last quiet interval.
Last full cache invalidation occurred h*h:mm:ss* ago	Time since last full cache invalidation was performed.
Prefix/Length	Network reachability information for cache entry.
Age	Age of cache entry.
Interface	Output interface type and number.
MAC Header	Layer 2 encapsulation information for cache entry.

The following is sample output from the **show ip cache** command with a prefix and mask specified:

```
Router# show ip cache 131.108.5.0 255.255.255.0

IP routing cache version 4490, 119 entries, 17464 bytes, 0 hash overflows
Minimum invalidation interval 2 seconds, maximum interval 5 seconds,
   quiet interval 3 seconds, threshold 0 requests
Invalidation rate 0 in last second, 0 in last 3 seconds
Last full cache invalidation occurred 0:11:56 ago

Prefix/Length       Age       Interface       MAC Header
131.108.5.0/24      0:00:34   Ethernet1/2     00000C04520800000C03574D0800
```

The following is sample output from the **show ip cache** command with an interface specified:

```
Router# show ip cache e0/2

IP routing cache version 4490, 141 entries, 20772 bytes, 0 hash overflows
Minimum invalidation interval 2 seconds, maximum interval 5 seconds,
   quiet interval 3 seconds, threshold 0 requests
Invalidation rate 0 in last second, 0 in last 3 seconds
Last full cache invalidation occurred 0:06:31 ago

Prefix/Length       Age       Interface       MAC Header
131.108.10.15/32    0:05:17   Ethernet0/2     00000C025FF500000C0357450800
```

show ip cache flow

To display a summary of the NetFlow statistics, use the **show ip cache flow** command in EXEC mode.

show ip cache [*prefix mask*] [*type number*] [**verbose**] **flow**

Syntax Description

prefix mask	(Optional) Displays only the entries in the cache that match the prefix and mask combination.
type number	(Optional) Displays only the entries in the cache that match the interface type and number combination.
verbose	(Optional) Displays additional information

Command Modes

EXEC

Command History

Release	Modification
11.1	This command was introduced.
11.1 CA	The information display for the command was updated.

Displaying NetFlow Cache Information on a Distributed Cisco 7500 Series Platform

To display NetFlow cache information using the **show ip cache flow** command on a Cisco 7500 series router that is running dCEF, enter the following sequence of commands:

```
Router# if-con slot-number
LC-slot-number# show ip cache [prefix mask] [type number] [verbose] flow
```

Displaying NetFlow Cache Information on a Distributed Cisco 12000 Series Platform

To display NetFlow cache information using the **show ip cache flow** command on a Cisco 12000 Series Internet router, you enter the following sequence of commands:

```
Router# attach slot-number
LC-slot-number# show ip cache [prefix mask] [type number] [verbose] flow
```

Examples

The following is an example display of a main cache using the **show ip cache flow** command:

```
Router# show ip cache flow

IP packet size distribution (230151 total packets):
   1-32   64   96  128  160  192  224  256  288  320  352  384  416  448  480
   .999 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

   512  544  576 1024 1536 2048 2560 3072 3584 4096 4608
   .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
```

The output above shows the percentage distribution of packets by size range. In this display, 99.9 percent of the packets fall in the size range from 1 to 33 bytes.

```
IP Flow Switching Cache, 4456448 bytes
  65509 active, 27 inactive, 820628747 added
  955454490 ager polls, 0 flow alloc failures
```

```
  Exporting flows to 1.1.15.1 (2057)
  820563238 flows exported in 34485239 udp datagrams, 0 failed
  last clearing of statistics 00:00:03

Protocol         Total    Flows   Packets Bytes  Packets Active(Sec) Idle(Sec)
--------         Flows     /Sec     /Flow  /Pkt     /Sec     /Flow     /Flow
TCP-BGP             71      0.0         1    49      0.0       2.5      15.8
UDP-other           17      0.0         1   328      0.0       0.0      15.7
ICMP             18966      6.7        10    28     72.9       0.1      22.9
Total:           19054      6.7        10    28     72.9       0.1      22.9
```

```
SrcIf          SrcIPaddress    DstIf          DstIPaddress    Pr TOS Flgs  Pkts
Port Msk AS                    Port Msk AS    NextHop              B/Pk  Active
Et1/1          52.52.52.1      Fd4/0          42.42.42.1      01 55  10    3748
0000 /8  50                    0000 /8  40    202.120.130.2          28    17.8
Et1/2          52.52.52.1      Fd4/0          42.42.42.1      01 CC  10    3568
0000 /8  50                    0000 /8  40    202.120.130.2          28    17.8
Et1/2          10.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1124
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          11.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1157
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.7
Et1/2          14.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1149
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          15.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1127
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.7
Et1/2          12.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1204
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          13.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1159
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          18.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1223
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          19.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1264
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          16.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1170
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          17.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1167
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          22.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1193
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.8
Et1/2          23.1.3.2        Fd4/0          42.42.42.1      01 C0  10    1212
0000 /0  0                     0000 /8  40    202.120.130.2          28    17.7
Et1/1          50.50.50.1      Local          31.31.31.1      06 C0  18       2
00B3 /32 0                     2AF8 /32 0     0.0.0.0                49    10.1
```

The following shows sample output from the **show ip cache** *prefix mask* **flow** command:

```
Router# show ip cache 10.0.0.1 256.0.0.0 flow

IP packet size distribution (25 total packets):
   1-32   64   96  128  160  192  224  256  288  320  352  384  416  448  480
   .000 .000 .000 1.00 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

    512  544  576 1024 1536 2048 2560 3072 3584 4096 4608
   .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
```

The output above shows the percentage distribution of packets by size range. In this display, 100 percent of the packets fall in the128 byte range.

```
IP Flow Switching Cache, 4456704 bytes
  1 active, 65535 inactive, 5 added
  68 ager polls, 0 flow alloc failures
  Active flows timeout in 30 minutes
  Inactive flows timeout in 15 seconds
  last clearing of statistics never

Protocol         Total    Flows   Packets Bytes  Packets Active(Sec) Idle(Sec)
--------         Flows     /Sec     /Flow  /Pkt     /Sec     /Flow     /Flow
ICMP                 4      0.0         5   100      0.0       0.0      15.2
Total:               4      0.0         5   100      0.0       0.0      15.2

SrcIf         SrcIPaddress    DstIf         DstIPaddress    Pr SrcP DstP  Pkts
Et1/2         10.0.0.2        Local         10.0.0.1        01 0000 0800     5
```

The following shows sample output from the **show ip cache** *type number* **flow** command:

```
Router# show ip cache e1/2 flow

IP packet size distribution (30 total packets):
   1-32   64   96  128  160  192  224  256  288  320  352  384  416  448  480
   .000 .000 .000 1.00 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

    512  544  576 1024 1536 2048 2560 3072 3584 4096 4608
   .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

IP Flow Switching Cache, 4456704 bytes
  1 active, 65535 inactive, 6 added
  85 ager polls, 0 flow alloc failures
  Active flows timeout in 30 minutes
  Inactive flows timeout in 15 seconds
  last clearing of statistics never

Protocol         Total    Flows   Packets Bytes  Packets Active(Sec) Idle(Sec)
--------         Flows     /Sec     /Flow  /Pkt     /Sec     /Flow     /Flow
ICMP                 5      0.0         5   100      0.0       0.0      15.1
Total:               5      0.0         5   100      0.0       0.0      15.1

SrcIf         SrcIPaddress    DstIf         DstIPaddress    Pr SrcP DstP  Pkts
Et1/2         10.0.0.2        Local         10.0.0.1        01 0000 0800     5
```

The following shows sample output from the **show ip cache verbose flow** command for interface e1/2 on 10.0.0.1 255.0.0.0:

```
Router# show ip cache 10.0.0.1 255.0.0.0 e1/2 verbose flow

IP packet size distribution (35 total packets):
   1-32   64   96  128  160  192  224  256  288  320  352  384  416  448  480
   .000 .000 .000 1.00 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

    512  544  576 1024 1536 2048 2560 3072 3584 4096 4608
   .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
```

The output above show the percentage distribution of packets by size range. In this display,100 percent of the packets fall in the 138 byte size range.

```
IP Flow Switching Cache, 4456704 bytes
  1 active, 65535 inactive, 7 added
  99 ager polls, 0 flow alloc failures
  Active flows timeout in 30 minutes
  Inactive flows timeout in 15 seconds
  last clearing of statistics never

Protocol         Total    Flows   Packets Bytes  Packets Active(Sec) Idle(Sec)
--------         Flows     /Sec     /Flow  /Pkt     /Sec     /Flow     /Flow
ICMP                 6      0.0         5   100      0.0       0.0      15.2
Total:               6      0.0         5   100      0.0       0.0      15.2

SrcIf          SrcIPaddress    DstIf          DstIPaddress    Pr TOS Flgs  Pkts
Port Msk AS                    Port Msk AS    NextHop              B/Pk  Active
Et1/2          10.0.0.2        Local          10.0.0.1        01 00  10       5
0000 /8  0                     0800 /8  0     0.0.0.0               100     0.0
```

Table 93 describes the significant fields shown in the flow switching cache lines of the displays.

Table 93 show ip cache flow Field Descriptions in Flow Switching Cache Display

Field	Description
bytes	Number of bytes of memory used by the NetFlow cache.
active	Number of active flows in the NetFlow cache at the time this command was entered.
inactive	Number of flow buffers that are allocated in the NetFlow cache, but are not currently assigned to a specific flow at the time this command is entered.
added	Number of flows created since the start of the summary period.
ager polls	Number of times the NetFlow code looked at the cache to cause entries to expire (used by Cisco for diagnostics only).
flow alloc failures	Number of times the NetFlow code tried to allocate a flow but could not.
Exporting flows	IP address and User Datagram Protocol (UDP) port number of the workstation to which flows are exported.
flows exported in udp datagrams	Total number of flows exported and the total number of UDP datagrams used to export the flows to the workstation.
failed	Number of flows that could not be exported by the router because of output interface limitations.
last clearing of statistics	Standard time output (hh:mm:ss) since the **clear ip flow stats** EXEC command was executed. This time output changes to hours and days after the time exceeds 24 hours.

Table 94 describes the significant fields shown in the activity by protocol lines of the display.

Table 94 show ip cache flow Field Descriptions in Activity By Protocol Display

Field	Description
Protocol	IP protocol and the “well known” port number as described in RFC 1340.
Total Flows	Number of flows for this protocol since the last time statistics were cleared.
Flows/Sec	Average number of flows for this protocol seen per second; equal to total flows/number of seconds for this summary period.
Packets/Flow	Average number of packets observed for the flows seen for this protocol. Equal to total packets for this protocol or number of flows for this protocol for this summary period.
Bytes/Pkt	Average number of bytes observed for the packets seen for this protocol (total bytes for this protocol or the total number of packet for this protocol for this summary period).
Packets/Sec	Average number of packets for this protocol per second (total packets for this protocol) or the total number of seconds for this summary period.
Active(Sec)/Flow	Sum of all the seconds from the first packet to the last packet of an expired flow (for example, TCP FIN, timeout, and so on) in seconds or total flows for this protocol for this summary period.
Idle(Sec)/Flow	Sum of all the seconds from the last packet seen in each nonexpired flow for this protocol until the time at which this command was entered, in seconds or total flows for this protocol for this summary period.

Table 95 describes the significant fields from the source to destination of the packets shown in the display.

Table 95 show ip cache flow Field Descriptions

Field	Description
SrcIf	Interface on which the packet was received.
Port Msk AS	Source Border Gateway Protocol (BGP) autonomous system. This is always set to 0 in MPLS flows.
SrcIPaddress	IP address of the device which transmitted the packet.
DstIf	Interface from which the packet was transmitted.
Port Msk AS	Destination BGP autonomous system. This is always set to 0 in MPLS flows.
DstIPaddress	IP address of the destination device.
NextHop	Specifies the BGP next hop address. This is always set to 0 in MPLS flows.
Pr	IP protocol well-known port number as described in RFC 1340, displayed in hexadecimal format.
B/Pk	Average number of bytes observed for the packets seen for this protocol (total bytes for this protocol or the total number of flows for this protocol for this summary period).
TOS	Type of service.
Flgs	TCP flags (result of bitwise OR of TCP flags from all packets in the flow).
Active	Number of active flows in the NetFlow cache at the time this command was entered.
Pkts	Number of packets switched through this flow.

Related Commands

Command	Description
clear ip flow stats	Clears the NetFlow statistics.
ip route-cache	Configures the router to export the flow cache entry to a workstation when a flow expires.