

Port Mirroring



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

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Port Mirroring
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About the Documentation

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Supported Platforms

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

- M Series
- T Series
- MX 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 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 or emphasizes 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; 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 metric>;
(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 string2 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

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

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- 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/>.
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- Join and participate in the Juniper Networks Community Forum:
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To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

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- 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 Task on page 3](#)
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- [Configuration Statements on page 21](#)

CHAPTER 1

Configuration Task

- [Configuring Port Mirroring on page 3](#)

Configuring Port Mirroring

On routers containing an Internet Processor II application-specific integrated circuit (ASIC) or T Series Internet Processor, you can send a copy of an IP version 4 (IPv4) or IP version 6 (IPv6) packet from the router to an external host address or a packet analyzer for analysis. This is known as *port mirroring*.

Port mirroring is different from traffic sampling. In traffic sampling, a sampling key based on the IPv4 header is sent to the Routing Engine. There, the key can be placed in a file, or cflowd packets based on the key can be sent to a cflowd server. In port mirroring, the entire packet is copied and sent out through a next-hop interface.

You can configure simultaneous use of sampling and port mirroring, and set an independent sampling rate and run-length for port-mirrored packets. However, if a packet is selected for both sampling and port mirroring, only one action can be performed and port mirroring takes precedence. For example, if you configure an interface to sample every packet input to the interface and a filter also selects the packet to be port mirrored to another interface, only the port mirroring would take effect. All other packets not matching the explicit filter port-mirroring criteria continue to be sampled when forwarded to their final destination.



NOTE: Configuration for both port mirroring and traffic sampling are handled by the same daemon, so in order to view a trace log file for port mirroring, you must configure the `traceoptions` option under traffic sampling.

To prepare traffic for port mirroring, include the **filter** statement at the **[edit firewall family inet]** hierarchy level:

```
filter filter-name;
```

This filter at the **[edit firewall family (inet | inet6)]** hierarchy level selects traffic to be port-mirrored:

```
filter filter-name {  
    term term-name {
```

```
    then {  
        port-mirror;  
        accept;  
    }  
}
```

To configure port mirroring on a logical interface, configure the following statements at the `[edit forwarding-options port-mirroring]` hierarchy level:

```
[edit forwarding-options port-mirroring family (inet|inet6)]  
input {  
    maximum-packet-length bytes  
    rate rate;  
    run-length number;  
}  
output {  
    interface interface-name {  
        next-hop address;  
    }  
    no-filter-check;  
}
```



NOTE: The `input` statement can also be configured at the `[edit forwarding-options port-mirroring]` hierarchy level. This is only maintained for backward compatibility. However, the configuration of the `output` statement is deprecated at the `[edit forwarding-options port-mirroring]` hierarchy level.

Specify the port-mirroring destination by including the `next-hop` statement at the `[edit forwarding-options port-mirroring output interface interface-name]` hierarchy level:

```
next-hop address;
```



NOTE: For IPv4 port mirroring to reach a next-hop destination, you must manually include a static Address Resolution Protocol (ARP) entry in the router configuration.

The `no-filter-check` statement is required when you send port-mirrored traffic to a Tunnel PIC that has a filter applied to it. `en`

The interface used to send the packets to the analyzer is the output interface configured above at the `[edit forwarding-options port-mirroring family (inet | inet6) output]` hierarchy level. You can use any physical interface type, including generic routing encapsulation (GRE) tunnel interfaces. The next-hop address specifies the destination address; this statement is mandatory for non point-to-point interfaces, such as Ethernet interfaces.

To configure the sampling rate or duration, include the `rate` or `run-length` statement at the `[edit forwarding-options port-mirroring input]` hierarchy level.

You can trace port-mirroring operations the same way you trace sampling operations. For more information, see [Tracing Traffic Sampling Operations](#).

For more information about port mirroring, see the following sections:

- [Configuring Tunnels on page 5](#)
- [Port Mirroring with Next-Hop Groups on page 5](#)
- [Configuring Inline Port Mirroring on page 7](#)
- [Filter-Based Forwarding with Multiple Monitoring Interfaces on page 7](#)
- [Restrictions on page 8](#)
- [Configuring Port Mirroring on Services Interfaces on page 9](#)
- [Examples: Configuring Port Mirroring on page 10](#)

Configuring Tunnels

In typical applications, you send the sampled packets to an analyzer or a workstation for analysis, rather than another router. If you must send this traffic over a network, you should use tunnels. For more information about tunnel interfaces, see Tunnel Properties.

If your router is equipped with a Tunnel PIC, you can forward duplicate packets to multiple interfaces by configuring a next-hop group. To configure a next-hop group, include the **next-hop-group** statement at the **[edit forwarding-options]** hierarchy level:

```
[edit forwarding-options]
next-hop-group group-names {
  interface interface-name {
    next-hop address;
  }
}
```

The **interface** statement specifies the interface that sends out sampled information. The **next-hop** statement specifies the next-hop addresses to which to send the sampled information.

Next-hop groups have the following restrictions:

- Next-hop groups are supported for IPv4 addresses only.
- Next-hop groups are supported on M Series routers only, except the M120 and the M320.
- Next-hop groups support 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.

Port Mirroring with Next-Hop Groups

You can configure next-hop groups for MX, TX, and T Series routers using either IP addresses or Layer 2 addresses for the next hops. Use the **group-type [inet | layer-2]** statement at **[edit forwarding-options next-hop-group next-hop-group-name]** hierarchy level to establish the next-hop groups. You can reference more than one port mirroring instance in a filter on MX Series routers. Use the **port-mirror-instance instance-name** statement at the **[edit firewall family family-name filter filter-name term term-name]** to

refer to one of several port mirroring instances. For more information about this configuration, see the JUNOS® MX Series 3D Universal Edge Routers Solutions, Release 13.1.



NOTE: On the Trio chipset for MX series routers, port mirroring instances can only be bound to the FPC level and not up to the PIC level. For MX series routers with a DPC card, both levels are supported.

On MX, TX, and T Series routers only, you can configure port mirroring using next-hop groups, also known as *multipacket port mirroring*, without the presence of a Tunnel PIC. To configure this functionality, include the **next-hop-group** statement at the **[edit forwarding-options port-mirror family inet output]** or **[edit forwarding-options port-mirror instance *instance-name* family inet output]** hierarchy level:

```
[edit forwarding-options]
port-mirror {
  family inet {
    output {
      next-hop-group group-name;
    }
  }
}
```

or

```
[edit forwarding-options]
port-mirror {
  instance instance-name {
    family (inet | vpls) {
      output {
        next-hop-group group-name;
      }
    }
  }
}
```

You define the next-hop group by including the **next-hop-group** statement at the **[edit forwarding-options]** hierarchy level. For an example, see [“Examples: Configuring Port Mirroring” on page 10](#). This configuration is supported only with IPv4 addresses.

You can disable this configuration by including a **disable** or **disable-all-instances** statement at the **[edit forwarding-options port-mirror]** hierarchy level or by including a **disable** statement at the **[edit forwarding-options port-mirror instance *instance-name*]** hierarchy level. You can display the settings and network status by issuing the **show forwarding-options next-hop-group** and **show forwarding-options port-mirroring** operational commands.



NOTE: If you try to bind any derived instance to the FPC, a commit error will occur.

Configuring Inline Port Mirroring

Inline port mirroring provides you with the ability to specify instances that are not bound to the flexible PIC concentrator (FPC) in the firewall filter's **then port-mirror-instance** action. This way, you are not limited to only two port-mirror instances per FPC. Inline port mirroring decouples the port-mirror destination from the input parameters like **rate**. While the input parameters are programmed in the switch interface board, the next-hop destination of the mirrored packet is available in the packet itself. Inline port mirroring is supported only on Trio-based modular port concentrators (MPCs).

Using inline port mirroring, a port-mirror instance will have an option to inherit input parameters from another instance that specifies it, as shown in the following CLI configuration example:

```
instance pm2 {
  + input-parameters-instance pm1;
  family inet {
    output {
      interface ge-1/2/3.0 {
        next-hop 50.0.0.3;
      }
    }
  }
}
```

Multiple levels of inheritance are not allowed. One instance can be referred by multiple instances. An instance can refer to another instance that is defined before it. Forward references are not allowed and an instance cannot refer to itself, doing so will cause an error during configuration parsing.

The user can specify an instance that is not bound to the FPC in the firewall filter. The specified filter should inherit one of the two instances that have been bound to the FPC. If it does not, the packet is not marked for port-mirroring. If it does, then the packet will be sampled using the input parameters specified by the referred instance but the copy will be sent to the its own destination.

Filter-Based Forwarding with Multiple Monitoring Interfaces

If port-mirrored packets are to be distributed to multiple monitoring or collection interfaces based on patterns in packet headers, it is helpful to configure a filter-based forwarding (FBF) filter on the port-mirroring egress interface.

When an FBF filter is installed as an output filter, a packet that is forwarded to the filter has already undergone at least one route lookup. After the packet is classified at the egress interface by the FBF filter, it is redirected to another routing table for additional route lookup. Obviously, the route lookup in the latter routing table (designated by an FBF routing instance) must result in a different next hop from those from the previous tables the packet has passed through, to avoid packet looping inside the Packet Forwarding Engine.

For more information about FBF configuration, see the Junos OS Routing Protocols Configuration Guide. For an example of FBF applied to an output interface, see [“Examples: Configuring Port Mirroring” on page 10](#).

Restrictions

The following restrictions apply to port-mirroring configurations:

- The interface you configure for port mirroring should not participate in any kind of routing activity.
- The destination address you specify should not have a route to the ultimate traffic destination. For example, if the sampled IPv4 packets have a destination address of **10.68.9.10** and the port-mirrored traffic is sent to **10.68.20.15** for analysis, the device associated with the latter address should not know a route to **10.68.9.10**. Also, it should not send the sampled packets back to the source address.
- IPv4 and IPv6 traffic is supported. For IPv6 port mirroring, you must configure the next-hop router with an IPv6 neighbor before mirroring the traffic, similar to an ARP request for IPv4 traffic. All the restrictions applied to IPv4 configurations should also apply to IPv6.
- On M120 and M320 routers, multiple next-hop mirroring is not supported.
- Because M320 routers do not support multiple bindings of port-mirror instances per FPC, the **port-mirror-instance** action is not supported in firewall filters for these routers.
- On M Series routers other than the M120 and M320 routers, only one family protocol (either IPv4 or IPv6) is supported at a time.
- Port mirroring supports up to 16 next hops, but there is no next-hop group support for **inet6**.
- Only transit data is supported.
- You can configure multiple port-mirroring interfaces per router.
- On routers containing an Internet Processor II application-specific integrated circuit (ASIC), you must include a firewall filter with both the **accept** action and the **port-mirror** action modifier on the inbound interface. Do not include the **discard** action, or port mirroring will not work.
- If the port-mirroring interface is a non-point-to-point interface, you must include an IP address under the **port-mirroring** statement to identify the other end of the link. This IP address must be reachable for you to see the sampled traffic. If the port-mirroring interface is an Ethernet interface, the router should have an Address Resolution Protocol (ARP) entry for it. The following sample configuration sets up a static ARP entry.
- You do not need to configure firewall filters on both inbound and outbound interfaces, but at least one is necessary on the inbound interface to provide the copies of the packets to send to an analyzer.
- Inline port mirroring is supported only on Trio-based MPCs.

Configuring Port Mirroring on Services Interfaces

A special situation arises when you configure unit 0 of a services interface (AS or Multiservices PIC) to be the port-mirroring logical interface, as in the following example:

```
[edit forwarding-options]
port-mirroring {
  input {
    rate 1;
  }
  family inet {
    output {
      interface sp-1/0/0.0;
    }
  }
}
```

Since any traffic directed to unit 0 on a services interface is targeted for monitoring (cflowd packets are generated for it), the sample port-mirroring configuration indicates that the customer would like to have cflowd records generated for the port-mirrored traffic.

However, generation of cflowd records requires the following additional configuration; if it is missing, the port-mirrored traffic is simply dropped by the services interface without generating any cflowd packets.

```
[edit forwarding-options]
sampling {
  instance instance1 { # named instances of sampling parameters
    input {
      rate 1;
    }
    family inet {
      output {
        flow-server 172.16.28.65 {
          port 1230;
        }
        interface sp-1/0/0 { # If the port-mirrored traffic requires monitoring, this
                              # interface must be same as that specified in the
                              # port-mirroring configuration.
          source-address 3.1.2.3;
        }
      }
    }
  }
}
```



NOTE: Another way to configure sp-1/0/0 to generate cflowd records is to use only the sampling configuration, but include a firewall filter `sample` action instead of a `port-mirror` action.

Examples: Configuring Port Mirroring

The following example sends port-mirrored traffic to multiple cflowd servers or packet analyzers:

```
[edit interfaces]
ge-1/0/0 { # This is the input interface where packets enter the router.
  unit 0 {
    family inet {
      filter {
        input mirror_pkts; # Here is where you apply the first filter.
      }
      address 10.11.0.1/24;
    }
  }
}
ge-1/1/0 { # This is an exit interface for HTTP packets.
  unit 0 {
    family inet {
      address 10.12.0.1/24;
    }
  }
}
ge-1/2/0 { # This is an exit interface for HTTP packets.
  unit 0 {
    family inet {
      address 10.13.0.1/24;
    }
  }
}
so-0/3/0 { # This is an exit interface for FTP packets.
  unit 0 {
    family inet {
      address 10.1.1.1/30;
    }
  }
}
so-4/3/0 { # This is an exit interface for FTP packets.
  unit 0 {
    family inet {
      address 10.2.2.2/30;
    }
  }
}
so-7/0/0 { # This is an exit interface for all remaining packets.
  unit 0 {
    family inet {
      address 10.5.5.5/30;
    }
  }
}
so-7/0/1 { # This is an exit interface for all remaining packets.
  unit 0 {
    family inet {
      address 10.6.6.6/30;
    }
  }
}
```



```

    }
  }
}
vt-3/3/0 { # The tunnel interface is where you send the port mirrored traffic.
  unit 0 {
    family inet;
  }
  unit 1 {
    family inet {
      filter {
        input collect_pkts; # This is where you apply the second firewall filter.
      }
    }
  }
}
[edit forwarding-options]
port-mirroring { # This is required when you configure next-hop groups.
  input {
    rate 1; # This rate port mirrors one packet for every one received (1:1 = all
    # packets).
  }
  family inet {
    output { # This sends traffic to a tunnel interface to prepare for multiport mirroring.
      interface vt-3/3/0.1;
      no-filter-check;
    }
  }
}
next-hop-group ftp-traffic { # Point-to-point interfaces require you to specify the interface
  # name only.
  interface so-4/3/0.0;
  interface so-0/3/0.0;
}
next-hop-group http-traffic { # You need to configure a next hop for multipoint interfaces
  # (Ethernet).
  interface ge-1/1/0.0 {
    next-hop 10.12.0.2;
  }
  interface ge-1/2/0.0 {
    next-hop 10.13.0.2;
  }
}
next-hop-group default-collect {
  interface so-7/0/0.0;
  interface so-7/0/1.0;
}
[edit firewall]
family inet {
  filter mirror_pkts { # Apply this filter to the input interface.
    term catch_all {
      then {
        count input_mirror_pkts;
        port-mirror; # This action sends traffic to be copied and port mirrored.
        accept;
      }
    }
  }
}

```

```
}
filter collect_pkts { # Apply this filter to the tunnel interface.
  term ftp-term { # This term sends FTP traffic to an FTP next-hop group.
    from {
      protocol ftp;
    }
    then next-hop-group ftp-traffic;
  }
  term http-term { # This term sends HTTP traffic to an HTTP next-hop group.
    from {
      protocol http;
    }
    then next-hop-group http-traffic;
  }
  term default { # This term sends all remaining traffic to a final next-hop group.
    then next-hop-group default-collectors;
  }
}
}
```

The following example demonstrates configuration of filter-based forwarding at the output interface. In this example, the packet flow follows this path:

1. A packet arrives at interface **fe-1/2/0.0** with source and destination addresses **10.50.200.1** and **10.50.100.1**, respectively.
2. The route lookup in routing table **inet.0** points to the egress interface **so-0/0/3.0**.
3. The output filter installed at **so-0/0/3.0** redirects the packet to routing table **fbf.inet.0**.
4. The packet matches the entry **10.50.100.0/25**, and finally leaves the router from interface **so-2/0/0.0**.

```
[edit interfaces]
so-0/0/3 {
  unit 0 {
    family inet {
      filter {
        output fbf;
      }
      address 10.50.10.2/25;
    }
  }
}
fe-1/2/0 {
  unit 0 {
    family inet {
      address 10.50.50.2/25;
    }
  }
}
so-2/0/0 {
  unit 0 {
    family inet {
      address 10.50.20.2/25;
    }
  }
}
```

```

}
[edit firewall]
filter fbf {
  term 0 {
    from {
      source-address {
        10.50.200.0/25;
      }
    }
    then routing-instance fbf;
  }
  term d {
    then count d;
  }
}
[edit routing-instances]
fbf {
  instance-type forwarding;
  routing-options {
    static {
      route 10.50.100.0/25 next-hop so-2/0/0.0;
    }
  }
}
[edit routing-options]
interface-routes {
  rib-group inet fbf-group;
}
static {
  route 10.50.100.0/25 next-hop 10.50.10.1;
}
rib-groups {
  fbf-group {
    import-rib [ inet.0 fbf.inet.0 ];
  }
}
}

```

The following example shows configuration of port mirroring using next-hops groups or multipacket port mirroring:

```

forwarding-options {
  next-hop-group inet_nhg {
    group-type inet;
    interface ge-2/0/2.101 {
      next-hop 10.2.0.2;
    }
    interface ge-2/2/8.2 {
      next-hop 10.8.0.2;
    }
  }
  next-hop-group vpls_nhg {
    group-type layer-2;
    interface ge-2/0/1.100;
    interface ge-2/2/9.0;
    inactive: next-hop-subgroup vpls_subg {
      interface ge-2/0/1.101;
    }
  }
}

```

```
        interface ge-2/2/9.1;
    }
}
next-hop-group vpls_nhg_2 {
    group-type layer-2;
    interface ge-2/2/1.100;
    interface ge-2/3/9.0;
}
port-mirror {
    disable-all-instances; /* Disable all port-mirroring instances */
    disable; /* Disable the global instance */
    input {
        rate 10; # start mirroring every 10th packet
        run-length 4; # mirror 4 additional packets
    }
    family inet {
        output {
            next-hop-group inet_nhg;
        }
    }
    family vpls {
        output {
            next-hop-group vpls_nhg;
        }
    }
    instance {
        inst1 {
            disable; /* Disable this instance */
            input {
                rate 1;
                maximum-packet-length 200;
            }
            family inet {
                output {
                    next-hop-group inet_nhg;
                }
            }
            family vpls {
                output {
                    next-hop-group vpls_nhg_2;
                }
            }
        }
    }
}
}
```

The following example shows configuration of port mirroring using next-hops groups or multipacket port mirroring on a T series router:

```
forwarding-options {
    next-hop-group inet_nhg {
        group-type inet;
        interface so-0/0/0.0; # There is no need for the nexthop address on T series routers
        interface ge-2/0/2.0 {
            next-hop 1.2.3.4
        }
    }
}
```

```

    }
    next-hop-subgroup sub_inet {
        interface so-1/2/0.0;
        interface ge-6/1/2.0 {
            next-hop 6.7.8.9;
        }
    }
    next-hop-group vpls_nhg_2 {
        group-type layer-2;
        interface ge-2/2/1.100;
        interface ge-2/3/9.0;
    }
}
port-mirroring {
    disable-all-instances; /*Disable all port-mirroring instances */
    disable; /* Disable the global instance */
    input {
        rate 10;
        run-length 4;
    }
    family inet {
        output {
            next-hop-group inet_nhg;
        }
    }
    family vpls {
        output {
            next-hop-group vpls_nhg;
        }
    }
}
instance {
    inst1 {
        disable; /* Disable this instance */
        input {
            rate 1;
            maximum-packet-length 200;
        }
        family inet {
            output {
                next-hop-group inet_nhg;
            }
        }
        family vpls {
            output {
                next-hop-group vpls_nhg_2;
            }
        }
    }
}
}
}

```

The following example shows configuration of inline port mirroring using PM1 and PM2 as our port mirror instances.

```
instance {
```

```
pm1 {
  input {
    rate 3;
  }
  family inet {
    output {
      interface ge-1/2/2.0 {
        next-hop 40.0.0.2;
      }
    }
  }
}
pm2 {
  input-parameters-instance pm1;
  family inet {
    output {
      interface ge-1/2/3.0 {
        next-hop 50.0.0.3;
      }
    }
  }
}
}
}
firewall {
  filter pm_filter {
    term t1 {
      then port-mirror-instance pm2;
    }
  }
}
chassis {
  fpc 1 {
    port-mirror-instance pm1;
  }
}
```

The packets will be sampled at a rate of 3 and the copy is sent to 50.0.0.3.

CHAPTER 2

Examples

- [Example: Multiple Port Mirroring with Next-Hop Groups Configuration on page 17](#)

Example: Multiple Port Mirroring with Next-Hop Groups Configuration

When you need to analyze traffic containing more than one packet type, or you wish to perform multiple types of analysis on a single type of traffic, you can implement multiple port mirroring and next-hop groups. You can make up to 16 copies of traffic per group and send the traffic to next-hop group members. A maximum of 30 groups can be configured on a router at any given time. The port-mirrored traffic can be sent to any interface, except aggregated SONET/SDH, aggregated Ethernet, loopback (lo0), or administrative (fxp0) interfaces. To send port-mirrored traffic to multiple flow servers or packet analyzers, you can use the **next-hop-group** statement at the [edit forwarding-options] hierarchy level.

Figure 1: Active Flow Monitoring—Multiple Port Mirroring with Next-Hop Groups Topology Diagram

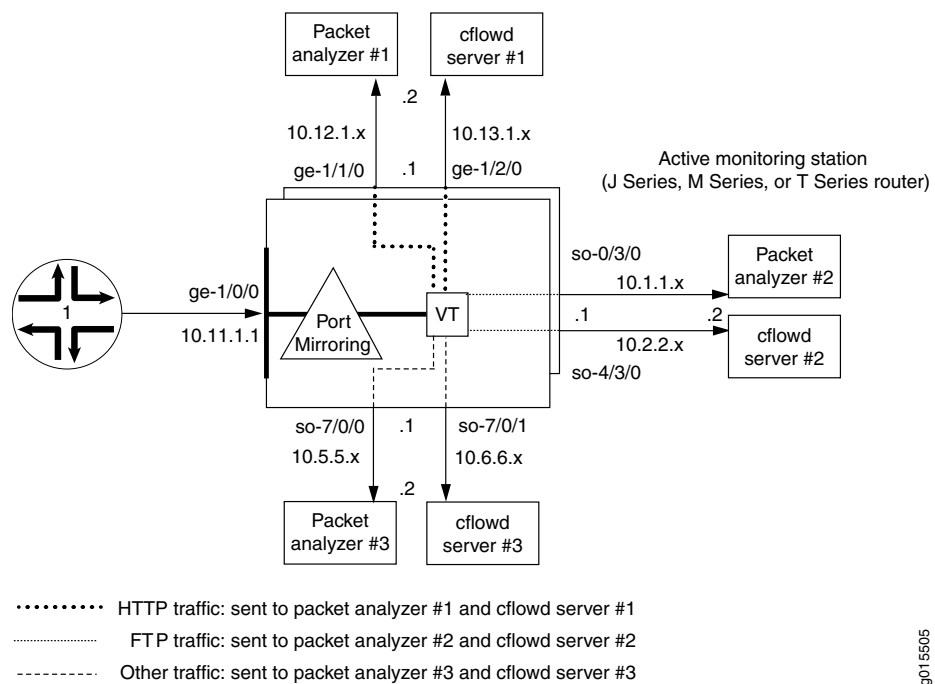


Figure 1 on page 17 shows an example of how to configure multiple port mirroring with next-hop groups. All traffic enters the monitoring router at interface **ge-1/0/0**. A firewall filter counts and port-mirrors all incoming packets to a Tunnel Services PIC. A second filter is applied to the tunnel interface and splits the traffic into three categories: HTTP traffic, FTP traffic, and all other traffic. The three types of traffic are assigned to three separate next-hop groups. Each next-hop group contains a unique pair of exit interfaces that lead to different groups of packet analyzers and flow servers.

```
[edit]
interfaces {
  ge-1/0/0 { # This is the input interface where packets enter the router.
    unit 0 {
      family inet {
        filter {
          input mirror_pkts; # Here is where you apply the first filter.
        }
        address 10.11.1.1/24;
      }
    }
  }
  ge-1/1/0 { # This is an exit interface for HTTP packets.
    unit 0 {
      family inet {
        address 10.12.1.1/24;
      }
    }
  }
  ge-1/2/0 { # This is an exit interface for HTTP packets.
    unit 0 {
      family inet {
        address 10.13.1.1/24;
      }
    }
  }
  so-0/3/0 { # This is an exit interface for FTP packets.
    unit 0 {
      family inet {
        address 10.1.1.1/30;
      }
    }
  }
  so-4/3/0 { # This is an exit interface for FTP packets.
    unit 0 {
      family inet {
        address 10.2.2.1/30;
      }
    }
  }
  so-7/0/0 { # This is an exit interface for all remaining packets.
    unit 0 {
      family inet {
        address 10.5.5.1/30;
      }
    }
  }
}
```



```

so-7/0/1 { # This is an exit interface for all remaining packets.
    unit 0 {
        family inet {
            address 10.6.6.1/30;
        }
    }
}
vt-3/3/0 { # The tunnel interface is where you send the port-mirrored traffic.
    unit 0 {
        family inet;
    }
    unit 1 {
        family inet {
            filter {
                input collect_pkts; # This is where you apply the second firewall filter.
            }
        }
    }
}
forwarding-options {
    port-mirroring { # This is required when you configure next-hop groups.
        family inet {
            input {
                rate 1; # This port-mirrors all packets (one copy for every packet received).
            }
            output { # Sends traffic to a tunnel interface to enable multipoint mirroring.
                interface vt-3/3/0.1;
                no-filter-check;
            }
        }
    }
    next-hop-group ftp-traffic { # Point-to-point interfaces require you to specify the
        interface so-4/3/0.0; # interface name.
        interface so-0/3/0.0;
    }
    next-hop-group http-traffic { # Configure a next hop for all multipoint interfaces.
        interface ge-1/1/0.0 {
            next-hop 10.12.1.2;
        }
        interface ge-1/2/0.0 {
            next-hop 10.13.1.2;
        }
    }
    next-hop-group default-collect {
        interface so-7/0/0.0;
        interface so-7/0/1.0;
    }
}
firewall {
    family inet {
        filter mirror_pkts { # Apply this filter to the input interface.
            term catch_all {
                then {
                    count input_mirror_pkts;
                    port-mirror; # This action sends traffic to be copied and port-mirrored.
                }
            }
        }
    }
}

```

```
    }  
  }  
}  
filter collect_pkts { # Apply this filter to the tunnel interface.  
  term ftp-term { # This term sends FTP traffic to an FTP next-hop group.  
    from {  
      protocol ftp;  
    }  
    then next-hop-group ftp-traffic;  
  }  
  term http-term { # This term sends HTTP traffic to an HTTP next-hop group.  
    from {  
      protocol http;  
    }  
    then next-hop-group http-traffic;  
  }  
  term default { # This sends all remaining traffic to a final next-hop group.  
    then next-hop-group default-collectors;  
  }  
}  
}
```

CHAPTER 3

Configuration Statements

family (Monitoring)

Syntax

```
family inet {
  output {
    flow-active-timeout seconds;
    flow-inactive-timeout seconds;
    export-format format;
    cflowd hostname {
      aggregation {
        autonomous-system;
        destination-prefix;
        protocol-port;
        source-destination-prefix {
          caida-compliant;
        }
        source-prefix;
      }
    }
    port port-number;
  }
  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 *name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Specify input and output interfaces and properties for flow monitoring. Only IPv4 (**inet**) is supported.

The statements are explained separately.

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.

file (Trace Options)

Syntax	file <i>filename</i> <files <i>number</i> <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.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

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">• Routing Policy Configuration Guide or the Junos OS System Basics Configuration Guide

input (Port Mirroring)

Syntax	input { maximum-packet-length <i>bytes</i> <i>rate</i> <i>number</i> ; run-length <i>number</i> ; }
Hierarchy Level	[edit forwarding-options port-mirroring], [edit forwarding-options port-mirroring instance <i>instance-name</i>] [edit forwarding-options port-mirroring family (inet inet6)]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure port mirroring on a logical interface. The statements are explained separately.
Usage Guidelines	See “ Configuring Port Mirroring ” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

interface (Accounting or Sampling)

Syntax	interface <i>interface-name</i> { engine-id <i>number</i> ; engine-type <i>number</i> ; source-address <i>address</i> ; }
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 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

next-hop (Forwarding Options)

Syntax	<code>next-hop <i>address</i>;</code>
Hierarchy Level	[edit forwarding-options port-mirroring family (inet inet6) output interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
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 “Configuring Port Mirroring” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

next-hop-group (Forwarding Options)

Syntax	<pre>next-hop-group <i>group-name</i> { interface <i>interface-name</i> { next-hop <i>address</i>; } }</pre>
Hierarchy Level	[edit forwarding-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Specify the next-hop address for sending copies of packets to an analyzer.</p> <p>The commit operation fails when a next-hop group has only one interface configured. It is implicitly assumed that a subgroup is up only if more than one interface in the subgroup is up.</p>
Options	<p>address—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>group-name—Name of next-hop group. Up to 30 next-hop groups are supported for the router. Each next-hop group must have at least two next-hop addresses.</p> <p>interface-name—Name of interface used to reach the next-hop destination.</p>
Usage Guidelines	See “Configuring Port Mirroring” on page 3.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

no-filter-check

Syntax	no-filter-check;
Hierarchy Level	[edit forwarding-options port-mirroring family (inet inet6) output]
Release Information	Statement introduced before Junos OS Release 7.4.
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 “ Configuring Port Mirroring ” 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>

output (Port Mirroring)

Syntax	<pre>output { interface <i>interface-name</i> { next-hop <i>address</i>; } no-filter-check; }</pre>
Hierarchy Level	[edit forwarding-options port-mirroring family (inet inet6)]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure output interfaces and flow properties.</p> <p>The statements are explained separately.</p>
Usage Guidelines	See “ Configuring Port Mirroring ” 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>

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	<i>number</i> —Denominator of the ratio. Range: 1 through 65,535
Usage Guidelines	See “Configuring Port Mirroring” on page 3 or Configuring Traffic Sampling.
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 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. Statement introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches.
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
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">• Applying Filters to Forwarding Tables• Configuring Port Mirroring on page 3• Configuring Traffic Sampling

size

Syntax	<i>size bytes;</i>
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	<p>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.</p> <p>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.</p>
Options	<p>bytes—Maximum size of each traffic sampling file or trace log file, in kilobytes (KB), megabytes (MB), or gigabytes (GB).</p> <p>Syntax: <i>xk</i> to specify KB, <i>xm</i> to specify MB, or <i>xg</i> to specify GB</p> <p>Range: 10 KB through the maximum file size supported on your router</p> <p>Default: 1 MB for sampling data; 128 KB for log information</p>
Usage Guidelines	See " Configuring Port Mirroring " on page 3 or Configuring Traffic Sampling.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

traceoptions (Forwarding Options)

Syntax	<pre>traceoptions { no-remote-trace; file filename <files number> <size bytes> <match expression> <world-readable no-world-readable>; }</pre>
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.
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 ” on page 3 or Configuring Traffic Sampling.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

PART 2

Administration

- [Port Mirroring Operational Mode Commands on page 33](#)

CHAPTER 4

Port Mirroring Operational Mode Commands

show forwarding-options next-hop-group

Syntax	show forwarding-options next-hop-group <terse brief detail> <group-name>
Release Information	Command introduced in Junos OS Release 9.6.
Description	Display current state of next-hop groups.
Options	terse brief detail —(Optional) Display the specified level of output. group-name —(Optional) Display a single next-hop group.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show forwarding-options port-mirroring on page 38
List of Sample Output	show forwarding-options next-hop-group terse on page 36 show forwarding-options next-hop-group brief on page 36 show forwarding-options next-hop-group detail on page 36
Output Fields	Table 3 on page 34 lists the output fields for the show forwarding-options next-hop-group command. Output fields are listed in the approximate order in which they appear.

Table 3: show forwarding-options next-hop-group Output Fields

Field Name	Field Description	Level of Output
Next-hop-group	Name of next-hop group.	All levels
Type	Next-hop group type, such as inet or layer-2 .	All levels
State	Next-hop group state, either up or down .	All levels
Members Interfaces	Names of interfaces to which next-hop group members belong.	brief detail
Members Subgroup	Names of subgroups to which next-hop group members belong.	brief detail
Number of members configured	Number of next-hop group members configured.	detail
Number of members that are up	Number of next-hop group members that are up.	detail
Number of subgroups configured	Number of subgroups configured.	detail

Table 3: show forwarding-options next-hop-group Output Fields (*continued*)

Field Name	Field Description	Level of Output
Number of subgroups that are up	Number of subgroups that are up.	detail

Sample Output

show
forwarding-options
next-hop-group terse

```
user@host> show forwarding-options next-hop-group terse
Next-hop-group      Type      State
inet_nhg            inet      up
vpls_nhg            layer-2   up
vpls_nhg_2          layer-2   down
```

show
forwarding-options
next-hop-group brief

```
user@host> show forwarding-options next-hop-group brief
Next-hop-group: inet_nhg
Type: inet      State: up
Members Interfaces:
  ge-2/0/2.101 next-hop 101.2.0.2

Next-hop-group: vpls_nhg
Type: layer-2   State: up
Members Interfaces:
  ge-2/0/1.100
  ge-2/2/9.0
Members Subgroup: vpls_subg
Members Interfaces:
  ge-2/0/1.101
  ge-2/2/9.1

Next-hop-group: vpls_nhg_2
Type: layer-2   State: down
```

show
forwarding-options
next-hop-group detail

```
user@host> show forwarding-options next-hop-group detail
Next-hop-group: inet_nhg
Type: inet      State: up
Number of members configured : 2
Number of members that are up : 1
Number of subgroups configured : 0
Number of subgroups that are up : 0
Members Interfaces:      State
  ge-2/0/2.101 next-hop 101.2.0.2 up
  ge-2/2/8.2   next-hop 2.8.0.2   down

Next-hop-group: vpls_nhg
Type: layer-2   State: up
Number of members configured : 2
Number of members that are up : 2
Number of subgroups configured : 1
Number of subgroups that are up : 1
Members Interfaces:      State
  ge-2/0/1.100           up
  ge-2/2/9.0             up
Members Subgroup: vpls_subg up
  Number of members configured : 2
  Number of members that are up : 2
Members Interfaces:
  ge-2/0/1.101           up
  ge-2/2/9.1             up

Next-hop-group: vpls_nhg_2
Number of members configured : 2
Number of members that are up : 0
Number of subgroups configured : 0
```

```
Number of subgroups that are up : 0
Type: layer-2          State: down
Members Interfaces:    State
    ge-2/2/1.100      down
    ge-2/3/9.0        down
```

show forwarding-options port-mirroring

Syntax	show forwarding-options port-mirroring <terse detail> <instance-name>
Release Information	Command introduced in Junos OS Release 9.6.
Description	Display current state of port-mirroring instances.
Options	terse detail —(Optional) Display the specified level of output. instance-name —(Optional) Display a single port-mirroring instance.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show forwarding-options next-hop-group on page 34
List of Sample Output	show forwarding-options port-mirroring terse on page 39 show forwarding-options port-mirroring detail on page 39
Output Fields	Table 4 on page 38 lists the output fields for the show forwarding-options port-mirroring command. Output fields are listed in the approximate order in which they appear.

Table 4: show forwarding-options port-mirroring Output Fields

Field Name	Field Description	Level of Output
Instance Name	Name of port-mirroring instance.	All levels
Instance Id	Instance identification number.	All levels
State	Instance state, either up or down .	All levels
Input parameters		
Rate	Rate (ratio of packets sampled).	detail
Run-length	Run length (number of consecutive packets sampled).	detail
Maximum-packet-length	Maximum packet length.	detail
Output parameters		
Family	Protocol family.	detail
State	Instance state, either up or down .	detail
Destination	Destination (next-hop group name).	detail

Sample Output

show
forwarding-options
port-mirroring terse

```
user@host> show forwarding-options port-mirroring terse
Instance Name      Instance Id  State
&global_instance  1           up
inst1              2           up
```

show
forwarding-options
port-mirroring detail

```
user@host> show forwarding-options port-mirroring detail
Instance Name: &global_instance
Instance Id: 1      State: up
  Input parameters:
    Rate:          10
    Run-length:    4
    Maximum-packet-length: 0
  Output parameters:
    Family: inet   State: up Destination: inet_nhg
    Family: vpls/bridge State: up  Destination: vpls_nhg

Instance Name: inst1
Instance Id: 2      State: up
  Input parameters:
    Rate:          1
    Run-length:    0
    Maximum-packet-length: 200
  Output parameters:
    Family: inet   State: up   Destination: inet_nhg
    Family: vpls/bridge State: down Destination: vpls_nhg_2
```


PART 3

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