

Chapter 15

Summary of Traffic Sampling and Forwarding Options Configuration Statements

The following sections explain each of the sampling and forwarding statements. The statements are organized alphabetically.

accounting

Syntax `accounting group-name {
 output {
 cflowd [hostnames] {
 aggregation {
 autonomous-system;
 destination-prefix;
 protocol-port;
 source-destination-prefix {
 caida-compliant;
 }
 source-prefix;
 }
 autonomous-system-type (origin | peer);
 port port-number;
 version format;
 }
 flow-active-timeout seconds;
 flow-inactive-timeout seconds;
 interface [interface-names] {
 engine-id number;
 engine-type number;
 source-address address;
 }
 }
 }`

Hierarchy Level [edit forwarding-options]

Description Specify discard accounting instance name and options.

The statements are explained separately.

Usage Guidelines See “Configure Discard Accounting” on page 234.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

aggregation

Syntax

```
aggregation {
  autonomous-system;
  destination-prefix;
  protocol-port;
  source-destination-prefix {
    caida-compliant;
  }
  source-prefix;
}
```

Hierarchy Level [edit forwarding-options accounting output cflowd *hostname*],
[edit forwarding-options sampling output cflowd *hostname*]

Description For cflowd version 8 only, specify the type of data to be aggregated; cflowd records and sends only those flows that match the specified criteria.

Options autonomous-system—Aggregate by autonomous system (AS) number.

caida-compliant—Record source and destination mask length values in compliance with the Version 2.1b1 release of the cflowd application from the Cooperative Association for Internet Data Analysis (CAIDA). If this statement is not configured, the JUNOS software records source and destination mask length values in compliance with the *cflowd Configuration Guide*, dated August 30, 1999.

destination-prefix—Aggregate by destination prefix.

protocol-port—Aggregate by protocol and port number.

source-destination-prefix—Aggregate by source and destination prefix.

source-prefix—Aggregate by source prefix.

Usage Guidelines See “Configure Flow Aggregation (cflowd)” on page 246.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

autonomous-system-type

Syntax	autonomous-system-type (origin peer);
Hierarchy Level	[edit forwarding-options accounting output cflowd <i>hostname</i>], [edit forwarding-options sampling output cflowd <i>hostname</i>]
Description	Specify the type of AS numbers that cflowd exports.
Options	origin—Export origin AS numbers of the packet source address in the Source Autonomous System cflowd field. peer—Export peer AS numbers through which the packet passed in the Source Autonomous System cflowd field.
Default	origin
Usage Guidelines	See “Configure Flow Aggregation (cflowd)” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

bootp

Syntax	bootp { description <i>description-of-service</i> ; interface <i>interface-group</i> { description <i>description-of-interface</i> ; maximum-hop-count <i>number</i> ; minimum-wait-time <i>seconds</i> ; no-listen; server [<i>addresses</i>]; } maximum-hop-count <i>number</i> ; minimum-wait-time <i>seconds</i> ; server [<i>addresses</i>]; }
Hierarchy Level	[edit forwarding-options helpers]
Description	Configures a router or interface to act as a Dynamic Host Configuration Protocol (DHCP) or (BOOTP) relay agent. DHCP relaying is disabled.
Options	The remaining statements are explained separately.
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

cflowd

cflowd (discard accounting)

```

Syntax  cflowd hostname {
            aggregation {
              autonomous-system;
              destination-prefix;
              protocol-port;
              source-destination-prefix {
                caida-compliant;
              }
              source-prefix;
            }
            autonomous-system-type (origin | peer);
            port port-number;
            source-address address;
            version format;
          }

```

Hierarchy Level [edit forwarding-options accounting *group-name* output]

Description Collect an aggregate of sampled flows and send the aggregate to a specified host system that runs the collection utility `cfcollect`.

You can configure up to one version 5 and one version 8 flow format at the [edit forwarding-options accounting *group-name* output] hierarchy level.

Options *hostname*—The IP address or identifier of the host system (the workstation running the `cflowd` utility).

The remaining statements are explained separately.

Usage Guidelines See “Configure Flow Aggregation (cflowd)” on page 246.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

cflowd (flow monitoring)

Syntax `cflowd hostname {
 port port-number;
}`

Hierarchy Level [edit forwarding-options monitoring *group-name* family inet output]

Description Collect an aggregate of sampled flows and send the aggregate to a specified host system that runs the collection utility `cfcollect`.

You can configure up to eight version 5 flow formats at the [edit forwarding-options monitoring *group-name* output] hierarchy level. Version 8 flow formats are not supported for flow-monitoring applications.

Options *hostname*—The IP address or identifier of the host system (the workstation running the `cflowd` utility).

The remaining statements are explained separately.

Usage Guidelines See “Configure Flow Monitoring” on page 235.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

cflowd (sampling)

Syntax `cflowd hostname {
 aggregation {
 autonomous-system;
 destination-prefix;
 protocol-port;
 source-destination-prefix {
 caida-compliant;
 }
 source-prefix;
 }
 autonomous-system-type (origin | peer);
 (local-dump | no-local-dump);
 port port-number;
 source-address address;
 version format;
}`

Hierarchy Level [edit forwarding-options sampling output]

Description Collect an aggregate of sampled flows and send the aggregate to a specified host system that runs the collection utility `cfcollect`.

You can configure up to one version 5 and one version 8 flow format at the [edit forwarding-options sampling output] hierarchy level.

Options *hostname*—The IP address or identifier of the host system (the workstation running the `cflowd` utility).

The remaining statements are explained separately.

Usage Guidelines See “Configure Flow Aggregation (`cflowd`)” on page 246.

Required Privilege Level `interface`—To view this statement in the configuration.
`interface-control`—To add this statement to the configuration.

description

description (interface)

Syntax `description description-of-interface;`

Hierarchy Level [edit forwarding-options helpers bootp interface *interface-group*],
 [edit forwarding-options helpers domain interface *interface-name*],
 [edit forwarding-options helpers tftp interface *interface-name*]

Description Text description of interface.

Usage Guidelines See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237 and “Configure DNS and TFTP Packet Forwarding” on page 239.

Required Privilege Level `interface`—To view this statement in the configuration.
`interface-control`—To add this statement to the configuration.

description (service)

Syntax	<code>description <i>description-of-service</i>;</code>
Hierarchy Level	[edit forwarding-options helpers bootp], [edit forwarding-options helpers domain], [edit forwarding-options helpers tftp]
Description	Description of BOOTP, DHCP, Domain Name System (DNS), or Trivial File Transfer Protocol (TFTP) service. The remaining statements are explained separately.
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237 and “Configure DNS and TFTP Packet Forwarding” on page 239.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

disable

Syntax	<code>disable;</code>
Hierarchy Level	[edit forwarding-options sampling], [edit forwarding-options sampling output file]
Description	Disable traffic sampling.
Usage Guidelines	See “Disable Traffic Sampling” on page 240.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

domain

Syntax	<code>domain { description <i>description-of-service</i>; server <i>address</i> < [routing-instance <i>routing-instance-names</i>] >; interface <i>interface-name</i> { description <i>description-of-interface</i>; no-listen; server <i>address</i> < [routing-instance <i>routing-instance-names</i>] >; } }</code>
Hierarchy Level	[edit forwarding-options helpers]
Description	Enable DNS request packet forwarding.
Options	The statements are explained separately.

Usage Guidelines See “Configure DNS and TFTP Packet Forwarding” on page 239.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

export-format

Syntax export-format cflowd-version-5;

Hierarchy Level [edit forwarding-options monitoring *group-name* family inet output]

Description Flow monitoring export format.

Options cflowd-version-5—Cflowd version 5.

Usage Guidelines See “Configure Flow Monitoring” on page 235.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

family

```
Syntax family family-name {
    filter {
        input filter-name;
    }
    flood {
        input filter-name;
    }
}
```

Hierarchy Level [edit forwarding-options]

Description Specify address family for filters.

Options *family-name*—Address family. Specify inet for Internet Protocol version 4 (IPv4), inet6 for Internet Protocol version 6 (IPv6), mpls for Multiprotocol Label Switching (MPLS), or vpls for virtual private LAN service (VPLS).

filter—Filtering for forwarding table.

filter-name—Name of filter to apply to forwarded packets.

flood—(For VPLS address family only) Filtering for flood table.

Usage Guidelines See “Configure a Forwarding Table Filter” on page 232.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

family inet

family inet (for load balancing)

Syntax	family inet { layer-3; layer-4; }
Hierarchy Level	[edit forwarding-options hash-key]
Description	Configure layer information for the load-balancing specification. Only the IPv4 protocol is supported.
Options	layer-3—Include Layer 3 (IP) data in the hash key. layer-4—Include Layer 4 Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) data in the hash key.
Usage Guidelines	See “Configure Load-Balance Per-Packet Action” on page 134.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

family inet (for sampling rates)

Syntax	family inet { max-packets-per-second <i>number</i> ; rate <i>number</i> ; run-length <i>number</i> ; }
Hierarchy Level	[edit forwarding-options sampling input]
Description	Configure the protocol family to be sampled. Only the IPv4 protocol is supported.
Options	The statements are explained separately.
Usage Guidelines	See “Configure a Forwarding Table Filter” on page 232.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

family mpls

Syntax	family mpls { label-1; label-2; payload { ip; } }
Hierarchy Level	[edit forwarding-options hash-key]
Description	For aggregated Ethernet and SONET/SDH interfaces only, configure load balancing based on MPLS labels. Only the IPv4 protocol is supported.
Options	label-1—Include only one label in the hash key. label-2—Include both labels in the hash key. payload—Includes bits from IP payload in the hash key.
Usage Guidelines	See “Configure Load-Balance Per-Packet Action” on page 134.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

file

file (collect traffic samples)

Syntax	file { disable; filename <i>filename</i> ; files <i>number</i> ; size <i>bytes</i> ; (stamp no-stamp); (world-readable no-world-readable); }
Hierarchy Level	[edit forwarding-options sampling output]
Description	Collect the traffic samples in a file. The statements are explained separately.
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

file (collect trace information)

Syntax	file <i>filename</i> { files <i>number</i> ; size <i>bytes</i> ; (world-readable no-world-readable); }
Hierarchy Level	[edit forwarding-options sampling traceoptions], [edit forwarding-options port-mirroring traceoptions]
Description	Configure information about the files that contain trace logging information.
Options	<i>filename</i> —The name of the file containing the trace information. Default: /var/log/sampled The remaining statements are explained separately.
Usage Guidelines	See “Trace Traffic Sampling Operations” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

file (for helpers traceoptions)

Syntax	file <i>filename</i> { files <i>number</i> ; size <i>bytes</i> ; }
Hierarchy Level	[edit forwarding-options helpers traceoptions]
Description	Configure information about the DNS and TFTP packet-forwarding files that contain trace logging information.
Options	<i>filename</i> —Name of the file containing the trace information. Default: /var/log/sampled <i>flag flag</i> —Name of the flag. The remaining statements are explained separately.
Usage Guidelines	See “Trace BOOTP, DNS, and TFTP Forwarding Operations” on page 240.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

filename

Syntax	filename <i>filename</i> ;
Hierarchy Level	[edit forwarding-options sampling output file]
Description	Configure the name of the output file.
Options	<i>filename</i> —Name of the file in which to place the traffic samples. All files are placed in the directory <i>/var/tmp</i> .
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

files

Syntax	files <i>number</i> ;
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling output file], [edit forwarding-options sampling traceoptions file]
Description	Configure the total number of files to be saved with samples or trace data.
Options	<i>number</i> —Maximum number of traffic sampling or trace log files. When a file named <i>sampling-file</i> reaches its maximum size, it is renamed <i>sampling-file.0</i> , then <i>sampling-file.1</i> , and so on, until the maximum number of traffic sampling files is reached. Then the oldest sampling file is overwritten. Range: 1 through 100 files Default: 5 files for sampling output; 10 files for trace log information
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244 and “Trace Traffic Sampling Operations” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

filter

Syntax	filter input <i>filter-name</i> ;
Hierarchy Level	[edit forwarding-options family <i>family-name</i>]
Description	Apply a forwarding table filter to a forwarding table.
Options	input <i>filter-name</i> —Name of the forwarding table filter.
Usage Guidelines	See “Configure a Forwarding Table Filter” on page 232.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

flood

Syntax	flood input <i>filter-name</i> ;
Hierarchy Level	[edit forwarding-options family <i>family-name</i>]
Description	Apply a forwarding table filter to a flood table.
Options	input <i>filter-name</i> —Name of the forwarding table filter.
Usage Guidelines	See “Configure a Forwarding Table Filter” on page 232.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

flow-active-timeout

Syntax	flow-active-timeout <i>seconds</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>group-name</i> output], [edit forwarding-options monitoring <i>group-name</i> family inet output], [edit forwarding-options sampling output]
Description	Configure the interval before exporting an active flow.
Options	<i>seconds</i> —Interval, in seconds. Range: 60 through 1800 Default: 1800
Usage Guidelines	See “Configure Discard Accounting” on page 234, “Configure Flow Monitoring” on page 235, and “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

flow-export-destination

Syntax	flow-export-destination { collector-pic; }
Hierarchy Level	[edit forwarding-options monitoring <i>group-name</i> family inet output],
Description	Configure flow collection.
Options	collector-pic—Collector PIC.
Usage Guidelines	See “Configure Flow Monitoring” on page 235.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

flow-inactive-timeout

Syntax	flow-inactive-timeout <i>seconds</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>group-name</i> output], [edit forwarding-options monitoring <i>group-name</i> family inet output], [edit forwarding-options sampling output]
Description	Configure the interval before a flow is considered inactive.
Options	<i>seconds</i> —Interval, in seconds. Range: 15 through 1800 Default: 60
Usage Guidelines	See “Configure Discard Accounting” on page 234, “Configure Flow Monitoring” on page 235, and “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

forwarding-options

Syntax	forwarding-options { ... }
Hierarchy Level	[edit]
Description	Configure traffic forwarding. The statements are explained separately.
Usage Guidelines	See “Traffic Sampling and Forwarding Configuration” on page 227.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

hash-key

```

Syntax hash-key {
            family inet {
                layer-3;
                layer-4;
            }
            family mpls {
                label-1;
                label-2;
                payload {
                    ip;
                }
            }
        }

```

Hierarchy Level [edit forwarding-options]

Description Select which packet header data to use for per-flow load balancing.

Options inet—IP address family.

mpls—MPLS address family.

layer-3—Incorporate Layer 3 data into the hash key.

layer-4—Incorporate Layer 4 data into the hash key.

label-1—Incorporate the first label into the hash key.

label-2—Incorporate the second label into the hash key.

payload—Incorporate payload data into the hash key.

ip—Specify payload as an IP packet.

Usage Guidelines See “Configure Load-Balance Per-Packet Action” on page 134.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

helpers

```

Syntax  helpers {
            bootp {
                description description-of-service;
                interface interface-group {
                    description description-of-interface;
                    maximum-hop-count number;
                    minimum-wait-time seconds;
                    no-listen;
                    server [ addresses ];
                }
                maximum-hop-count number;
                minimum-wait-time seconds;
                server address [ addresses ];
            }
            domain {
                description description-of-service;
                server address < [ routing-instance routing-instance-names ] >;
                interface interface-name {
                    description description-of-interface;
                    no-listen;
                    server address < [ routing-instance routing-instance-names ] >;
                }
            }
            tftp {
                description description-of-service;
                server address < [ routing-instance routing-instance-names ] >;
                interface interface-name {
                    description description-of-interface;
                    no-listen;
                    server address < [ routing-instance routing-instance-names ] >;
                }
            }
            traceoptions {
                file filename {
                    files number;
                    size bytes;
                }
                level level;
                flag flag;
            }
        }

```

Hierarchy Level [edit forwarding-options]

Description Enable TFTP or DNS request packet forwarding, or configure the router or interface to act as a DHCP/BOOTP relay agent. Use only one server address per interface or global configuration.

Options The statements are explained separately.

Usage Guidelines See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237 and “Configure DNS and TFTP Packet Forwarding” on page 239.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

input

input (port-mirroring)

Syntax input {
 family inet {
 rate *number*;
 run-length *number*;
 }
}

Hierarchy Level [edit forwarding-options port-mirroring]

Description Configure port mirroring on a logical interface.

The statements are explained separately.

Usage Guidelines See “Configure Port Mirroring” on page 249.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

input (sampling)

Syntax input {
 family inet {
 max-packets-per-second *number*;
 rate *number*;
 run-length *number*;
 }
}

Hierarchy Level [edit forwarding-options sampling]

Description Configure traffic sampling on a logical interface.

The statements are explained separately.

Usage Guidelines See “Configure Traffic Sampling” on page 233.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

interface

interface (for accounting or sampling)

Syntax	interface [<i>interface-names</i>] { engine-id <i>number</i> ; engine-type <i>number</i> ; source-address <i>address</i> ; }
Hierarchy Level	[edit forwarding-options accounting <i>group-name</i> output], [edit forwarding-options sampling output]
Description	Specify the output interface for sending copies of packets elsewhere to be analyzed.
Options	<i>interface-names</i> —Name of one or more accounting interfaces. <i>engine-id number</i> —Identity of the accounting interface. <i>engine-type number</i> —Type of this accounting interface. <i>source-address address</i> —Address used for generating packets.
Usage Guidelines	See “Configure Discard Accounting” on page 234 and “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (for BOOTP)

Syntax	interface <i>interface-group</i> { description <i>description-of-interface</i> ; maximum-hop-count <i>number</i> ; minimum-wait-time <i>seconds</i> ; no-listen; server [<i>addresses</i>]; }
Hierarchy Level	[edit forwarding-options helpers bootp]
Description	Specify the interface for a DHCP or BOOTP relay agent.
Options	<i>interface-group</i> —Sets a logical interface or group of logical interfaces with a specific DHCP relay configuration. The remaining statements are explained separately.
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (for DNS and TFTP packet forwarding or relay agent)

Syntax	interface <i>interface-name</i> { description <i>description-of-service</i> ; no-listen; server <i>address</i> < [routing-instance <i>routing-instance-names</i>] >; }
Hierarchy Level	[edit forwarding-options helpers domain], [edit forwarding-options helpers tftp]
Description	Specify the interface for monitoring and forwarding DNS or TFTP requests.
Options	<i>interface-name</i> —Name of the interface. The remaining statements are explained separately.
Usage Guidelines	See “Configure DNS and TFTP Packet Forwarding” on page 239.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (for monitoring)

Syntax	interface <i>interface-name</i> { engine-id <i>number</i> ; engine-type <i>number</i> ; input-interface-index <i>number</i> ; output-interface-index <i>number</i> ; source-address <i>address</i> ; }
Hierarchy Level	[edit forwarding-options monitoring <i>group-name</i> family inet output]
Description	Specify the output interface for monitored traffic.
Options	<i>interface-name</i> —Name of the interface. <i>engine-id number</i> —Identity of the monitoring interface. <i>engine-type number</i> —Type of this monitoring interface. <i>input-interface-index number</i> —Input interface index for records from this interface. <i>output-interface-index number</i> —Output interface index for records from this interface. <i>source-address address</i> —Address used for generating packets.
Usage Guidelines	See “Configure Flow Monitoring” on page 235.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (for next-hop group)

Syntax	interface <i>interface-name</i> { next-hop [<i>addresses</i>]; }
Hierarchy Level	[edit forwarding-options next-hop-group <i>group-names</i>]
Description	Specify the output interface for sending copies of packets elsewhere to be analyzed.
Options	<i>interface-name</i> —Name of the interface. The remaining statements are explained separately.
Usage Guidelines	See “Configure a Next-Hop Group” on page 236.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (for port mirroring)

Syntax	interface <i>interface-name</i> { next-hop <i>address</i> ; }
Hierarchy Level	[edit forwarding-options port-mirroring output]
Description	Specify the output interface for sending copies of packets elsewhere to be analyzed.
Options	<i>interface-name</i> —Name of the interface. The remaining statements are explained separately.
Usage Guidelines	See “Configure Port Mirroring” on page 249.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

local-dump

Syntax	(local-dump no-local-dump);
Hierarchy Level	[edit forwarding-options sampling output cflowd <i>hostname</i>]
Description	Enable collection of cflowd records in a log file.
Options	no-local-dump—Do not dump cflowd records to a log file before exporting. local-dump—Dump cflowd records to a log file before exporting.
Usage Guidelines	See “Debug cflowd Flow Aggregation” on page 248.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

max-packets-per-second

Syntax	max-packets-per-second <i>number</i> ;
Hierarchy Level	[edit forwarding-options sampling input family inet]
Description	Specify the traffic threshold that must be exceeded before packets are dropped. A value of 0 instructs the Packet Forwarding Engine not to sample any traffic.
Options	<i>number</i> — Maximum number of packets per second. Range: 0 through 65,535 Default: 1000
Usage Guidelines	See “Configure Traffic Sampling” on page 233.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

maximum-hop-count

Syntax	maximum-hop-count <i>number</i> ;
Hierarchy Level	[edit forwarding-options helpers bootp], [edit forwarding-options helpers bootp interface <i>interface-group</i>]
Description	The maximum number of hops allowed.
Options	<i>number</i> — Maximum number of hops. Default: 4 hops
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

minimum-wait-time

Syntax	minimum-wait-time <i>seconds</i> ;
Hierarchy Level	[edit forwarding-options helpers bootp], [edit forwarding-options helpers bootp interface <i>interface-group</i>]
Description	The minimum time allowed.
Options	<i>seconds</i> —Minimum time. Default: 3
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

monitoring

Syntax monitoring *group-name* {
 family inet {
 output {
 cflowd *hostname* {
 port *port-number*;
 }
 export-format cflowd-version-5;
 flow-active-timeout *seconds*;
 flow-export-destination {
 collector-pic;
 }
 flow-inactive-timeout *seconds*;
 interface *interface-name* {
 engine-id *number*;
 engine-type *number*;
 input-interface-index *number*;
 output-interface-index *number*;
 source-address *address*;
 }
 }
 }
 }

Hierarchy Level [edit forwarding-options]

Description Specify flow monitoring instance name and properties.
 The statements are explained separately.

Usage Guidelines See “Configure Flow Monitoring” on page 235.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

next-hop

Syntax next-hop *address*;

Hierarchy Level [edit forwarding-options port-mirroring output interface *interface-name*]

Description Specify the next-hop address for sending copies of packets to an analyzer.

Options *address*—IP address of the next-hop router.

Usage Guidelines See “Configure Port Mirroring” on page 249.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

next-hop-group

Syntax	<pre>next-hop-group [<i>group-names</i>] { interface <i>interface-name</i> { next-hop [<i>addresses</i>]; } }</pre>
Hierarchy Level	[edit forwarding-options]
Description	Specify the next-hop address for sending copies of packets to an analyzer.
Options	<p><i>addresses</i>—IP address of the next-hop router. Each next-hop group supports up to 16 next-hop addresses. Up to 30 next-hop groups are supported. Each next-hop group must have at least two next-hop addresses.</p> <p><i>group-names</i>—Name of next-hop group. Up to 30 next-hop groups are supported for the router. Each next-hop group must have at least 2 next-hop addresses.</p> <p><i>interface-name</i>—Interface used to reach the next-hop destination.</p>
Usage Guidelines	See “Configure a Next-Hop Group” on page 236.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

no-filter-check

Syntax	no-filter-check ;
Hierarchy Level	[edit forwarding-options port-mirroring output]
Description	<p>Disable filter checking on the port-mirroring interface.</p> <p>This statement is required when you send port-mirrored traffic to a Tunnel PIC that has a filter applied to it.</p>
Usage Guidelines	See “Configure Port Mirroring” on page 249.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

no-listen

Syntax	no-listen;
Hierarchy Level	[edit forwarding-options helpers bootp interface <i>interface-group</i>], [edit forwarding-options helpers domain interface <i>interface-name</i>], [edit forwarding-options helpers tftp interface <i>interface-name</i>]
Description	Disable recognition of DNS requests or stop packets from being forwarded on a logical interface, a group of logical interfaces, or a router.
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237 and “Configure DNS and TFTP Packet Forwarding” on page 239.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

no-local-dump

See local-dump on page 272

no-stamp

See stamp on page 284

no-world-readable

See world-readable on page 288

output

output (accounting)

```

Syntax  output {
            cflowd [ hostnames ] {
                aggregation {
                    autonomous-system;
                    destination-prefix;
                    protocol-port;
                    source-destination-prefix {
                        caida-compliant;
                    }
                    source-prefix;
                }
                autonomous-system-type (origin | peer);
                port port-number;
                version format;
            }
            flow-active-timeout seconds;
            flow-inactive-timeout seconds;
            interface[ interface-names ] {
                engine-id number;
                engine-type number;
                source-address address;
            }
        }

```

Hierarchy Level [edit forwarding-options accounting *group-name*]

Description Configure cflowd, output interfaces, and flow properties.

The statements are explained separately.

Usage Guidelines See “Configure Discard Accounting” on page 234.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

output (monitoring)

```

Syntax  output {
            cflowd hostname {
                port port-number;
            }
            export-format cflowd-version-5;
            flow-active-timeout seconds;
            flow-export-destination {
                collector-pic;
            }
            flow-inactive-timeout seconds;
            interface interface-name {
                engine-id number;
                engine-type number;
                input-interface-index number;
                output-interface-index number;
                source-address address;
            }
        }

```

Hierarchy Level [edit forwarding-options monitoring *group-name* family inet]

Description Configure cflowd, output interfaces, and flow properties.

The statements are explained separately.

Usage Guidelines See “Configure Flow Monitoring” on page 235.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

output (port mirroring)

```

Syntax  output {
            interface interface-name {
                next-hop address;
            }
            no-filter-check;
        }

```

Hierarchy Level [edit forwarding-options port-mirroring]

Description Configure output interfaces and flow properties.

The statements are explained separately.

Usage Guidelines See “Configure Port Mirroring” on page 249.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

output (sampling)

```

Syntax  output {
            cflowd hostname {
                aggregation {
                    autonomous-system;
                    destination-prefix;
                    protocol-port;
                    source-destination-prefix {
                        caida-compliant;
                    }
                    source-prefix;
                }
                autonomous-system-type (origin | peer);
                (local-dump | no-local-dump);
                port port-number;
                source-address address;
                version format;
            }
            file {
                disable;
                filename filename;
                files number;
                size bytes;
                (stamp | no-stamp);
                (world-readable | no-world-readable);
            }
            flow-active-timeout seconds;
            flow-inactive-timeout seconds;
            interface [ interface-names ] {
                engine-id number;
                engine-type number;
                source-address address;
            }
        }

```

Hierarchy Level [edit forwarding-options sampling]

Description Configure cflowd, output files and interfaces, and flow properties.

The statements are explained separately.

Usage Guidelines See “Configure Traffic Sampling Output” on page 244.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

port

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit forwarding-options accounting <i>group-name</i> output cflowd <i>hostname</i>], [edit forwarding-options monitoring <i>group-name</i> family inet output cflowd <i>hostname</i>], [edit forwarding-options sampling output cflowd <i>hostname</i>]
Description	Specify the UDP port number on the cflowd host system.
Options	<i>port-number</i> —Any valid UDP port number on the host system.
Usage Guidelines	See “Configure Flow Aggregation (cflowd)” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

port-mirroring

Syntax	<pre> port-mirroring { input { family inet{ rate <i>number</i>; run-length <i>number</i>; } } output { interface <i>interface-name</i> { next-hop <i>address</i>; } no-filter-check; } traceoptions { file <i>filename</i> { files <i>number</i>; size <i>bytes</i>; (world-readable no-world-readable); } } } </pre>
Hierarchy Level	[edit forwarding-options]
Description	Specify the address family, rate, run length, interface, and next-hop address for sending copies of packets to an analyzer. The statements are explained separately.
Usage Guidelines	See “Configure Port Mirroring” on page 249.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

rate

Syntax	<code>rate number;</code>
Hierarchy Level	[edit forwarding-options port-mirroring input family inet], [edit forwarding-options sampling input family inet]
Description	Set the ratio of the number of packets to be sampled. For example, if you specify a rate of 10, every tenth packet (1 packet out of 10) is sampled.
Options	<i>number</i> —Denominator of the ratio. Range: 1 through 65,535
Usage Guidelines	See “Configure Traffic Sampling” on page 233.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

routing-instance

Syntax	<code>routing-instance [routing-instance-names];</code>
Hierarchy Level	[edit forwarding-options helpers domain server <i>address</i>], [edit forwarding-options helpers domain interface <i>interface-name</i> server <i>address</i>], [edit forwarding-options helpers tftp server <i>address</i>], [edit forwarding-options helpers tftp interface <i>interface-name</i> server <i>address</i>]
Description	Set the routing instance of the server to forward. You can include as many routing instances as necessary in the same statement.
Options	<i>routing-instance-names</i> —Name of the routing instance.
Usage Guidelines	See “Configure a Forwarding Table Filter” on page 232.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

run-length

Syntax	<code>run-length number;</code>
Hierarchy Level	[edit forwarding-options port-mirroring family inet input], [edit forwarding-options sampling input family inet]
Description	Set the number of samples following the initial trigger event. This allows you to sample packets following those already being sampled.
Options	<i>number</i> —Number of samples. Range: 0 through 20 Default: 0

Usage Guidelines See “Configure a Forwarding Table Filter” on page 232.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

sampling

Syntax

```
sampling {
  disable;
  input {
    family inet {
      max-packets-per-second number;
      rate number;
      run-length number;
    }
  }
  output {
    cflowd hostname {
      aggregation {
        autonomous-system;
        destination-prefix;
        protocol-port;
        source-destination-prefix {
          caida-compliant;
        }
        source-prefix;
      }
      autonomous-system-type (origin | peer);
      (local-dump | no-local-dump);
      port port-number;
      source-address address;
      version format;
    }
    file {
      disable;
      filename filename;
      files number;
      size bytes;
      (stamp | no-stamp);
      (world-readable | no-world-readable);
    }
    flow-active-timeout seconds;
    flow-inactive-timeout seconds;
    interface [ interface-names ] {
      engine-id number;
      engine-type number;
      source-address address;
    }
  }
  traceoptions {
    file filename {
      files number;
      size bytes;
      (world-readable | no-world-readable);
    }
  }
}
```

```
    }
}
```

Hierarchy Level	[edit forwarding-options]
Description	Configure traffic sampling. The statements are explained separately.
Usage Guidelines	See “Configure a Forwarding Table Filter” on page 232, “Configure Flow Aggregation (cflowd)” on page 246, “Trace Traffic Sampling Operations” on page 246, and “Configure Port Mirroring” on page 249.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

server

server (DHCP or BOOTP service)

Syntax	server [<i>addresses</i>];
Hierarchy Level	[edit forwarding-options helpers bootp], [edit forwarding-options helpers bootp interface <i>interface-group</i>]
Description	Configure the router to act as a DHCP or BOOTP relay agent.
Options	<i>addresses</i> —One or more addresses of the server.
Usage Guidelines	See “Configure the Router or Interface to Act as a DHCP/BOOTP Relay Agent” on page 237.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

server (DNS and TFTP service)

Syntax	server <i>address</i> < [routing-instance <i>routing-instance-names</i>] >;
Hierarchy Level	[edit forwarding-options helpers domain], [edit forwarding-options helpers domain interface <i>interface-name</i>], [edit forwarding-options helpers tftp], [edit forwarding-options helpers tftp interface <i>interface-name</i>]
Description	Specify the DNS or TFTP server for forwarding DNS or TFTP requests. Only one server can be specified for each interface.
Options	<i>address</i> —Address of the server. <i>routing-instance</i> [<i>routing-instance-names</i>]—Set the routing instance name or names that belong to the DNS server or TFTP server.

Usage Guidelines	See “Configure DNS and TFTP Packet Forwarding” on page 239.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

size

Syntax	size <i>bytes</i> ;
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling output file], [edit forwarding-options sampling traceoptions file]
Description	Specify the maximum size of each file containing sample or log data. The file size is limited by the number of files to be created and the available hard disk space. When a traffic sampling file named <i>sampling-file</i> reaches the maximum size, it is renamed <i>sampling-file.0</i> . When the <i>sampling-file</i> again reaches its maximum size, <i>sampling-file.0</i> is renamed <i>sampling-file.1</i> and <i>sampling-file</i> is renamed <i>sampling-file.0</i> . This renaming scheme continues until the maximum number of traffic sampling files is reached. Then the oldest traffic sampling file is overwritten.
Options	<i>bytes</i> —Maximum size of each traffic sampling file or trace log file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). Syntax: <i>xk</i> to specify KB, <i>xm</i> to specify MB, or <i>xg</i> to specify GB Range: 10 KB through the maximum file size supported on your router Default: 1 MB for sampling data; 128 KB for log information
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244 and “Trace Traffic Sampling Operations” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

stamp

Syntax	(stamp no-stamp);
Hierarchy Level	[edit forwarding-options sampling output file]
Description	Include a timestamp with each line in the output file.
Options	<i>no-stamp</i> —Do not include timestamps. This is the default. <i>stamp</i> —Include a timestamp with each line of packet sampling information. Default: No timestamp is included.
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

tftp

```

Syntax  tftp {
            description description-of-service;
            server address < [ routing-instance routing-instance-names ] >;
            interface interface-name {
                description description-of-interface;
                no-listen;
                server address < [ routing-instance routing-instance-names ] >;
            }
        }

```

Hierarchy Level [edit forwarding-options helpers]

Description Enable TFTP request packet forwarding.

Options The statements are explained separately.

Usage Guidelines See “Configure DNS and TFTP Packet Forwarding” on page 239.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

traceoptions

traceoptions (for DNS and TFTP packet forwarding)

```

Syntax  traceoptions {
            file filename {
              files number;
              size bytes;
            }
            flag flag;
            level level;
          }

```

Hierarchy Level [edit forwarding-options helpers]

Description Configure tracing operations.

Options flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements.

address—Address management

all—All forwarding tracing operations

config—Configuration

fdb—Interface database

io—I/O

main—Main loop

rtsock—Routing socket

trace—Trace tracing

ui—User interface

util—Miscellaneous utility

level—Level at which traceoptions tracks the filter information:

all—Match all levels.

error—Match error conditions.

info—Match informational messages.

notice—Match conditions that should be handled specially.

verbose—Match verbose messages.

warning—Match warning messages.

The remaining statements are explained separately.

Usage Guidelines See “Trace BOOTP, DNS, and TFTP Forwarding Operations” on page 240.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

traceoptions (for port mirroring and traffic sampling)

Syntax

```
traceoptions {
    file filename {
        files number;
        size bytes;
        (world-readable | no-world-readable);
    }
}
```

Hierarchy Level [edit forwarding-options port-mirroring],
[edit forwarding-options sampling]

Description Configure traffic sampling tracing operations.
The statements are explained separately.

Usage Guidelines See “Trace Traffic Sampling Operations” on page 246.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

version

Syntax

```
version format;
```

Hierarchy Level [edit forwarding-options accounting *group-name* output cflowd *hostname*],
[edit forwarding-options sampling output cflowd *hostname*]

Description Specify the version format of the aggregated flows exported to a cflowd server.

Options *format*—Format of the flows.
Values: 5 or 8
Default: 5

Usage Guidelines See “Configure Flow Aggregation (cflowd)” on page 246.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

world-readable

Syntax	(world-readable no-world-readable);
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling output file], [edit forwarding-options sampling traceoptions file]
Description	Enable unrestricted file access.
Options	no-world-readable—Restrict file access to owner. This is the default. world-readable—Enable unrestricted file access.
	Default: no-world-readable
Usage Guidelines	See “Configure Traffic Sampling Output” on page 244 and “Trace Traffic Sampling Operations” on page 246.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.