

Traffic Sampling



Published: 2012-02-28

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

This product includes the Envoy SNMP Engine, developed by Epilogue Technology, an Integrated Systems Company. Copyright © 1986-1997, Epilogue Technology Corporation. All rights reserved. This program and its documentation were developed at private expense, and no part of them is in the public domain.

This product includes memory allocation software developed by Mark Moraes, copyright © 1988, 1989, 1993, University of Toronto.

This product includes FreeBSD software developed by the University of California, Berkeley, and its contributors. All of the documentation and software included in the 4.4BSD and 4.4BSD-Lite Releases is copyrighted by the Regents of the University of California. Copyright © 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994. The Regents of the University of California. All rights reserved.

GateD software copyright © 1995, the Regents of the University. All rights reserved. Gate Daemon was originated and developed through release 3.0 by Cornell University and its collaborators. Gated is based on Kirton's EGP, UC Berkeley's routing daemon (routed), and DCN's HELLO routing protocol. Development of Gated has been supported in part by the National Science Foundation. Portions of the GateD software copyright © 1988, Regents of the University of California. All rights reserved. Portions of the GateD software copyright © 1991, D. L. S. Associates.

This product includes software developed by Maker Communications, Inc., copyright © 1996, 1997, Maker Communications, Inc.

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, and JunosE are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Products made or sold by Juniper Networks or components thereof might be covered by one or more of the following patents that are owned by or licensed to Juniper Networks: U.S. Patent Nos. 5,473,599, 5,905,725, 5,909,440, 6,192,051, 6,333,650, 6,359,479, 6,406,312, 6,429,706, 6,459,579, 6,493,347, 6,538,518, 6,538,899, 6,552,918, 6,567,902, 6,578,186, and 6,590,785.

Traffic Sampling
Copyright © 2012, Juniper Networks, Inc.
All rights reserved.

The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at <http://www.juniper.net/support/eula.html>. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

Table of Contents

	About the Documentation	ix
	Documentation and Release Notes	ix
	Supported Platforms	ix
	Using the Examples in This Manual	ix
	Merging a Full Example	x
	Merging a Snippet	x
	Documentation Conventions	xi
	Documentation Feedback	xiii
	Requesting Technical Support	xiii
	Self-Help Online Tools and Resources	xiii
	Opening a Case with JTAC	xiv
Part 1	Configuration	
Chapter 1	Configuration Tasks	3
	Configuring Traffic Sampling	3
	Minimum Configuration for Traffic Sampling	3
	Configuring Traffic Sampling	4
	Disabling Traffic Sampling	5
	Sampling Once	6
	Configuring Traffic Sampling Output	6
	Traffic Sampling Output Format	7
	Tracing Traffic Sampling Operations	8
	Traffic Sampling Examples	8
	Example: Sampling a Single SONET/SDH Interface	8
	Example: Sampling All Traffic from a Single IP Address	9
	Example: Sampling All FTP Traffic	10
	Configuring Sampling Instances	11
Chapter 2	Configuration Statements	15
	address	15
	aggregate-export-interval	16
	aggregation	17
	autonomous-system-type	18
	destination	18
	disable	19
	engine-id	19
	engine-type	20
	extension-service	21
	family (Sampling)	22
	file (Sampling)	23

file (Trace Options)	24
filename	24
files	25
filter	26
flow-active-timeout	27
flow-export-rate	28
flow-inactive-timeout	29
flow-server	30
inline-jflow	31
input (Sampling)	31
instance (Sampling)	32
interface (Accounting or Sampling)	33
label-position	34
local-dump	34
match	35
maximum-packet-length	35
max-packets-per-second	36
no-remote-trace (Trace Options)	36
output (Sampling)	37
port	38
rate	39
run-length	40
sample-once	40
sampling (Forwarding Options)	41
size	43
source-address	44
stamp	44
template (Forwarding Options)	45
traceoptions	45
version	46
version9 (Forwarding Options)	46
world-readable	47

Part 2

Index

Index	51
-------------	----

List of Figures

Part 1	Configuration	
Chapter 1	Configuration Tasks	3
	Figure 1: Configure Sampling Rate	5

List of Tables

About the Documentation	ix
Table 1: Notice Icons	xi
Table 2: Text and Syntax Conventions	xi

About the Documentation

- Documentation and Release Notes on page ix
- Supported Platforms on page ix
- Using the Examples in This Manual on page ix
- Documentation Conventions on page xi
- Documentation Feedback on page xiii
- Requesting Technical Support on page xiii

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

For the features described in this document, the following platforms are supported:

- M Series
- T Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xml;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the [Junos OS CLI User Guide](#).

Documentation Conventions

[Table 1 on page xi](#) defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

[Table 2 on page xi](#) defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to techpubs-comments@juniper.net, or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>

- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/> .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html> .

PART 1

Configuration

- [Configuration Tasks on page 3](#)
- [Configuration Statements on page 15](#)

CHAPTER 1

Configuration Tasks

- [Configuring Traffic Sampling on page 3](#)
- [Configuring Sampling Instances on page 11](#)

Configuring Traffic Sampling

Traffic sampling enables you to copy traffic to a Physical Interface Card (PIC) that performs flow accounting while the router forwards the packet to its original destination. You can configure the router to perform sampling in either of two locations:

- On the Routing Engine, using the sampled process. To select this method, use a filter (input or output) with a matching term that contains the **then sample** statement.
- On the Monitoring Services, Adaptive Services, or Multiservices PIC.



NOTE: Routing Engine based sampling is not supported on VPN routing and forwarding (VRF) instances.

The following sections provide configuration instructions for traffic sampling:

- [Minimum Configuration for Traffic Sampling on page 3](#)
- [Configuring Traffic Sampling on page 4](#)
- [Disabling Traffic Sampling on page 5](#)
- [Sampling Once on page 6](#)
- [Configuring Traffic Sampling Output on page 6](#)
- [Tracing Traffic Sampling Operations on page 8](#)
- [Traffic Sampling Examples on page 8](#)

Minimum Configuration for Traffic Sampling

To configure traffic sampling on a logical interface, you must perform at least the following tasks:

- Create a firewall filter to apply to the logical interfaces being sampled by including the **filter** statement at the **[edit firewall family *family-name*]** hierarchy level. In the filter **then** statement, you must specify the action modifier **sample** and the action **accept**.

```
filter filter-name {  
  term term-name {  
    then {  
      sample;  
      accept;  
    }  
  }  
}
```

For more information about firewall filter actions and action modifiers, see the [Junos OS Policy Framework Configuration Guide](#).

- Apply the filter to the interfaces on which you want to sample traffic by including the **address** and **filter** statements at the **[edit interfaces *interface-name* unit *logical-unit-number* family *family-name*]** hierarchy level:

```
address address {  
  destination destination-address;  
}  
filter {  
  input filter-name;  
}
```

- Enable sampling and specify a nonzero sampling rate by including the **sampling** statement at the **[edit forwarding-options]** hierarchy level:

```
sampling {  
  input {  
    rate number;  
    run-length number;  
    max-packets-per-second number;  
    maximum-packet-length bytes;  
  }  
}
```

Configuring Traffic Sampling

To configure traffic sampling on any logical interface, include the **input** statement at the **[edit forwarding-options sampling]** hierarchy level:

```
input {  
  rate number;  
  run-length number;  
  max-packets-per-second number;  
  maximum-packet-length bytes;  
}
```

When you use Routing Engine-based sampling, specify the threshold traffic value by including the **max-packets-per-second** statement. The value is the maximum number of packets to be sampled, beyond which the sampling mechanism begins dropping packets. The range is from 0 through 65,535. A value of 0 instructs the Packet Forwarding Engine not to sample any packets. The default value is 1000.



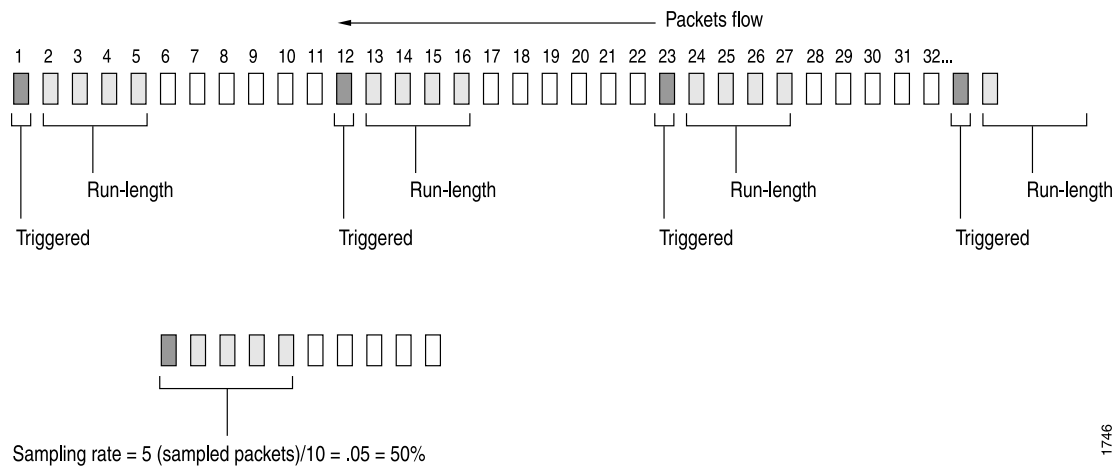
NOTE: When you configure active monitoring and specify a Monitoring Services, Adaptive Services, or Multiservices PIC in the **output** statement, the **max-packets-per-second** value is ignored.

Specify the sampling rate by setting the values for **rate** and **run-length** (see [Figure 1 on page 5](#)).

Figure 1: Configure Sampling Rate

Rate and Run-length

Case #1 Rate =10, run-length =4



The **rate** statement specifies the ratio of packets to be sampled. For example, if you configure a rate of 10, x number of packets out of every 10 is sampled, where $x = \text{run-length} + 1$. By default, the rate is 0, which means that no traffic is sampled.

The **run-length** statement specifies the number of matching packets to sample following the initial one-packet trigger event. By default, the **run-length** is 0, which means that no more traffic is sampled after the trigger event. The range is from 0 through 20. Configuring a run length greater than 0 allows you to sample packets following those already being sampled.



NOTE: The **run-length** and **maximum-packet-length** configuration statements are not supported on MX80 routers.

If you do not include the **input** statement, sampling is disabled.

To collect the sampled packets in a file, include the **file** statement at the **[edit forwarding-options sampling output]** hierarchy level. Output file formats are discussed later in the chapter.

Disabling Traffic Sampling

To explicitly disable traffic sampling on the router, include the **disable** statement at the **[edit forwarding-options sampling]** hierarchy level:

```
disable;
```

Sampling Once

To explicitly sample a packet for active monitoring only once, include the **sample-once** statement at the **[edit forwarding-options sampling]** hierarchy level:

```
sample-once;
```

Setting this option avoids duplication of packets in cases where sampling is enabled at both the ingress and egress interfaces and simplifies analysis of the sampled traffic.

Configuring Traffic Sampling Output

To configure traffic sampling output, include the following statements at the **[edit forwarding-options sampling family (inet | inet6 | mpls) output]** hierarchy level:

```
aggregate-export-interval seconds;
flow-active-timeout seconds;
flow-inactive-timeout seconds;
extension-service service-name;
flow-server 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;
  version9 {
    template template-name;
  }
}
interface interface-name {
  engine-id number;
  engine-type number;
  source-address address;
}
file {
  disable;
  filename filename;
  files number;
  size bytes;
  (stamp | no-stamp);
  (world-readable | no-world-readable);
}
```

To configure inline flow monitoring on MX Series routers, include the **inline-jflow** statement at the **[edit forwarding-options sampling instance instance-name family (inet | inet6 | mpls)]**

output] hierarchy level. Inline sampling exclusively supports a new format called IP_FIX that uses UDP as the transport protocol. When you configure inline sampling, you must include the **version-ipfix** statement at the **[edit forwarding-options sampling instance instance-name family (inet | inet6 | mpls) output flow-server address]** hierarchy level and also at the **[edit services flow-monitoring]** hierarchy level. For more information about configuring inline flow monitoring, see *Configuring Inline Flow Monitoring*.

To direct sampled traffic to a flow-monitoring interface, include the **interface** statement. The **engine-id** and **engine-type** statements specify the identity and type numbers of the interface; they are dynamically generated based on the Flexible PIC Concentrator (FPC), PIC, and slot numbers and the chassis type. The **source-address** statement specifies the traffic source.

To configure flow sampling version 9 output, you need to include the **template** statement at the **[edit forwarding-options sampling output version9]** hierarchy level. For information on cflowd, see *Enabling Flow Aggregation*.

The **aggregate-export-interval** statement is described in *Configuring Discard Accounting*, and the **flow-active-timeout** and **flow-inactive-timeout** statements are described in *Configuring Flow Monitoring*.

Traffic sampling results are automatically saved to a file in the **/var/tmp** directory. To collect the sampled packets in a file, include the **file** statement at the **[edit forwarding-options sampling family inet output]** hierarchy level:

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

Traffic Sampling Output Format

Traffic sampling output is saved to an ASCII text file. The following is an example of the traffic sampling output that is saved to a file in the **/var/tmp** directory. Each line in the output file contains information for one sampled packet. You can optionally display a timestamp for each line.

The column headers are repeated after each group of 1000 packets.

```
# Apr  7 15:48:50
Time                Dest                Src Dest Src Proto TOS Pkt Intf  IP    TCP
                  addr                addr port port          len num frag flags
Apr 7 15:48:54 192.168.9.194 192.168.9.195  0   0   1   0x0  84  8   0x0  0x0
Apr 7 15:48:55 192.168.9.194 192.168.9.195  0   0   1   0x0  84  8   0x0  0x0
Apr 7 15:48:56 192.168.9.194 192.168.9.195  0   0   1   0x0  84  8   0x0  0x0
Apr 7 15:48:57 192.168.9.194 192.168.9.195  0   0   1   0x0  84  8   0x0  0x0
Apr 7 15:48:58 192.168.9.194 192.168.9.195  0   0   1   0x0  84  8   0x0  0x0
```

To set the timestamp option for the file **my-sample**, enter the following:

```
[edit forwarding-options sampling output file]
```

```
user@host# set filename my-sample files 5 size 2m world-readable stamp;
```

Whenever you toggle the timestamp option, a new header is included in the file. If you set the **stamp** option, the **Time** field is displayed.

```
# Apr  7 15:48:50
# Time           Dest      Src  Dest  Src Proto TOS   Pkt  Intf   IP   TCP
#               addr      addr port  port                len   num  frag flags
# Feb  1 20:31:21
#               Dest      Src  Dest  Src Proto TOS   Pkt  Intf   IP   TCP
#               addr      addr port  port                len   num  frag flags
```

Tracing Traffic Sampling Operations

Tracing operations track all traffic sampling operations and record them in a log file in the `/var/log` directory. By default, this file is named `/var/log/sampled`. The default file size is 128K, and 10 files are created before the first one gets overwritten.

To trace traffic sampling operations, include the **traceoptions** statement at the **[edit forwarding-options sampling]** hierarchy level:

```
traceoptions {
  no-remote-trace;
  file filename <files number> <size bytes> <match expression> <world-readable |
  no-world-readable>;
}
```

Traffic Sampling Examples

The following sections provide examples of configuring traffic sampling:

- [Example: Sampling a Single SONET/SDH Interface on page 8](#)
- [Example: Sampling All Traffic from a Single IP Address on page 9](#)
- [Example: Sampling All FTP Traffic on page 10](#)

Example: Sampling a Single SONET/SDH Interface

The following configuration gathers statistical sampling information from a small percentage of all traffic on a single SONET/SDH interface and collects it in a file named `sonet-samples.txt`.

Create the filter:

```
[edit firewall family inet]
filter {
  input sample-sonet {
    then {
      sample;
      accept;
    }
  }
}
```

Apply the filter to the SONET/SDH interface:

```
[edit interfaces]
so-0/0/1 {
  unit 0 {
    family inet {
      filter {
        input sample-sonet;
      }
      address 10.127.68.254/32 {
        destination 172.16.74.7;
      }
    }
  }
}
```

Finally, configure traffic sampling:

```
[edit forwarding-options]
sampling {
  input {
    family inet {
      rate 100;
      run-length 2;
    }
  }
  family inet {
    output {
      file {
        filename sonet-samples.txt;
        files 40;
        size 5m;
      }
    }
  }
}
```

Example: Sampling All Traffic from a Single IP Address

The following configuration gathers statistical information about every packet entering the router on a specific Gigabit Ethernet port originating from a single source IP address of **172.16.92.31**, and collects it in a file named **samples-172-16-92-31.txt**.

Create the filter:

```
[edit firewall family inet]
filter one-ip {
  term get-ip {
    from {
      source-address 172.16.92.31;
    }
    then {
      sample;
      accept;
    }
  }
}
```

Apply the filter to the Gigabit Ethernet interface:

```
[edit interfaces]
ge-4/1/1 {
  unit 0 {
    family inet {
      filter {
        input one-ip;
      }
      address 10.45.92.254;
    }
  }
}
```

Finally, gather statistics on all the candidate samples; in this case, gather all statistics:

```
[edit forwarding-options]
sampling {
  input {
    family inet {
      rate 1;
    }
  }
  family inet {
    output {
      file {
        filename samples-172-16-92-31.txt;
        files 100;
        size 100k;
      }
    }
  }
}
```

Example: Sampling All FTP Traffic

The following configuration gathers statistical information about a moderate percentage of packets using the FTP data transfer protocol in the output path of a specific T3 interface, and collects the information in a file named **t3-ftp-traffic.txt**.

Create a filter:

```
[edit firewall family inet]
filter ftp-stats {
  term ftp-usage {
    from {
      destination-port [ftp ftp-data];
    }
    then {
      sample;
      accept;
    }
  }
}
```

Apply the filter to the T3 interface:

```
[edit interfaces]
t3-7/0/2 {
```



```

unit 0 {
  family inet {
    filter {
      input ftp-stats;
    }
    address 10.35.78.254/32 {
      destination 10.35.78.4;
    }
  }
}

```

Finally, gather statistics on 10 percent of the candidate samples:

```

[edit forwarding-options]
sampling {
  input {
    family inet {
      rate 10;
    }
  }
  family inet {
    output {
      file {
        filename t3-ftp-traffic.txt;
        files 50;
        size 1m;
      }
    }
  }
}

```

Configuring Sampling Instances

You can configure active sampling by defining a sampling instance that specifies a name for the sampling parameters and binding the instance name to a particular engine. This configuration enables you to define multiple named sampling parameter sets associated with multiple destinations (as many as the number of Packet Forwarding Engines in the chassis), with multiple protocol families per each sampling destination. This configuration is supported on MX Series, M120, M320, T640, T1600, and TX matrix routers and on the cflowd version 5/8 and flow aggregation version 9 templates.

To implement this feature, you include the **instance** statement at the **[edit forwarding-options sampling]** hierarchy level:

```

instance instance-name { # named instances of sampling parameters
  disable;
  input { # input parameters common to all protocol families
    rate number;
    run-length number;
    max-packets-per-second number;
    maximum-packet-length bytes;
  }
  family (inet | inet6 | mpls) {
    disable;
  }
}

```

```
output {
  aggregate-export-interval seconds;
  flow-active-timeout seconds;
  flow-inactive-timeout seconds;
  extension-service service-name;
  flow-server 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;
    version9 {
      template template-name;
    }
  }
  interface interface-name {
    engine-id number;
    engine-type number;
    source-address address;
  }
  inline-jflow {
    source-address address;
    flow-export-rate rate;
  }
}
}
```

The following considerations apply to the sampling instance configuration:

- This configuration is supported on the IP version 4 (**inet**), IP version 6 (**ipv6**), and MPLS protocol families.
- You can configure the **rate** and **run-length** options at the **[edit forwarding-options sampling input]** hierarchy level to apply common values for all families on a global basis. Alternatively, you can configure these options at the **[edit forwarding-options sampling instance *instance-name* input]** hierarchy level to apply specific values for each instance or at the **[edit forwarding-options sampling instance *instance-name* family *family* input]** hierarchy level to apply specific values for each protocol family you configure.



NOTE: The **run-length** and **maximum-packet-length** configuration statements are not supported on MX80 routers.

To associate the defined instance with a particular Packet Forwarding Engine, you include the **sampling-instances** statement at the **[edit chassis fpc number]** hierarchy level, as in the following example:

```
chassis {  
  fpc 2 {  
    sampling-instances samp1;  
  }  
}
```

For more information about chassis configuration, see the *Junos OS System Configuration Guide*

CHAPTER 2

Configuration Statements

address

Syntax	<pre>address address { destination address; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the interface address.
Options	address —Address of the interface. The remaining statement is explained separately.
Usage Guidelines	See Configuring Flow Monitoring or “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Network Interfaces Configuration Guide for other options not associated with flow monitoring.

aggregate-export-interval

Syntax	<code>aggregate-export-interval <i>seconds</i>;</code>
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output], [edit forwarding-options sampling family (inet inet6 mpls) output]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the duration, in seconds, of the interval for exporting aggregate accounting information.
Options	<i>seconds</i> —Duration.
Usage Guidelines	See Configuring Discard Accounting.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

aggregation

Syntax	<pre>aggregation { autonomous-system; destination-prefix; protocol-port; source-destination-prefix { caida-compliant; } source-prefix; }</pre>
Hierarchy Level	<p>[edit forwarding-options accounting output cflowd <i>hostname</i>], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output flow-server <i>hostname</i>], [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i>]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
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	<p>autonomous-system—Aggregate by autonomous system (AS) number.</p> <p>caida-compliant—Record source and destination mask-length values in compliance with the Version 2.1b1 release of CAIDA's cflowd application. If this statement is not configured, the Junos OS records source and destination mask length values in compliance with the <i>cflowd Configuration Guide</i>, dated August 30, 1999.</p> <p>destination-prefix—Aggregate by destination prefix.</p> <p>protocol-port—Aggregate by protocol and port number.</p> <p>source-destination-prefix—Aggregate by source and destination prefix.</p> <p>source-prefix—Aggregate by source prefix.</p>
Usage Guidelines	See Enabling Flow Aggregation.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

autonomous-system-type

Syntax	<code>autonomous-system-type (origin peer);</code>
Hierarchy Level	[edit forwarding-options <code>sampling instance</code> <i>instance-name</i> <code>family</code> (inet inet6 mpls) <code>output flow-server</code> <i>hostname</i>], [edit forwarding-options <code>sampling family</code> (inet inet6 mpls) <code>output flow-server</code> <i>hostname</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the type of AS numbers that cflowd exports.
Default	<code>origin</code>
Options	<code>origin</code> —Export origin AS numbers of the packet source address in the Source Autonomous System cflowd field. <code>peer</code> —Export peer AS numbers through which the packet passed in the Source Autonomous System cflowd field.
Usage Guidelines	See Enabling Flow Aggregation.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

destination

Syntax	<code>destination</code> <i>destination-address</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For tunnel interfaces, specify the remote address of the tunnel.
Options	<code>destination-address</code> —Address of the remote side of the connection.
Usage Guidelines	See Configuring Unicast Tunnels, “ Configuring Traffic Sampling ” on page 3, and Configuring Flow Monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.


disable

Syntax	disable;
Hierarchy Level	[edit forwarding-options port-mirror], [edit forwarding-options port-mirror instance <i>instance-name</i>], [edit forwarding-options sampling], [edit forwarding-options sampling instance <i>instance-name</i>], [edit forwarding-options sampling family (inet inet6 mpls)], [edit forwarding-options sampling family (inet inet6 mpls) output file]
Release Information	Statement introduced before Junos OS Release 7.4. Statement added to port-mirror hierarchy in Junos OS Release 9.6.
Description	Disable traffic accounting, port mirroring, or sampling.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3 or Configuring Port Mirroring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.


engine-id

Syntax	engine-id <i>number</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output interface <i>interface-name</i>], [edit forwarding-options monitoring <i>name</i> output interface <i>interface-name</i>], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output interface <i>interface-name</i>], [edit forwarding-options sampling family (inet inet6 mpls) output interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the engine ID number for flow monitoring and accounting services.
Options	<i>number</i> —Identity of accounting interface.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3, Configuring Flow Monitoring, or Configuring Discard Accounting.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

engine-type

Syntax	engine-type <i>number</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output interface <i>interface-name</i>], [edit forwarding-options monitoring <i>name</i> output interface <i>interface-name</i>], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output interface <i>interface-name</i>], [edit forwarding-options sampling family (inet inet6 mpls) output interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the engine type number for flow monitoring and accounting services. The engine type attribute refers to the type of the flow switching engine, such as the route processor or a line module. The configured engine type is inserted in output cflowd packets. The Source ID , a 32-bit value to ensure uniqueness for all flows exported from a particular device, is the equivalent of the engine type and the engine ID fields.
<div><p>NOTE: You must configure a source address in the output interface statements. The interface-level statement of engine-type is added automatically but you may override this value with manually configured statements to track different flows with a single cflowd collector.</p></div>	
Options	<i>number</i> —Platform-specific accounting interface type.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3, Configuring Flow Monitoring, or Configuring Discard Accounting.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

extension-service

Syntax	extension-service <i>service-name</i> { <i>provider-specific rules</i> ; }
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6) output] [edit forwarding-options sampling family (inet inet6) output] [edit services service-set <i>service-set-name</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	Define a customer specific sampling configuration. Define a service set or traffic monitoring for applications using application-specific configuration guidelines.
<div>  <p>NOTE: If the <code>extension-service</code> statement is specified while configuring a service set, the <code>service-order</code> statement is mandatory.</p> </div>	
Options	<i>provider-specific rules</i> —Provider-specific subhierarchy for services and service sets. See the application-specific documentation for details. <i>service-name</i> —Name of the service.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • service-order • sampling on page 41

family (Sampling)

```
Syntax  family (inet | inet6 | mpls) {
        disable;
        output {
            aggregate-export-interval seconds;
            flow-active-timeout seconds;
            flow-inactive-timeout seconds;
            extension-service service-name;
            flow-server 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;
                version9 {
                    template template-name;
                }
            }
        }
        interface interface-name {
            engine-id number;
            engine-type number;
            source-address address;
        }
        file {
            disable;
            filename filename;
            files number;
            size bytes;
            (stamp | no-stamp);
            (world-readable | no-world-readable);
        }
        inline-jflow {
            source-address address;
            flow-export-rate rate;
        }
    }
```

Hierarchy Level [edit forwarding-options [sampling](#)],
[edit forwarding-options [sampling instance](#) *instance-name*]

Release Information Statement introduced before Junos OS Release 7.4.
mpls option introduced in Release 8.3.
inet6 option introduced in Release 9.4.

Description Configure the protocol family to be sampled. IPv4 (**inet**) is supported for most purposes, but you can configure **family mpls** to collect and export MPLS label information or **family inet6** to collect and export IPv6 traffic using flow aggregation version 9.

The remaining statements are explained separately.



NOTE: The `inline-jflow` statement is valid only under the `[edit forwarding-options sampling instance instance-name family inet output]` hierarchy level. The `file` statement is valid only under the `[edit forwarding-options sampling family inet output]` hierarchy level.

Usage Guidelines See “Configuring Traffic Sampling” on page 3.

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

file (Sampling)

Syntax

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

Hierarchy Level [edit forwarding-options **sampling family inet output**]

Release Information Statement introduced before Junos OS Release 7.4.

Description Collect the traffic samples in a file.

The statements are explained separately.

Usage Guidelines See “Configuring Traffic Sampling” on page 3.

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

file (Trace Options)

Syntax	file <i>filename</i> <files number <size bytes> <world-readable no-world-readable>;
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions], [edit forwarding-options sampling traceoptions]
Release Information	Statement introduced before Junos OS Release 7.4.
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 “ Tracing Traffic Sampling Operations ” on page 8.
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 family (inet inet6 mpls) output file]
Release Information	Statement introduced before Junos OS Release 7.4.
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 /var/tmp.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.



files

Syntax	<code>files <i>number</i>;</code>
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling family (inet inet6 mpls) output file], [edit forwarding-options sampling traceoptions file]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the total number of files to be saved with samples or trace data.
Options	<p><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.</p> <p>Range: 1 through 100 files</p> <p>Default: 5 files for sampling output; 10 files for trace log information</p>
Usage Guidelines	See Configuring Port Mirroring or “Configuring Traffic Sampling” on page 3 .
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

filter

Syntax	<pre>filter { input <i>filter-name</i>; output <i>filter-name</i>; group <i>filter-group-number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Apply a firewall filter to an interface. You can also use filters for encrypted traffic.
Options	<p>group <i>filter-group-number</i>—Define an interface to be part of a filter group. The default filter group number is 0.</p> <p>input <i>filter-name</i>—Name of one filter to evaluate when packets are received on the interface.</p> <p>output <i>filter-name</i>—Name of one filter to evaluate when packets are transmitted on the interface.</p>
Usage Guidelines	See Configuring Flow Monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Policy Framework Configuration Guide or the Junos OS System Basics Configuration Guide


flow-active-timeout

Syntax	flow-active-timeout <i>seconds</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output], [edit forwarding-options monitoring <i>name</i> output], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output], [edit forwarding-options sampling family (inet inet6 mpls) output], [edit services flow-monitoring version9]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Interval after which an active flow is exported.
<div>  <p>NOTE: The router must include an Adaptive Services, Multiservices, or Monitoring Services PIC for this statement to take effect.</p> </div>	
Options	<p>seconds—Duration of the timeout period.</p> <p>Range: 60 through 1800 seconds (for forwarding-options configurations); 10 through 600 seconds (for services configurations)</p> <p>Default: 1800 seconds (for forwarding-options configurations); 60 seconds (for services configurations)</p>
<div>  <p>NOTE: In active flow monitoring, the cflowd records are exported after a time period that is a multiple of 60 seconds and greater than or equal to the configured active timeout value. For example, if the active timeout value is 90 seconds, the cflowd records are exported at 120-second intervals. If the active timeout value is 150 seconds, the cflowd records are exported at 180-second intervals, and so forth.</p> </div>	
Usage Guidelines	See Configuring Time Periods when Flow Monitoring is Active and Inactive or Configuring the Version 9 Template Properties.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

flow-export-rate

Syntax	flow-export-rate <i>rate</i> ;
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family inet output inline-jflow]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the flow export rate of monitored packets in kpps.
Options	<i>rate</i> —Flow export rate of monitored packets in kpps (from 1 to 400).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Discard Accounting• Configuring Flow Monitoring• Configuring Traffic Sampling on page 3

flow-inactive-timeout

Syntax	flow-inactive-timeout <i>seconds</i> ;
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output], [edit forwarding-options monitoring <i>name</i> output], [edit forwarding-options <i>sampling instance instance-name family</i> (inet inet6 mpls) <i>output</i>], [edit forwarding-options <i>sampling family</i> (inet inet6 mpls) <i>output</i>], [edit services flow-monitoring <i>version9</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Interval of inactivity that marks a flow inactive.
<div>  <p>NOTE: The router must include an Adaptive Services, Multiservices, or Monitoring Services PIC for this statement to take effect.</p> </div>	
Options	<p>seconds—Duration of the timeout period.</p> <p>Range: 60 through 1800 seconds (for forwarding-options configurations); 10 through 600 seconds (for services configurations)</p> <p>Default: 1800 seconds (for forwarding-options configurations); 60 seconds (for services configurations)</p>
Usage Guidelines	See Configuring Time Periods when Flow Monitoring is Active and Inactive or Configuring the Version 9 Template Properties.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

flow-server

Syntax	<pre> flow-server <i>hostname</i> { 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 <i>port-number</i>; source-address <i>address</i>; version <i>format</i>; version9 { template <i>template-name</i>; } } </pre>
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output], [edit forwarding-options sampling family (inet inet6 mpls) output]
Release Information	Statement introduced before Junos OS Release 7.4. version9 statement introduced in Junos OS Release 8.3.
Description	<p>Collect an aggregate of sampled flows and send the aggregate to a specified host system that runs the collection utility cfdcollect. Specify a host system to collect sampled flows using the version 9 format.</p> <p>You can configure up to one version 5 and one version 8 flow format at the [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i>] hierarchy level. For the same configuration, you can specify only either version 9 flow record formats or formats using versions 5 and 8, not both types of formats.</p>
Options	<p>hostname—The IP address or identifier of the host system (the workstation either running the cflowd utility or collecting traffic flows using version 9).</p> <p>You can configure only one host system for version 9.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Traffic Sampling on page 3

inline-jflow

Syntax	inline-jflow { source-address <i>address</i> ; flow-export-rate <i>rate</i> ; }
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family inet output]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify inline flow monitoring for traffic from the designated address.
Options	<i>address</i> —Source IP address.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Inline Flow Monitoring

input (Sampling)

Syntax	input { max-packets-per-second <i>number</i> ; rate <i>number</i> ; run-length <i>number</i> ; maximum-packet-length <i>bytes</i> ; }
Hierarchy Level	[edit forwarding-options sampling], [edit forwarding-options sampling instance <i>instance-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure traffic sampling on a logical interface. The statements are explained separately.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

instance (Sampling)

```

Syntax  instance instance-name {
        disable;
        input {
            rate number;
            run-length number;
            max-packets-per-second number;
            maximum-packet-length bytes;
        }
        family (inet | inet6 | mpls) {
            disable;
            output {
                aggregate-export-interval seconds;
                flow-active-timeout seconds;
                flow-inactive-timeout seconds;
                extension-service service-name;
                flow-server 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;
                    version9 {
                        template template-name;
                    }
                }
            }
            interface interface-name {
                engine-id number;
                engine-type number;
                source-address address;
            }
            inline-jflow {
                source-address address;
                flow-export-rate rate;
            }
        }
    }

```

Hierarchy Level [edit forwarding-options [sampling](#)]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure a sampling instance.

The remaining statements are explained separately.

Usage Guidelines	See “Configuring Sampling Instances” on page 11 .
Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.

interface (Accounting or Sampling)

Syntax	<pre>interface <i>interface-name</i> { <i>engine-id</i> <i>number</i>; <i>engine-type</i> <i>number</i>; <i>source-address</i> <i>address</i>; }</pre>
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output], [edit forwarding-options sampling family (inet inet6 mpls) output], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the output interface for monitored traffic.
Options	<i>interface-name</i> —Name of the interface. The remaining statements are explained separately.
Usage Guidelines	See Configuring Discard Accounting or “Configuring Traffic Sampling” on page 3 .
Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.

label-position

Syntax	label-position [<i>positions</i>];
Hierarchy Level	[edit services flow-monitoring version9 template <i>template-name</i> mpls-ipv4-template], [edit services flow-monitoring version9 template <i>template-name</i> mpls-template]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Specify positions for up to three labels in the template.
Default	[1 2 3]
Options	<i>positions</i> —Numbered positions for the labels.
Usage Guidelines	See Configuring Flow Aggregation to Use Version 9 Flow Templates.
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 instance <i>instance-name</i> family (inet inet6 mpls) output flow-server <i>hostname</i>], [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
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 Enabling Flow Aggregation.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.


match

Syntax	<code>match expression;</code>
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling traceoptions file]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Regular expression for lines to be logged for tracing.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Port Mirroring Configuring Traffic Sampling on page 3

maximum-packet-length

Syntax	<code>maximum-packet-length bytes;</code>
Hierarchy Level	[edit forwarding-options port-mirroring input], [edit forwarding-options port-mirroring instance <i>instance-name</i> input], [edit forwarding-options sampling input], [edit forwarding-options sampling instance instance-name input]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Set the maximum length of the packet used for port mirroring or traffic sampling. Packets with lengths greater than the specified maximum are truncated.
	<div>  <p>NOTE: The <code>maximum-packet-length</code> statement is not supported on MX80 routers.</p> </div>
Options	<i>bytes</i> —Number of bytes.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Port Mirroring Configuring Traffic Sampling

max-packets-per-second

Syntax	max-packets-per-second <i>number</i> ;
Hierarchy Level	[edit forwarding-options sampling input], [edit forwarding-options sampling instance <i>instance-name</i> input]
Release Information	Statement introduced before Junos OS Release 7.4.
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.
	<div> NOTE: When you configure active monitoring and specify a Monitoring Services, Adaptive Services, or Multiservices PIC in the output statement, the <code>max-packets-per-second</code> value is ignored.</div>
Options	<i>number</i> —Maximum number of packets per second. Range: 0 through 65,535 Default: 1000
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

no-remote-trace (Trace Options)

Syntax	no-remote-trace;
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions], [edit forwarding-options sampling traceoptions]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Disable remote tracing.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Tracing Traffic Sampling Operations on page 8

output (Sampling)

Syntax	<pre> output { aggregate-export-interval <i>seconds</i>; flow-active-timeout <i>seconds</i>; flow-inactive-timeout <i>seconds</i>; extension-service <i>service-name</i>; flow-server <i>hostname</i> { 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 <i>port-number</i>; source-address <i>address</i>; version <i>format</i>; version9 { template <i>template-name</i>; } } interface <i>interface-name</i> { engine-id <i>number</i>; engine-type <i>number</i>; source-address <i>address</i>; } file { disable; filename <i>filename</i>; files <i>number</i>; size <i>bytes</i>; (stamp no-stamp); (world-readable no-world-readable); } inline-jflow { source-address <i>address</i>; flow-export-rate <i>rate</i>; } } </pre>
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls)], [edit forwarding-options sampling family (inet inet6 mpls)]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure cflowd, output files and interfaces, and flow properties. The statements are explained separately.



NOTE: The `inline-jflow` statement is valid only under the `[edit forwarding-options sampling instance instance-name family inet output]` hierarchy level. The `file` statement is valid only under the `[edit forwarding-options sampling family inet output]` hierarchy level.

Usage Guidelines See “Configuring Traffic Sampling” on page 3.

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

port

Syntax `port port-number;`

Hierarchy Level `[edit forwarding-options accounting name output cflowd hostname],`
`[edit forwarding-options monitoring name family inet output cflowd hostname],`
`[edit forwarding-options sampling instance instance-name family (inet | inet6 | mpls) output`
`flow-server hostname],`
`[edit forwarding-options sampling family (inet | inet6 | mpls) output flow-server hostname]`

Release Information Statement introduced before Junos OS Release 7.4.

Description Specify the User Datagram Protocol (UDP) port number on the cflowd host system.

Options *port-number*—Any valid UDP port number on the host system.

Usage Guidelines See Enabling Flow Aggregation.

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], [edit forwarding-options sampling input], [edit forwarding-options sampling instance <i>instance-name</i> input], [edit forwarding-options port-mirroring family (inet inet6) input]
Release Information	Statement introduced before Junos OS Release 7.4.
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	number —Denominator of the ratio. Range: 1 through 65,535
Usage Guidelines	See Configuring Port Mirroring or “Configuring Traffic Sampling” on page 3 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

run-length

Syntax	run-length <i>number</i> ;
Hierarchy Level	[edit forwarding-options port-mirroring input], [edit forwarding-options port-mirroring instance <i>port-mirroring-instance-name</i> input], [edit forwarding-options port-mirroring family (inet inet6) input], [edit forwarding-options sampling input], [edit forwarding-options sampling instance <i>instance-name</i> input]
Release Information	Statement introduced before Junos OS Release 7.4.
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 Configuring Port Mirroring or “ Configuring Traffic Sampling ” on page 3.



NOTE: The run-length statement is not supported on MX80 routers.

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

sample-once

Syntax	sample-once;
Hierarchy Level	[edit forwarding-options sampling]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Sample traffic for active monitoring only once.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Traffic Sampling on page 3

sampling (Forwarding Options)

```

Syntax  sampling {
        disable;
        sample-once;
        input {
            rate number;
            run-length number;
            max-packets-per-second number;
            maximum-packet-length bytes;
        }
        traceoptions {
            no-remote-trace;
            file filename <files number> <size bytes> <match expression> <world-readable |
```

no-*world-readable*>;

```

        }
        family (inet | inet6 | mpls) {
            disable;
            output {
                aggregate-export-interval seconds;
                flow-active-timeout seconds;
                flow-inactive-timeout seconds;
                extension-service service-name;
                flow-server 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;
                    version9 {
                        template template-name;
                    }
                }
            }
            interface interface-name {
                engine-id number;
                engine-type number;
                source-address address;
            }
            file {
                disable;
                filename filename;
                files number;
                size bytes;
                (stamp | no-stamp);
                (world-readable | no-world-readable);
            }
        }
    }

```

```

    }
  }
}
instance instance-name {
  disable;
  input {
    rate number;
    run-length number;
    max-packets-per-second number;
    maximum-packet-length bytes;
  }
  family (inet | inet6 | mpls) {
    disable;
    output {
      aggregate-export-interval seconds;
      flow-active-timeout seconds;
      flow-inactive-timeout seconds;
      extension-service service-name;
      flow-server 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;
        version9 {
          template template-name;
        }
      }
    }
  }
  interface interface-name {
    engine-id number;
    engine-type number;
    source-address address;
  }
  inline-jflow {
    source-address address;
    flow-export-rate rate;
  }
}
}
}
}

```

Hierarchy Level [edit forwarding-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description	Configure traffic sampling. The statements are explained separately.
Usage Guidelines	See “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

size

Syntax	<code>size bytes;</code>
Hierarchy Level	[edit forwarding-options port-mirroring traceoptions file], [edit forwarding-options sampling family (inet inet6 mpls) output file], [edit forwarding-options sampling traceoptions file]
Release Information	Statement introduced before Junos OS Release 7.4.
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 sampling-file reaches the maximum size, it is renamed sampling-file.0 . When the sampling-file again reaches its maximum size, sampling-file.0 is renamed sampling-file.1 and sampling-file is renamed sampling-file.0 . This renaming scheme continues until the maximum number of traffic sampling files is reached. Then the oldest traffic sampling file is overwritten.
Options	bytes —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 Configuring Port Mirroring or “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

source-address

Syntax	<code>source-address <i>address</i>;</code>
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output <code>interface <i>interface-name</i></code>], [edit forwarding-options monitoring <i>name</i> family <i>family</i> inet output <code>interface <i>interface-name</i></code>], [edit forwarding-options <code>sampling instance <i>instance-name</i> family (inet inet6 mpls) output interface <i>interface-name</i></code>], [edit forwarding-options <code>sampling family (inet inet6 mpls) output interface <i>interface-name</i></code>], [edit forwarding-options <code>sampling instance <i>instance-name</i> family inet output inline-jflow</code>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the source address for monitored packets.
Options	<i>address</i> —Interface source address.
Usage Guidelines	See Configuring Discard Accounting, Configuring Flow Monitoring, or “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

stamp

Syntax	<code>(stamp no-stamp);</code>
Hierarchy Level	[edit forwarding-options <code>sampling family (inet inet6 mpls) output file</code>]
Release Information	Statement introduced before Junos OS Release 7.4.
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 “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

template (Forwarding Options)

Syntax	template <i>template-name</i> ;
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output flow-server <i>hostname</i> version9], [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i> version9]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Specify flow aggregation version 9 template to be used for output of sampling records.
Options	<i>template-name</i> —Name of version 9 template.
Usage Guidelines	See Configuring Flow Aggregation to Use Version 9 Flow Templates .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

traceoptions

Syntax	traceoptions { no-remote-trace ; file <i>filename</i> < files <i>number</i> > < size <i>bytes</i> > < match expression > < world-readable no- world-readable >; }
Hierarchy Level	[edit forwarding-options port-mirroring], [edit forwarding-options sampling]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure traffic sampling tracing operations. The statements are explained separately.
Usage Guidelines	See “Tracing Traffic Sampling Operations” on page 8 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

version

Syntax	<code>version <i>format</i>;</code>
Hierarchy Level	[edit forwarding-options accounting <i>name</i> output flow-server <i>hostname</i>], [edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output flow-server <i>hostname</i>], [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the version format of the aggregated flows exported to a cflowd server.
Options	<i>format</i> —Format of the flows. Values: 5 or 8 Default: 5
Usage Guidelines	See Enabling Flow Aggregation.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• export-format

version9 (Forwarding Options)

Syntax	<code>version9 { template <i>template-name</i>; }</code>
Hierarchy Level	[edit forwarding-options sampling instance <i>instance-name</i> family (inet inet6 mpls) output flow-server <i>hostname</i>], [edit forwarding-options sampling family (inet inet6 mpls) output flow-server <i>hostname</i>]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Specify flow aggregation version 9 properties to apply to output sampling records. The remaining statements are explained separately.
Usage Guidelines	See Configuring Flow Aggregation to Use Version 9 Flow Templates.
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 family (inet inet6 mpls) output file], [edit forwarding-options sampling traceoptionsfile]
Release Information	Statement introduced before Junos OS Release 7.4.
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 Configuring Port Mirroring or “ Configuring Traffic Sampling ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

PART 2

Index

- [Index on page 51](#)

Index

Symbols

#, comments in configuration statements.....	xii
(), in syntax descriptions.....	xii
< >, in syntax descriptions.....	xii
[], in configuration statements.....	xii
{ }, in configuration statements.....	xii
(pipe), in syntax descriptions.....	xii

A

accept	
action.....	3
address statement	
flow monitoring.....	15
usage guidelines.....	3
aggregate-export-interval statement.....	16
aggregation statement	
flow monitoring.....	17
autonomous-system-type statement.....	18

B

braces, in configuration statements.....	xii
brackets	
angle, in syntax descriptions.....	xii
square, in configuration statements.....	xii

C

comments, in configuration statements.....	xii
conventions	
text and syntax.....	xi
curly braces, in configuration statements.....	xii
customer support.....	xiii
contacting JTAC.....	xiii

D

destination statement	
flow monitoring.....	18
usage guidelines.....	3
disable statement	
flow monitoring.....	19
traffic sampling	
usage guidelines.....	5

documentation	
comments on.....	xiii

E

engine-id statement	
flow monitoring.....	19
engine-type statement.....	20
extension-service statement.....	21

F

family statement	
flow monitoring	
usage guidelines.....	3
file statement.....	24
traffic sampling.....	23
traffic sampling output	
usage guidelines.....	6, 8
filename statement.....	24
files	
logging information output file.....	8
traffic sampling output files.....	6
var/log/sampled file.....	8
var/tmp/sampled.pkts file.....	6
files statement.....	25
usage guidelines.....	6
filter statement	
flow monitoring.....	26
usage guidelines.....	3
firewall filters	
actions.....	3
in traffic sampling.....	3
flow-active-timeout statement.....	27
flow-export-rate statement	
flow monitoring.....	28
flow-inactive-timeout statement.....	29
flow-server statement	
flow monitoring.....	30
font conventions.....	xi
FTP traffic, sampling.....	10

I

inline-jflow statement	
flow monitoring.....	31
instance statement	
sampling.....	32
usage guidelines.....	11
interfaces statement	
flow monitoring	
usage guidelines.....	3

IP addresses		sample-once statement	
sampling traffic from single IP addresses.....	9	flow monitoring.....	40
L		usage guidelines.....	6
label-position statement.....	34	sampld file.....	8
local-dump statement.....	34	sampld.pkts file.....	6
log output		sampling	
traffic sampling.....	8	logical interface.....	4
M		sampling rate.....	4
manuals		sampling statement	
comments on.....	xiii	usage guidelines.....	3
match statement.....	35	size statement.....	43
max-packets-per-second statement.....	36	usage guidelines.....	8
usage guidelines.....	4	SONET interfaces	
maximum-packet-length statement.....	35	sampling SONET interfaces.....	8
N		source-address statement	
no-local-dump statement.....	34	flow monitoring.....	44
no-remote-trace statement		stamp option.....	7
flow monitoring.....	36	stamp statement.....	44
no-stamp statement.....	44	usage guidelines.....	6
usage guidelines.....	6	statement	
no-world-readable statement		flow monitoring	
flow monitoring.....	47	usage guidelines.....	8
usage guidelines.....	6	support, technical See technical support	
O		syntax conventions.....	xi
output files		T	
logging information output file.....	8	technical support	
traffic sampling output files.....	6	contacting JTAC.....	xiii
output statement		timestamp option.....	7
sampling.....	37	traceoptions statement	
P		flow monitoring.....	45
parentheses, in syntax descriptions.....	xii	traffic sampling	
port mirroring		configuring.....	3
disabling.....	19	disabling.....	5, 19
port statement		example configurations.....	8
flow monitoring.....	38	FTP traffic.....	10
R		logging information output file.....	8
rate statement.....	39	output files.....	6
usage guidelines.....	4	SONET interfaces.....	8
run-length statement.....	40	traffic from single IP addresses.....	9
usage guidelines.....	4	U	
S		unit statement	
sample (firewall filter action).....	3	flow monitoring	
		usage guidelines.....	3
		V	
		var/log/sampld file.....	8
		var/tmp/sampld.pkts file.....	6

version statement
 flow monitoring.....46

W

world-readable statement
 flow monitoring.....47
 usage guidelines.....6

