Junos® OS

RIP Configuration Guide

Release
12.1

Published: 2012-08-10

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

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Supported Platforms

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

- T Series
- MX Series
- M Series
- J Series
- SRX 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.xsl;
       }
     }
   }
   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.xsl; }

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 xiii 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 xiii 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
Italic text like this	• Introduces or emphasizes important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	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** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• 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** **(*string1* | *string2* | *string3*)**
# (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*]**

Indention and braces ({ })	Identify a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		    route default {
		      nexthop *address*;
		      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.	• 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**.

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

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- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/ .
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- 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/
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- 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/

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- Use the Case Management tool in the CSC at http://www.juniper.net/cm/ .
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For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html .

PART 1

Overview

CHAPTER 1

Introduction to RIP

RIP Overview

In a RIP network, each router's forwarding table is distributed among the nodes through the flooding of routing table information. Because topology changes are flooded throughout the network, every node maintains the same list of destinations. Packets are then routed to these destinations based on path-cost calculations done at each node in the network.

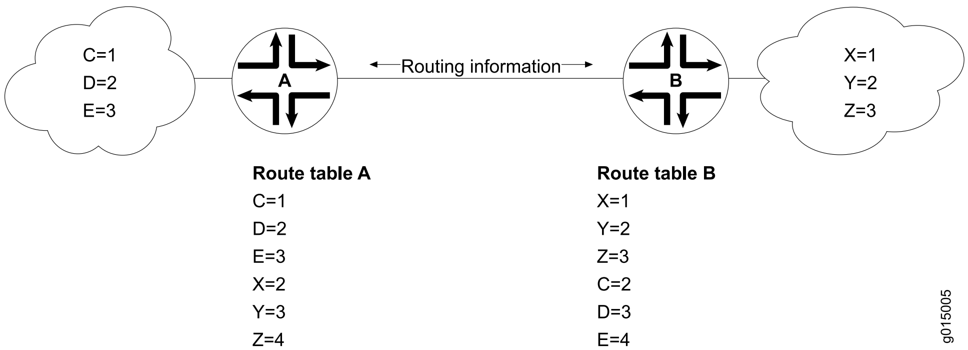
NOTE: In general, the term *RIP* refers to RIP version 1 and RIP version 2.

This topic contains the following sections:

Distance-Vector Routing Protocols

Distance-vector routing protocols transmit routing information that includes a distance vector, typically expressed as the number of hops to the destination. This information is flooded out all protocol-enabled interfaces at regular intervals (every 30 seconds in the case of RIP) to create a network map that is stored in each node's local topology database. Figure 1 on page 4 shows how distance-vector routing works.

Figure 1: Distance-Vector Protocol



In Figure 1 on page 4, Routers A and B have RIP enabled on adjacent interfaces. Router A has known RIP neighbors Routers C, D, and E, which are 1, 2, and 3 hops away, respectively. Router B has known RIP neighbors Routers X, Y, and Z, which are 1, 2, and 3 hops away, respectively. Every 30 seconds, each router floods its entire routing table information out all RIP-enabled interfaces. In this case, flooding exchanges routing table information across the RIP link.

When Router A receives routing information from Router B, it adds 1 to the hop count to determine the new hop count. For example, Router X has a hop count of 1, but when Router A imports the route to X, the new hop count is 2. The imported route also includes information about where the route was learned, so that the original route is imported as a route to Router X through Router B with a hop count of 2.

When multiple routes to the same host are received, RIP uses the distance-vector algorithm to determine which path to import into the forwarding table. The route with the smallest hop count is imported. If there are multiple routes with the same hop count, all are imported into the forwarding table, and traffic is sent along the paths in round-robin fashion.

Maximizing Hop Count

The successful routing of traffic across a RIP network requires that every node in the network maintain the same view of the topology. Topology information is broadcast between RIP neighbors every 30 seconds. If Router A is many hops away from a new host, Router B, the route to B might take significant time to propagate through the network and be imported into Router A's routing table. If the two routers are 5 hops away from each other, Router A cannot import the route to Router B until 2.5 minutes after Router B is online. For large numbers of hops, the delay becomes prohibitive. To help prevent this delay from growing arbitrarily large, RIP enforces a maximum hop count of 15 hops. Any prefix that is more than 15 hops away is treated as unreachable and assigned a hop count equal to infinity. This maximum hop count is called the *network diameter*.

RIP Packets

Routing information is exchanged in a RIP network by RIP request and RIP response packets. A router that has just booted can broadcast a RIP request on all RIP-enabled interfaces. Any routers running RIP on those links receive the request and respond by sending a RIP response packet immediately to the router. The response packet contains the routing table information required to build the local copy of the network topology map.

In the absence of RIP request packets, all RIP routers broadcast a RIP response packet every 30 seconds on all RIP-enabled interfaces. The RIP broadcast is the primary way in which topology information is flooded throughout the network.

Once a router learns about a particular destination through RIP, it starts a timer. Every time it receives a new response packet with information about the destination, the router resets the timer to zero. However, if the router receives no updates about a particular destination for 180 seconds, it removes the destination from its RIP routing table.

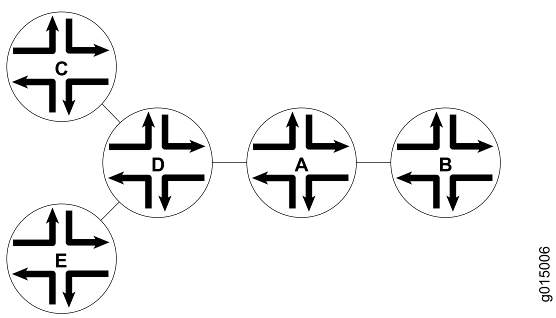
In addition to the regular transmission of RIP packets every 30 seconds, if a router detects a new neighbor or detects that an interface is unavailable, it generates a triggered update. The new routing information is immediately broadcast out all RIP-enabled interfaces, and the change is reflected in all subsequent RIP response packets.

Split Horizon and Poison Reverse Efficiency Techniques

Because RIP functions by periodically flooding the entire routing table out to the network, it generates a lot of traffic. The split horizon and poison reverse techniques can help reduce the amount of network traffic originated by RIP hosts and make the transmission of routing information more efficient.

If a router receives a set of route advertisements on a particular interface, RIP determines that those advertisements do not need to be retransmitted out the same interface. This technique, known as *split horizon*, helps limit the amount of RIP routing traffic by eliminating information that other neighbors on that interface have already learned. Figure 2 on page 5 shows an example of the split horizon technique.

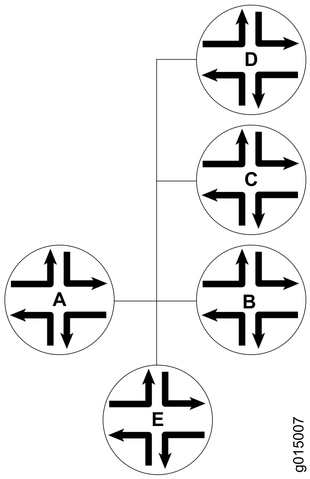
Figure 2: Split Horizon Example



In Figure 2 on page 5, Router A advertises routes to Routers C, D, and E to Router B. In this example, Router A can reach Router C in 2 hops. When Router A advertises the route to Router B, B imports it as a route to Router C through Router A in 3 hops. If Router B then readvertised this route to Router A, A would import it as a route to Router C through Router B in 4 hops. However, the advertisement from Router B to Router A is unnecessary, because Router A can already reach the route in 2 hops. The split horizon technique helps reduce extra traffic by eliminating this type of route advertisement.

Similarly, the poison reverse technique helps to optimize the transmission of routing information and improve the time to reach network convergence. If Router A learns about unreachable routes through one of its interfaces, it advertises those routes as unreachable (hop count of 16) out the same interface. Figure 3 on page 6 shows an example of the poison reverse technique.

Figure 3: Poison Reverse Example

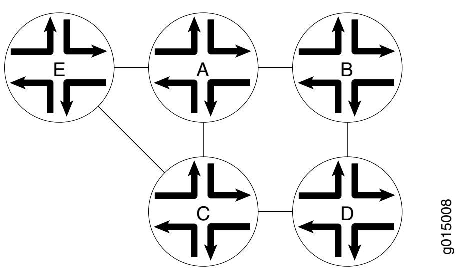


In Figure 3 on page 6, Router A learns through one of its interfaces that routes to Routers C, D, and E are unreachable. Router A readvertises those routes out the same interface as unreachable. The advertisement informs Router B that Hosts C, D, and E are definitely not reachable through Router A.

Limitations of Unidirectional Connectivity

Because RIP processes routing information based solely on the receipt of routing table updates, it cannot ensure bidirectional connectivity. As Figure 4 on page 6 shows, RIP networks are limited by their unidirectional connectivity.

Figure 4: Limitations of Unidirectional Connectivity



In Figure 4 on page 6, Routers A and D flood their routing table information to Router B. Because the path to Router E has the fewest hops when routed through Router A, that route is imported into Router B's forwarding table. However, suppose that Router A can transmit traffic but is not receiving traffic from Router B because of an unavailable link or invalid routing policy. If the only route to Router E is through Router A, any traffic destined for Router A is lost, because bidirectional connectivity was never established.

OSPF establishes bidirectional connectivity with a three-way handshake.

Related Documentation

- *Junos OS Feature Support Reference for SRX Series and J Series Devices*
- OBSOLETE-Routing Overview
- RIP Configuration Overview on page 7
- Understanding Basic RIP Routing on page 13
- Understanding RIP Traffic Control with Metrics on page 51
- Understanding RIP Authentication on page 20
- RIPng Overview
- OSPF Overview

RIP Configuration Overview

To achieve basic connectivity between all RIP hosts in a RIP network, you enable RIP on every interface that is expected to transmit and receive RIP traffic, as described in the steps that follow.

To configure a RIP network:

1. Configure network interfaces. See the *Junos OS Interfaces Configuration Guide for Security Devices*.
2. Define RIP groups, which are logical groupings of interfaces, and add interfaces to the groups. Then, configure a routing policy to export directly connected routes and routes learned through RIP routing exchanges. See "Example: Configuring a Basic RIP Network" on page 14.
3. (Optional) Configure metrics to control traffic through the RIP network. See"Example: Controlling Traffic with an Incoming Metric" on page 52 and "Example: Controlling Traffic with an Outgoing Metric" on page 53.
4. (Optional) Configure authentication to ensure that only trusted routers participate in the autonomous system's routing. See"Enabling Authentication with Plain-Text Passwords (CLI Procedure)" on page 25 and "Enabling Authentication with MD5 Authentication (CLI Procedure)" on page 25.

Related Documentation

- *Junos OS Feature Support Reference for SRX Series and J Series Devices*
- RIP Overview on page 3
- Verifying a RIP Configuration on page 86

CHAPTER 2

RIP Standards

Supported RIP and RIPng Standards

The Junos OS substantially supports the following RFCs, which define standards for RIP (for IP version 4 [IPv4]) and RIP next generation (RIPng, for IP version 6 [IPv6]).

The Junos OS supports authentication for all RIP protocol exchanges (MD5 or simple authentication).

- RFC 1058, *Routing Information Protocol*
- RFC 2080, *RIPng for IPv6*
- RFC 2082, *RIP-2 MD5 Authentication*

  Multiple keys using distinct key IDs are not supported.
- RFC 2453, *RIP Version 2*

The following RFC does not define a standard, but provides information about RIPng. The IETF classifies it as “Informational.”

- RFC 2081, *RIPng Protocol Applicability Statement*

Related Documentation

- Supported IPv4, TCP, and UDP Standards
- Supported IPv6 Standards
- Accessing Standards Documents on the Internet

PART 2

Configuration

CHAPTER 3

Concepts and Examples

Example: Configuring RIP

Understanding Basic RIP Routing

RIP is an interior gateway protocol (IGP) that routes packets within a single autonomous system (AS). By default, RIP does not advertise the subnets that are directly connected through the device's interfaces. For traffic to pass through a RIP network, you must create a routing policy to export these routes. Advertising only the direct routes propagates the routes to the immediately adjacent RIP-enabled router only. To propagate all routes through the entire RIP network, you must configure the routing policy to export the routes learned through RIP.

Example: Configuring a Basic RIP Network

This example shows how to configure a basic RIP network.

Requirements

No special configuration beyond device initialization is required before configuring this example.

Overview

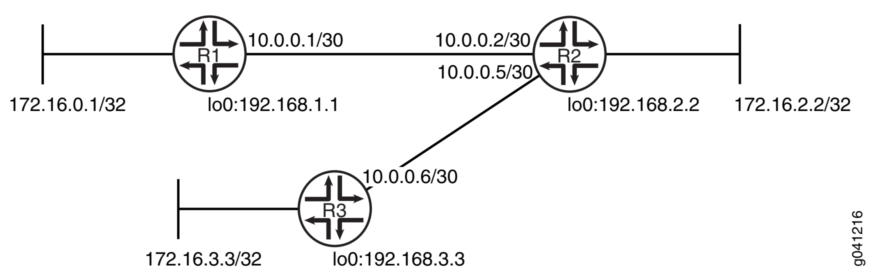
In this example, you configure a basic RIP network, you create RIP group called **rip-group**, and add the directly connected interfaces to the RIP group. Then you configure a routing policy to advertise direct routes using policy statement **advertise-routes-through-rip**.

By default, Junos OS does not advertise RIP routes, not even routes that are learned through RIP. To advertise RIP routes, you must configure and apply an export routing policy that advertises RIP-learned and direct routes.

In Junos OS, you do not need to configure the RIP version. RIP Version 2 is used by default.

To use RIP on the device, you must configure RIP on all of the RIP interfaces within the network. Figure 5 on page 14 shows the topology used in this example.

Figure 5: Sample RIP Network Topology



"CLI Quick Configuration" on page 14 shows the configuration for all of the devices in Figure 5 on page 14. "Step-by-Step Procedure" on page 15 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
```



```
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a basic RIP network:

1. Configure the network interfaces.

   This example shows multiple loopback interface addresses to simulate attached networks.

   ```
   [edit interfaces]
   user@R1# set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30

   user@R1# set interfaces lo0 unit 1 family inet address 172.16.0.1/32
   user@R1# set interfaces lo0 unit 1 family inet address 192.168.1.1/32
   ```

2. Create the RIP group and add the interface.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   ```

```
user@R1# set neighbor fe-1/2/0.1
```

3. Create the routing policy to advertise both direct and RIP-learned routes.

```
[edit policy-options policy-statement advertise-routes-through-rip term 1]
user@R1# set from protocol direct
user@R1# set from protocol rip
user@R1# set then accept
```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

```
[edit protocols rip group rip-group]
user@R1# set export advertise-routes-through-rip
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
lo0 {
  unit 1 {
    family inet {
      address 172.16.0.1/32;
      address 192.168.1.1/32;
    }
  }
}
```

```
user@R1# show protocols
rip {
  group rip-group {
    export advertise-routes-through-rip;
    neighbor fe-1/2/0.1;
  }
}
```

```
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform this task:

- Checking the Routing Table on page 17
- Looking at the Routes That Device R1 Is Advertising to Device R2 on page 17
- Looking at the Routes That Device R1 Is Receiving from Device R2 on page 18
- Verifying the RIP-Enabled Interfaces on page 18
- Verifying the Exchange of RIP Messages on page 18
- Verifying Reachability of All Hosts in the RIP Network on page 19

Checking the Routing Table

Purpose Verify that the routing table is populated with the expected routes..

Action From operational mode, enter the **show route protocol rip** command.

```
user@R1> show route protocol rip
inet.0: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.4/30         *[RIP/100] 00:59:15, metric 2, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
172.16.2.2/32       *[RIP/100] 02:52:48, metric 2, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
172.16.3.3/32       *[RIP/100] 00:45:05, metric 3, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
192.168.2.2/32      *[RIP/100] 02:52:48, metric 2, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
192.168.3.3/32      *[RIP/100] 00:45:05, metric 3, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
224.0.0.9/32        *[RIP/100] 00:45:09, metric 1
                          MultiRecv
```

Meaning The output shows that the routes have been learned from Device R2 and Device R3.

If you were to delete the **from protocol rip** condition in the routing policy on Device R2, the remote routes from Device R3 would not be learned on Device R1.

Looking at the Routes That Device R1 Is Advertising to Device R2

Purpose Verify that Device R1 is sending the expected routes.

Action From operational mode, enter the **show route advertising-protocol rip** command.

```
user@R1> show route advertising-protocol rip 10.0.0.1
inet.0: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.0.1/32       *[Direct/0] 05:18:26
                     >     via lo0.1
192.168.1.1/32      *[Direct/0] 05:18:25
                     >     via lo0.1
```


Meaning Device R1 is sending routes to its directly connected networks.

Looking at the Routes That Device R1 Is Receiving from Device R2

Purpose Verify that Device R1 is receiving the expected routes.

Action From operational mode, enter the **show route receive-protocol rip** command.

```
user@R1> show route receive-protocol rip 10.0.0.2
inet.0: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.4/30        *[RIP/100] 02:31:22, metric 2, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
172.16.2.2/32      *[RIP/100] 04:24:55, metric 2, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
172.16.3.3/32      *[RIP/100] 02:17:12, metric 3, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
192.168.2.2/32     *[RIP/100] 04:24:55, metric 2, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
192.168.3.3/32     *[RIP/100] 02:17:12, metric 3, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
```

Meaning Device R1 is receiving from Device R2 all of Device R2's directly connected networks. Device R1 is also receiving from Device R2 all of Device R3's directly connected networks, which Device R2 learned from Device R3 through RIP.

Verifying the RIP-Enabled Interfaces

Purpose Verify that all RIP-enabled Interfaces are available and active.

Action From operational mode, enter the **show rip neighbor** command.

```
user@R1> show rip neighbor
                  Local  Source          Destination     Send   Receive    In
Neighbor          State  Address         Address         Mode   Mode       Met
--------          -----  -------         -----------     ----   -------    ---
fe-1/2/0.1           Up  10.0.0.1        224.0.0.9       mcast  both        1
```

Meaning The output shows that the RIP-enabled interface on Device R1 is operational.

In general for this command, the output shows a list of the RIP neighbors that are configured on the device. Verify the following information:

- Each configured interface is present. Interfaces are listed in alphabetical order.
- Each configured interface is up. The state of the interface is listed in the **Destination State** column. A state of **Up** indicates that the link is passing RIP traffic. A state of **Dn** indicates that the link is not passing RIP traffic. In a point-to-point link, this state generally means that either the end point is not configured for RIP or the link is unavailable.

Verifying the Exchange of RIP Messages

Purpose Verify that RIP messages are being sent and received on all RIP-enabled interfaces.

Action From operational mode, enter the **show rip statistics** command.

```
user@R1> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              5              0              0              0

fe-1/2/0.1:  5 routes learned; 2 routes advertised; timeout 180s; update interval
 30s
Counter                          Total   Last 5 min  Last minute
-------                    -----------  -----------  -----------
Updates Sent                      2669           10            2
Triggered Updates Sent               2            0            0
Responses Sent                       0            0            0
Bad Messages                         0            0            0
RIPv1 Updates Received               0            0            0
RIPv1 Bad Route Entries              0            0            0
RIPv1 Updates Ignored                0            0            0
RIPv2 Updates Received            2675           11            2
RIPv2 Bad Route Entries              0            0            0
RIPv2 Updates Ignored                0            0            0
Authentication Failures              0            0            0
RIP Requests Received                0            0            0
RIP Requests Ignored                 0            0            0
none                                 0            0            0
```

Meaning The output shows the number of RIP routes learned. It also shows the number of RIP updates sent and received on the RIP-enabled interfaces. Verify the following information:

- The number of RIP routes learned matches the number of expected routes learned. Subnets learned by direct connectivity through an outgoing interface are not listed as RIP routes.
- RIP updates are being sent on each RIP-enabled interface. If no updates are being sent, the routing policy might not be configured to export routes.
- RIP updates are being received on each RIP-enabled interface. If no updates are being received, the routing policy might not be configured to export routes on the host connected to that subnet. The lack of updates might also indicate an authentication error.

Verifying Reachability of All Hosts in the RIP Network

Purpose By using the traceroute command on each loopback address in the network, verify that all hosts in the RIP network are reachable from each Juniper Networks device.

Action From operational mode, enter the **traceroute** command.

```
user@R1> traceroute 192.168.3.3
traceroute to 192.168.3.3 (192.168.3.3), 30 hops max, 40 byte packets
 1  10.0.0.2 (10.0.0.2)  1.094 ms  1.028 ms  0.957 ms
 2  192.168.3.3 (192.168.3.3)  1.344 ms  2.245 ms  2.125 ms
```

Meaning Each numbered row in the output indicates a routing hop in the path to the host. The three-time increments indicate the round-trip time (RTT) between the device and the hop for each traceroute packet.

To ensure that the RIP network is healthy, verify the following information:

- The final hop in the list is the host you want to reach.
- The number of expected hops to the host matches the number of hops in the traceroute output. The appearance of more hops than expected in the output indicates that a network segment is probably unreachable. It might also indicate that the incoming or outgoing metric on one or more hosts has been set unexpectedly.

Related Documentation

- Example: Configuring Point-to-Multipoint RIP Networks on page 40

Example: Configuring Authentication for RIP Routes

Understanding RIP Authentication

RIPv2 provides authentication support so that RIP links can require authentication keys (passwords) before they become active. Authentication provides an additional layer of security on the network beyond the other security features. By default, this authentication is disabled.

Authentication keys can be specified in either plain-text or MD5 form. Authentication requires all routers within the RIP network or subnetwork to have the same authentication type and key (password) configured.

This type of authentication is not supported on RIPv1 networks.

Example: Configuring Route Authentication for RIP

This example shows how to configure authentication for a RIP network.

Requirements

No special configuration beyond device initialization is required before configuring this example.

Overview

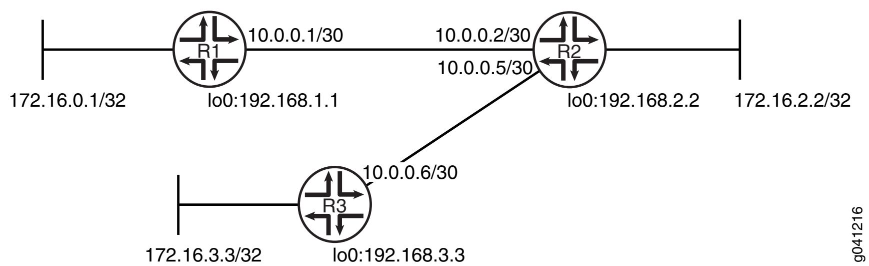
You can configure the router to authenticate RIP route queries. By default, authentication is disabled. You can use one of the following authentication methods:

- Simple authentication—Uses a text password that is included in the transmitted packet. The receiving router uses an authentication key (password) to verify the packet.
- MD5 authentication—Creates an encoded checksum that is included in the transmitted packet. The receiving router uses an authentication key (password) to verify the packet's MD5 checksum.

This example shows MD5 authentication.

Figure 6 on page 21 shows the topology used in this example.

Figure 6: RIP Authentication Network Topology



"CLI Quick Configuration" on page 21 shows the configuration for all of the devices in Figure 6 on page 21. The section "Step-by-Step Procedure" on page 22 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set protocols rip authentication-type md5
set protocols rip authentication-key "$9$ONLRBhreK87dsM8i.5FAtM8XxNb"
set protocols rip traceoptions file rip-authentication-messages
set protocols rip traceoptions flag auth
set protocols rip traceoptions flag packets
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
```

```
set protocols rip group rip-group neighbor fe-1/2/1.5
set protocols rip authentication-type md5
set protocols rip authentication-key "$9$Lf1Xds2gJDHmoJCu1hKvoJGUjq"
set protocols rip traceoptions file rip-authentication-messages
set protocols rip traceoptions flag auth
set protocols rip traceoptions flag packets
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set protocols rip authentication-type md5
set protocols rip authentication-key "$9$G.UkP5T39tOz3K87V4oz36/Cu"
set protocols rip traceoptions file rip-authentication-messages
set protocols rip traceoptions flag auth
set protocols rip traceoptions flag packets
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure RIP authentication:

1. Configure the network interfaces.

   This example shows multiple loopback interface addresses to simulate attached networks.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30

   user@R1# set lo0 unit 1 family inet address 172.16.0.1/32
   user@R1# set lo0 unit 1 family inet address 192.168.1.1/32
   ```

2. Create the RIP group and add the interface.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   user@R1# set neighbor fe-1/2/0.1
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

   ```
   [edit policy-options policy-statement advertise-routes-through-rip term 1]
   user@R1# set from protocol direct
   ```



```
user@R1# set from protocol rip
user@R1# set then accept
```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

   ```
   [edit protocols rip group rip-group]
   user@R1# set export advertise-routes-through-rip
   ```

5. Require MD5 authentication for RIP route queries received on an interface.

   The passwords must match on neighboring RIP routers. If the password does not match, the packet is rejected. The password can be from 1 through 16 contiguous characters long and can include any ASCII strings.

   Do not enter the password as shown here. The password shown here is the encrypted password that is displayed in the configuration after the actual password is already configured.

   ```
   [edit protocols rip]
   user@R1# set authentication-type md5
   user@R1# set authentication-key "$9$ONLRBhreK87dsM8i.5FAtM8XxNb"
   ```

6. Configure tracing operations to track authentication.

   ```
   [edit protocols rip traceoptions]
   user@R1# set file rip-authentication-messages
   user@R1# set flag auth
   user@R1# set flag packets
   ```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
lo0 {
  unit 1 {
    family inet {
      address 172.16.0.1/32;
      address 192.168.1.1/32;
    }
  }
}
```

```
user@R1# show protocols
rip {
  traceoptions {
    file rip-authentication-messages;
    flag auth;
```

```
      flag packets;
    }
    authentication-type md5;
    authentication-key "$9$ONLRBhreK87dsM8i.5FAtM8XxNb"; ## SECRET-DATA
    group rip-group {
      export advertise-routes-through-rip;
      neighbor fe-1/2/0.1;
    }
  }
```

```
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Checking for Authentication Failures on page 24
- Verifying That MD5 Authentication Is Enabled in RIP Update Packets on page 25

Checking for Authentication Failures

Purpose Verify that there are no authentication failures.

Action From operational mode, enter the **show rip statistics** command.

```
user@R1> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              5              0              0              0

fe-1/2/0.1:  5 routes learned; 2 routes advertised; timeout 180s; update interval
 30s
Counter                          Total   Last 5 min  Last minute
-------                    -----------  -----------  -----------
Updates Sent                      2669           10            2
Triggered Updates Sent               2            0            0
Responses Sent                       0            0            0
Bad Messages                         0            0            0
RIPv1 Updates Received               0            0            0
RIPv1 Bad Route Entries              0            0            0
RIPv1 Updates Ignored                0            0            0
RIPv2 Updates Received            2675           11            2
RIPv2 Bad Route Entries              0            0            0
RIPv2 Updates Ignored                0            0            0
Authentication Failures              0            0            0
RIP Requests Received                0            0            0
RIP Requests Ignored                 0            0            0
none                                 0            0            0
```

Meaning The output shows that there are no authentication failures.

Verifying That MD5 Authentication Is Enabled in RIP Update Packets

Purpose Use tracing operations to verify that MD5 authentication is enabled in RIP updates.

Action From operational mode, enter the **show log** command.

```
user@R1> show log rip-authentication-messages | match md5
Feb 15 15:45:13.969462          sending msg 0xb9a8c04, 3 rtes (needs MD5)
Feb 15 15:45:43.229867          sending msg 0xb9a8c04, 3 rtes (needs MD5)
Feb 15 15:46:13.174410          sending msg 0xb9a8c04, 3 rtes (needs MD5)
Feb 15 15:46:42.716566          sending msg 0xb9a8c04, 3 rtes (needs MD5)
Feb 15 15:47:11.425076          sending msg 0xb9a8c04, 3 rtes (needs MD5)
...
```

Meaning The **(needs MD5)** output shows that all route updates require MD5 authentication.

Enabling Authentication with Plain-Text Passwords (CLI Procedure)

To configure authentication that requires a plain-text password to be included in the transmitted packet, enable simple authentication by performing these steps on all RIP devices in the network:

1. Navigate to the top of the configuration hierarchy.
2. Perform the configuration tasks described in Table 3 on page 25.
3. If you are finished configuring the router, commit the configuration.

Table 3: Configuring Simple RIP Authentication

Task	CLI Configuration Editor
Navigate to **Rip** level in the configuration hierarchy.	From the **[edit]** hierarchy level, enter **edit protocols rip**
Set the authentication type to **simple**.	Set the authentication type to **simple**: **set authentication-type simple**
Set the authentication key to a simple-text password. The password can be from 1 through 16 contiguous characters long and can include any ASCII strings.	Set the authentication key to a simple-text password: **set authentication-key *password***

Enabling Authentication with MD5 Authentication (CLI Procedure)

To configure authentication that requires an MD5 password to be included in the transmitted packet, enable MD5 authentication by performing these steps on all RIP devices in the network:

1. Navigate to the top of the configuration hierarchy.
2. Perform the configuration tasks described in Table 4 on page 26.

3. If you are finished configuring the router, commit the configuration.

Table 4: Configuring MD5 RIP Authentication

Task	CLI Configuration Editor
Navigate to **Rip** level in the configuration hierarchy.	From the **[edit]** hierarchy level, enter **edit protocols rip**
Set the authentication type to **MD5**.	Set the authentication type to **md5**: **set authentication-type md5**
Set the MD5 authentication key (password). The key can be from 1 through 16 contiguous characters long and can include any ASCII strings.	Set the MD5 authentication key: **set authentication-key *password***

Related Documentation

- Example: Configuring RIP on page 13

Example: Configuring BFD for RIP

Understanding BFD for RIP

The Bidirectional Forwarding Detection (BFD) Protocol is a simple hello mechanism that detects failures in a network. Hello packets are sent at a specified, regular interval. A neighbor failure is detected when the routing device stops receiving a reply after a specified interval. BFD works with a wide variety of network environments and topologies. BFD failure detection times are shorter than RIP detection times, providing faster reaction times to various kinds of failures in the network. Instead of waiting for the routing protocol neighbor timeout, BFD provides rapid detection of link failures. BFD timers are adaptive and can be adjusted to be more or less aggressive. For example, a timer can adapt to a higher value if the adjacency fails, or a neighbor can negotiate a higher value for a timer than the one configured.

BFD enables quick failover between a primary and a secondary routed path. The protocol tests the operational status of the interface multiple times per second. BFD provides for configuration timers and thresholds for failure detection. For example, if the minimum interval is set for 50 milliseconds and the threshold uses the default value of three missed messages, a failure is detected on an interface within 200 milliseconds of the failure.

Intervening devices (for example, an Ethernet LAN switch) hide link-layer failures from routing protocol peers, such as when two routers are connected by way of a LAN switch, where the local interface status remains up even when a physical fault happens on the remote link. Link-layer failure detection times vary, depending on the physical media and the Layer 2 encapsulation. BFD can provide fast failure detection times for all media types, encapsulations, topologies, and routing protocols.

To enable BFD for RIP, both sides of the connection must receive an update message from the peer. By default, RIP does not export any routes. Therefore, you must enable update messages to be sent by configuring an export policy for routes before a BFD session is triggered.

Example: Configuring BFD for RIP

This example shows how to configure Bidirectional Forwarding Detection (BFD) for a RIP network.

Requirements

No special configuration beyond device initialization is required before configuring this example.

Overview

To enable failure detection, include the **bfd-liveness-detection** statement:

```
bfd-liveness-detection {
  detection-time {
    threshold milliseconds;
  }
  minimum-interval milliseconds;
  minimum-receive-interval milliseconds;
  multiplier number;
  no-adaptation;
  transmit-interval {
    threshold milliseconds;
    minimum-interval milliseconds;
  }
  version (1 | automatic);
}
```

Optionally, you can specify the threshold for the adaptation of the detection time by including the **threshold** statement. When the BFD session detection time adapts to a value equal to or greater than the threshold, a single trap and a system log message are sent.

To specify the minimum transmit and receive interval for failure detection, include the **minimum-interval** statement. This value represents the minimum interval at which the local routing device transmits hello packets as well as the minimum interval at which the routing device expects to receive a reply from a neighbor with which it has established a BFD session. You can configure a value in the range from 1 through 255,000 milliseconds. This examples sets a minimum interval of 600 milliseconds.

NOTE: BFD is an intensive protocol that consumes system resources. Specifying a minimum interval for BFD of less than 100 ms for Routing Engine-based sessions and 10 ms for distributed BFD sessions can cause undesired BFD flapping.

Depending on your network environment, these additional recommendations might apply:

- For large-scale network deployments with a large number of BFD sessions, specify a minimum interval of 300 ms for Routing Engine-based sessions and 100 ms for distributed BFD sessions.
- For very large-scale network deployments with a large number of BFD sessions, contact Juniper Networks customer support for more information.
- For BFD sessions to remain up during a Routing Engine switchover event when nonstop active routing (NSR) is configured, specify a minimum interval of 2500 ms for Routing Engine-based sessions. For distributed BFD sessions with nonstop active routing configured, the minimum interval recommendations are unchanged and depend only on your network deployment.

You can optionally specify the minimum transmit and receive intervals separately.

To specify only the minimum receive interval for failure detection, include the **minimum-receive-interval** statement. This value represents the minimum interval at which the local routing device expects to receive a reply from a neighbor with which it has established a BFD session. You can configure a value in the range from 1 through 255,00 milliseconds.

To specify only the minimum transmit interval for failure detection, include the **transmit-interval minimum-interval** statement. This value represents the minimum interval at which the local routing device transmits hello packets to the neighbor with which it has established a BFD session. You can configure a value in the range from 1 through 255,000 milliseconds.

To specify the number of hello packets not received by a neighbor that causes the originating interface to be declared down, include the **multiplier** statement. The default is 3, and you can configure a value in the range from 1 through 255.

To specify the threshold for detecting the adaptation of the transmit interval, include the **transmit-interval threshold** statement. The threshold value must be greater than the transmit interval.

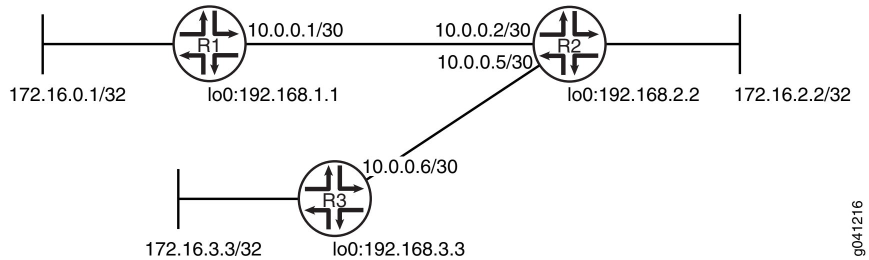
To specify the BFD version used for detection, include the **version** statement. The default is to have the version detected automatically.

You can trace BFD operations by including the **traceoptions** statement at the **[edit protocols bfd]** hierarchy level.

In Junos OS Release 9.0 and later, you can configure BFD sessions not to adapt to changing network conditions. To disable BFD adaptation, include the **no-adaptation** statement. We recommend that you not disable BFD adaptation unless it is preferable not to have BFD adaptation enabled in your network.

Figure 7 on page 29 shows the topology used in this example.

Figure 7: RIP BFD Network Topology



"CLI Quick Configuration" on page 29 shows the configuration for all of the devices in Figure 7 on page 29. The section "Step-by-Step Procedure" on page 30 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set protocols bfd traceoptions file bfd-trace
set protocols bfd traceoptions flag all
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set protocols rip group rip-group export advertise-routes-through-rip
```

```
set protocols rip group rip-group neighbor fe-1/2/0.6
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a BFD for a RIP network:

1. Configure the network interfaces.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30
   ```

2. Create the RIP group and add the interface.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   user@R1# set neighbor fe-1/2/0.1
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

   ```
   [edit policy-options policy-statement advertise-routes-through-rip term 1]
   user@R1# set from protocol direct
   user@R1# set from protocol rip
   user@R1# set then accept
   ```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

   ```
   [edit protocols rip group rip-group]
   user@R1# set export advertise-routes-through-rip
   ```

5. Enable BFD.

   ```
   [edit protocols rip group rip-group]
   user@R1# set bfd-liveness-detection minimum-interval 600
   ```

6. Configure tracing operations to track BFD messages.

   ```
   [edit protocols bfd traceoptions]
   user@R1# set file bfd-trace
   user@R1# set flag all
   ```

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
```

```
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
```

```
user@R1# show protocols
bfd {
  traceoptions {
    file bfd-trace;
    flag all;
  }
}
rip {
  group rip-group {
    export advertise-routes-through-rip;
    bfd-liveness-detection {
      minimum-interval 600;
    }
    neighbor fe-1/2/0.1;
  }
}
```

```
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying That the BFD Sessions Are Up on page 31
- Checking the BFD Trace File on page 32

Verifying That the BFD Sessions Are Up

Purpose Make sure that the BFD sessions are operating.

Action From operational mode, enter the **show bfd session** command.

```
user@R1> show bfd session
                                                  Detect   Transmit
Address                  State     Interface      Time     Interval  Multiplier
10.0.0.2                 Up        fe-1/2/0.1     1.800     0.600        3

1 sessions, 1 clients
Cumulative transmit rate 1.7 pps, cumulative receive rate 1.7 pps
```

Meaning The output shows that there are no authentication failures.

Checking the BFD Trace File

Purpose Use tracing operations to verify that BFD packets are being exchanged.

Action From operational mode, enter the **show log** command.

```
user@R1> show log bfd-trace
Feb 16 10:26:32 PPM Trace: BFD periodic xmit to 10.0.0.2 (IFL 124, rtbl 53,
single-hop port)
Feb 16 10:26:32 Received Downstream TraceMsg (24) len 86:
Feb 16 10:26:32    IfIndex (3) len 4: 0
Feb 16 10:26:32    Protocol (1) len 1: BFD
Feb 16 10:26:32    Data (9) len 61: (hex) 42 46 44 20 70 61 63 6b 65 74 20 66 72
 6f 6d 20 31 30 2e
Feb 16 10:26:32 PPM Trace: BFD packet from 10.0.0.1 (IFL 73, rtbl 56, ttl 255)
absorbed
Feb 16 10:26:32 Received Downstream TraceMsg (24) len 60:
Feb 16 10:26:32    IfIndex (3) len 4: 0
Feb 16 10:26:32    Protocol (1) len 1: BFD
Feb 16 10:26:32    Data (9) len 35: (hex) 42 46 44 20 70 65 72 69 6f 64 69 63 20
 78 6d 69 74 20 6f
...
```

Meaning The output shows the normal functioning of BFD.

Related Documentation

- Example: Configuring RIP on page 13
- Example: Configuring Authentication for RIP Routes on page 20
- Example: Configuring Point-to-Multipoint RIP Networks on page 40

Example: Configuring BFD Authentication for RIP

Overview of BFD Authentication for RIP

BFD enables rapid detection of communication failures between adjacent systems. By default, authentication for BFD sessions is disabled. However, when running BFD over Network Layer protocols, the risk of service attacks can be significant. We strongly recommend using authentication if you are running BFD over multiple hops or through insecure tunnels. Beginning with Junos OS Release 9.6, the Junos OS supports authentication for BFD sessions running over RIP. BFD authentication is only supported in the domestic image and is not available in the export image.

You authenticate BFD sessions by specifying an authentication algorithm and keychain, and then associating that configuration information with a security authentication keychain using the keychain name.

The following sections describe the supported authentication algorithms, security keychains, and the level of authentication that can be configured:

BFD Authentication Algorithms

Junos OS supports the following algorithms for BFD authentication:

- **simple-password**—Plain-text password. One to 16 bytes of plain text are used to authenticate the BFD session. One or more passwords may be configured. This method is the least secure and should be used only when BFD sessions are not subject to packet interception.
- **keyed-md5**—Keyed Message Digest 5 hash algorithm for sessions with transmit and receive intervals greater than 100 ms. To authenticate the BFD session, keyed MD5 uses one or more secret keys (generated by the algorithm) and a sequence number that is updated periodically. With this method, packets are accepted at the receiving end of the session if one of the keys matches and the sequence number is greater than or equal to the last sequence number received. Although more secure than a simple password, this method is vulnerable to replay attacks. Increasing the rate at which the sequence number is updated can reduce this risk.
- **meticulous-keyed-md5**—Meticulous keyed Message Digest 5 hash algorithm. This method works in the same manner as keyed MD5, but the sequence number is updated with every packet. Although more secure than keyed MD5 and simple passwords, this method may take additional time to authenticate the session.
- **keyed-sha-1**—Keyed Secure Hash Algorithm I for sessions with transmit and receive intervals greater than 100 ms. To authenticate the BFD session, keyed SHA uses one or more secret keys (generated by the algorithm) and a sequence number that is updated periodically. The key is not carried within the packets. With this method, packets are accepted at the receiving end of the session if one of the keys matches and the sequence number is greater than the last sequence number received.
- **meticulous-keyed-sha-1**—Meticulous keyed Secure Hash Algorithm I. This method works in the same manner as keyed SHA, but the sequence number is updated with every packet. Although more secure than keyed SHA and simple passwords, this method may take additional time to authenticate the session.

NOTE: Nonstop active routing (NSR) is not supported with meticulous-keyed-md5 and meticulous-keyed-sha-1 authentication algorithms. BFD sessions using these algorithms may go down after a switchover.

Security Authentication Keychains

The security authentication keychain defines the authentication attributes used for authentication key updates. When the security authentication keychain is configured and associated with a protocol through the keychain name, authentication key updates can occur without interrupting routing and signaling protocols.

The authentication keychain contains one or more keychains. Each keychain contains one or more keys. Each key holds the secret data and the time at which the key becomes valid. The algorithm and keychain must be configured on both ends of the BFD session, and they must match. Any mismatch in configuration prevents the BFD session from being created.

BFD allows multiple clients per session, and each client can have its own keychain and algorithm defined. To avoid confusion, we recommend specifying only one security authentication keychain.

Strict Versus Loose Authentication

By default, strict authentication is enabled and authentication is checked at both ends of each BFD session. Optionally, to smooth migration from nonauthenticated sessions to authenticated sessions, you can configure *loose checking*. When loose checking is configured, packets are accepted without authentication being checked at each end of the session. This feature is intended for transitional periods only.

Example: Configuring BFD Authentication for RIP

This example shows how to configure Bidirectional Forwarding Detection (BFD) authentication for a RIP network.

- Requirements on page 34
- Overview on page 34
- Configuration on page 35
- Verification on page 39

Requirements

No special configuration beyond device initialization is required before configuring this example.

The devices must be running Junos OS Release 9.6 or later.

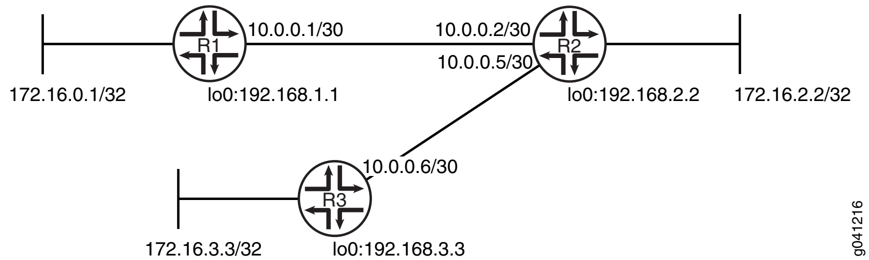
Overview

Only three steps are needed to configure authentication on a BFD session:

1. Specify the BFD authentication algorithm for the RIP protocol.
2. Associate the authentication keychain with the RIP protocol.
3. Configure the related security authentication keychain.

Figure 8 on page 35 shows the topology used in this example.

Figure 8: RIP BFD Authentication Network Topology



"CLI Quick Configuration" on page 35 shows the configuration for all of the devices in Figure 8 on page 35. The section "Step-by-Step Procedure" on page 36 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set protocols bfd traceoptions file bfd-trace
set protocols bfd traceoptions flag all
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set protocols rip group rip-group bfd-liveness-detection authentication key-chain bfd-rip
set protocols rip group rip-group bfd-liveness-detection authentication algorithm
   keyed-md5
set protocols rip group rip-group bfd-liveness-detection authentication loose-check
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
set security authentication-key-chains key-chain bfd-rip key 53 secret
   "$9$d1V2aZGi.fzDiORSeXxDikqmT"
set security authentication-key-chains key-chain bfd-rip key 53 start-time
   "2012-2-16.12:00:00 -0800"
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set protocols rip group rip-group bfd-liveness-detection authentication key-chain bfd-rip
set protocols rip group rip-group bfd-liveness-detection authentication algorithm
   keyed-md5
set protocols rip group rip-group bfd-liveness-detection authentication loose-check
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   direct
```

```
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
set security authentication-key-chains key-chain bfd-rip key 53 secret
   "$9$d1V2aZGi.fzDiORSeXxDikqmT"
set security authentication-key-chains key-chain bfd-rip key 53 start-time
   "2012-2-16.12:00:00 -0800"
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set protocols rip group rip-group bfd-liveness-detection minimum-interval 600
set protocols rip group rip-group bfd-liveness-detection authentication key-chain bfd-rip
set protocols rip group rip-group bfd-liveness-detection authentication algorithm
   keyed-md5
set protocols rip group rip-group bfd-liveness-detection authentication loose-check
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
   rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
set security authentication-key-chains key-chain bfd-rip key 53 secret
   "$9$d1V2aZGi.fzDiORSeXxDikqmT"
set security authentication-key-chains key-chain bfd-rip key 53 start-time
   "2012-2-16.12:00:00 -0800"
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a BFD authentication:

1. Configure the network interfaces.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30
   ```

2. Create the RIP group and add the interface.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   user@R1# set neighbor fe-1/2/0.1
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

   ```
   [edit policy-options policy-statement advertise-routes-through-rip term 1]
   user@R1# set from protocol direct
   user@R1# set from protocol rip
   user@R1# set then accept
   ```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

   ```
   [edit protocols rip group rip-group]
   user@R1# set export advertise-routes-through-rip
   ```

5. Enable BFD.

   ```
   [edit protocols rip group rip-group]
   user@R1# set bfd-liveness-detection minimum-interval 600
   ```

6. Specify the algorithm (**keyed-md5**, **keyed-sha-1**, **meticulous-keyed-md5**, **meticulous-keyed-sha-1**, or **simple-password**) to use.

   NOTE: Nonstop active routing is not supported with meticulous-keyed-md5 and meticulous-keyed-sha-1 authentication algorithms. BFD sessions using these algorithms might go down after a switchover.

   ```
   [edit protocols rip group rip-group]
   user@R1# set bfd-liveness-detection authentication algorithm keyed-md5
   ```

7. Specify the keychain to be used to associate BFD sessions on RIP with the unique security authentication keychain attributes.

   The keychain you specify must match a keychain name configured at the **[edit security authentication key-chains]** hierarchy level.

   The algorithm and keychain must be configured on both ends of the BFD session, and they must match. Any mismatch in configuration prevents the BFD session from being created.

   ```
   [edit protocols rip group rip-group]
   user@R1# set bfd-liveness-detection authentication key-chain bfd-rip
   ```

8. (Optional) Specify loose authentication checking if you are transitioning from nonauthenticated sessions to authenticated sessions.

   ```
   [edit protocols rip group rip-group]
   user@R1# set bfd-liveness-detection authentication loose-check
   ```

9. Specify the unique security authentication information for BFD sessions:

   - The matching keychain name as specified in Step 7.
   - At least one key, a unique integer between **0** and **63**. Creating multiple keys allows multiple clients to use the BFD session.
   - The secret data used to allow access to the session.
   - The time at which the authentication key becomes active, in the format *yyyy-mm-dd.hh:mm:ss*.

   ```
   [edit security authentication-key-chains key-chain bfd-rip]
   user@R1# set key 53 secret "$9$d1V2aZGi.fzDiORSeXxDikqmT"
   user@R1# set key 53 start-time "2012-2-16.12:00:00 -0800"
   ```

10. Configure tracing operations to track BFD authentication.

   ```
   [edit protocols bfd traceoptions]
   user@R1# set file bfd-trace
   user@R1# set flag all
   ```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show security** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
user@R1# show protocols
bfd {
  traceoptions {
    file bfd-trace;
    flag all;
  }
}
rip {
  group rip-group {
    export advertise-routes-through-rip;
    bfd-liveness-detection {
      minimum-interval 600;
    }
    neighbor fe-1/2/0.1;
  }
}
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
user@R1# show security
authentication-key-chains {
  key-chain bfd-rip {
    key 53 {
      secret "$9$d1V2aZGi.fzDiORSeXxDikqmT"; ## SECRET-DATA
      start-time "2012-2-16.12:00:00 -0800";
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying That the BFD Sessions Are Authenticated on page 39
- Viewing Extensive Information About the BFD Authentication on page 39
- Checking the BFD Trace File on page 40

Verifying That the BFD Sessions Are Authenticated

Purpose Make sure that the BFD sessions are authenticated.

Action From operational mode, enter the **show bfd session detail** command.

```
user@R1> show bfd session detail
                                                  Detect   Transmit
Address                  State     Interface      Time     Interval  Multiplier
10.0.0.2                 Up        fe-1/2/0.1     1.800     0.600        3
 Client RIP, TX interval 0.600, RX interval 0.600, Authenticate
 Session up time 01:39:34
 Local diagnostic None, remote diagnostic None
 Remote state Up, version 1
 Logical system 6, routing table index 53

1 sessions, 1 clients
Cumulative transmit rate 1.7 pps, cumulative receive rate 1.7 pps
```

Meaning **Authenticate** is displayed to indicate that BFD authentication is configured.

Viewing Extensive Information About the BFD Authentication

Purpose View the keychain name, the authentication algorithm and mode for each client in the session, and the BFD authentication configuration status.

Action From operational mode, enter the **show bfd session extensive** command.

```
user@R1> show bfd session extensive
                                                  Detect   Transmit
Address                  State     Interface      Time     Interval  Multiplier
10.0.0.2                 Up        fe-1/2/0.1     1.800     0.600        3
 Client RIP, TX interval 0.600, RX interval 0.600, Authenticate
        keychain bfd-rip, algo keyed-md5, mode loose
 Session up time 01:46:29
 Local diagnostic None, remote diagnostic None
 Remote state Up, version 1
 Logical system 6, routing table index 53
 Min async interval 0.600, min slow interval 1.000
 Adaptive async TX interval 0.600, RX interval 0.600
 Local min TX interval 0.600, minimum RX interval 0.600, multiplier 3
 Remote min TX interval 0.600, min RX interval 0.600, multiplier 3
 Local discriminator 225, remote discriminator 226
 Echo mode disabled/inactive
 Authentication enabled/active, keychain bfd-rip, algo keyed-md5, mode loose
  Session ID: 0x300501

1 sessions, 1 clients
Cumulative transmit rate 1.7 pps, cumulative receive rate 1.7 pps
```


Meaning The output shows the keychain name, the authentication algorithm and mode for the client in the session, and the BFD authentication configuration status.

Checking the BFD Trace File

Purpose Use tracing operations to verify that BFD packets are being exchanged.

Action From operational mode, enter the **show log** command.

```
user@R1> show log bfd-trace
Feb 16 10:26:32 PPM Trace: BFD periodic xmit to 10.0.0.2 (IFL 124, rtbl 53,
single-hop port)
Feb 16 10:26:32 Received Downstream TraceMsg (24) len 86:
Feb 16 10:26:32    IfIndex (3) len 4: 0
Feb 16 10:26:32    Protocol (1) len 1: BFD
Feb 16 10:26:32    Data (9) len 61: (hex) 42 46 44 20 70 61 63 6b 65 74 20 66 72
 6f 6d 20 31 30 2e
Feb 16 10:26:32 PPM Trace: BFD packet from 10.0.0.1 (IFL 73, rtbl 56, ttl 255)
absorbed
Feb 16 10:26:32 Received Downstream TraceMsg (24) len 60:
Feb 16 10:26:32    IfIndex (3) len 4: 0
Feb 16 10:26:32    Protocol (1) len 1: BFD
Feb 16 10:26:32    Data (9) len 35: (hex) 42 46 44 20 70 65 72 69 6f 64 69 63 20
 78 6d 69 74 20 6f
...
```

Meaning The output shows the normal functioning of BFD.

Related Documentation

- Example: Configuring BFD for RIP on page 26
- Example: Configuring Authentication for RIP Routes on page 20
- Example: Configuring RIP on page 13

Example: Configuring Point-to-Multipoint RIP Networks

Configuring Point-to-Multipoint RIP Networks Overview

A point-to-multipoint RIP network consists of a device having two or more peers on a single interface. All the devices forming a point-to-multipoint connection are placed in a single broadcast domain.

In a RIP network, a device can have a single peer or multiple peers for an interface. However, the demand circuit feature implementation in a RIP network requires the use of a single RIP peer. When you configure the following statements, a RIP network with demand circuits can also be configured to have multiple peers on an interface:

- Configuring the interface type to be a multipoint interface by using the **interface-type p2mp** statement.

- Enabling dynamic peer discovery by using the **dynamic-peers** statement (SRX Series devices only).

> NOTE: Before configuring the **dynamic-peers** statement, IPsec must be configured and IPsec tunnels must be set up by configuring IPsec parameters. Without IPsec configuration, the remote peers have to be explicitly configured at the RIP protocol level by using the **peer *address*** statement. See Configuring Security Associations for IPsec on an ES PIC for more details.

- Configuring peers by using the **peer *address*** statement.

```
[edit]
protocols {
  rip {
    group red {
      neighbor fe-0/1/3 {
        interface-type p2mp;
        peer address; (or use dynamic-peers;)
      }
    }
  }
}
```

The **show rip statistics peer *address*** command can be used to display the RIP statistics at the peer level. The **clear rip statistics peer *address*** command can be used to clear the RIP statistics for a peer. Alternately, you can use the **show rip statistics peer all** or **clear rip statistics peer all** command to display and clear RIP statistics for all peers.

Example: Configuring Point-to-Multipoint RIP Networks

This example shows how to configure a point-to-multipoint RIP network.

Requirements

This example uses the following hardware and software components:

- M Series, MX Series 3D Universal Edge, T Series routers, or SRX Series devices
- Junos OS Release 12.1 or later

Overview

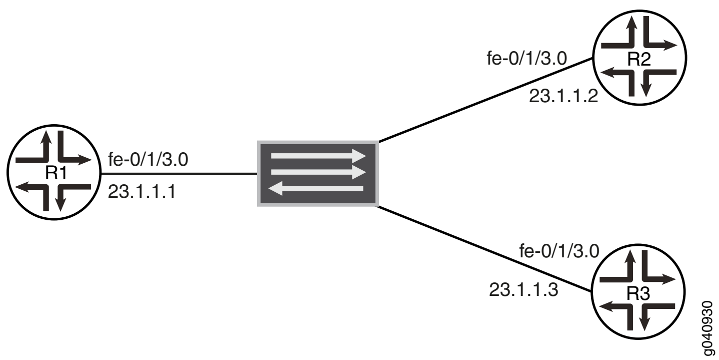
The following example shows how you can configure the point-to-multipoint feature in a RIP network.

Topology

In this example, Devices R1, R2, and R3 form a point-to-multipoint network. R1 is connected to R2 and to R3 as a point-to-multipoint connection through a switch that places all devices in the same broadcast domain. RIP demand circuits are configured on all three devices. The two peers to R1 are configured statically by using the **peer *address*** statement. The **dynamic-peers** statement is not used here.

Figure 9 on page 42 shows the topology used in this example.

Figure 9: Configuring a Point-to-Multipoint RIP Network



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-0/1/3 unit 0 family inet address 23.1.1.1/24
set policy-options policy-statement accept-rip-routes term from-direct from protocol
   direct
set policy-options policy-statement accept-rip-routes term from-direct then accept
set policy-options policy-statement accept-rip-routes term from-rip from protocol rip
set policy-options policy-statement accept-rip-routes term from-rip then accept
set protocols rip traceoptions file R1.log size 4m world-readable
set protocols rip traceoptions flag all detail
set protocols rip group red export accept-rip-routes
set protocols rip group red neighbor fe-0/1/3.0 interface-type p2mp
set protocols rip group red neighbor fe-0/1/3.0 peer 23.1.1.2
set protocols rip group red neighbor fe-0/1/3.0 peer 23.1.1.3
set protocols rip group red neighbor fe-0/1/3.0 demand-circuit
set protocols rip group red neighbor fe-0/1/3.0 max-retrans-time 10
```

Similarly, configure Devices R2 and R3, omitting the **peer *address*** configuration statement.

Configuring a Point-to-Multipoint RIP Network (with Demand Circuits)

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure the point-to-multipoint feature across a RIP network:

1. Configure the device interface.

   ```
   [edit interfaces fe-0/1/3 unit 0]
   user@R1# set family inet address 23.1.1.1/24
   ```

2. Define a policy for exporting RIP routes from the routing table to the protocol for transmission through the network.

   ```
   [edit policy-options policy-statement accept-rip-routes]
   user@R1# set term from-direct from protocol direct
   user@R1# set term from-direct then accept
   user@R1# set term from-rip from protocol rip
   user@R1# set term from-rip then accept
   ```

3. Configure RIP and a RIP group with the defined export policy and point-to-multipoint configuration statements.

   ```
   [edit protocols rip]
   user@R1# set traceoptions file R1.log size 4m world-readable
   user@R1# set traceoptions flag all detail
   user@R1# set group red export accept-rip-routes
   user@R1# set group red neighbor fe-0/1/3.0 interface-type p2mp
   user@R1# set group red neighbor fe-0/1/3.0 peer 23.1.1.2
   user@R1# set group red neighbor fe-0/1/3.0 peer 23.1.1.3
   user@R1# set group red neighbor fe-0/1/3.0 demand-circuit
   user@R1# set group red neighbor fe-0/1/3.0 max-retrans-time 10
   ```

   Similarly, configure Devices R2 and R3, omitting the **peer *address*** configuration statement.

   NOTE: Configuring max-retrans-time is optional. In the absence of this configuration statement, the default retransmission time of 180 seconds is configured.

   The configuration used in this example is for a RIP network with demand circuits. To configure RIP for networks without demand circuits, exclude the demand-circuit and max-retrans-time statements from the configuration and check the resulting output. For more information about configuring RIP demand circuits, see "Example: Configuring RIP Demand Circuits" on page 78.

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, and **show protocols rip** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@R1# show interfaces
fe-0/1/3 {
  unit 0 {
    family inet {
      address 23.1.1.1/24;
    }
  }
}

user@R1# show protocols rip
traceoptions {
  file R1.log size 4m world-readable;
  flag all detail;
}
group red {
  export accept-rip-routes;
  neighbor fe-0/1/3.0 {
    interface-type p2mp;
    peer 23.1.1.2;
    peer 23.1.1.3;
    demand-circuit;
    max-retrans-time 10;
  }
}

user@R1# show policy-options
policy-statement accept-rip-routes {
  term from-direct {
    from protocol direct;
    then accept;
  }
  term from-rip {
    from protocol rip;
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Verifying the Point-to-Multipoint RIP Network

Purpose Verify that the RIP network is functional with the point-to-multipoint feature configured.

Action From operational mode, run the **show rip neighbor** command.

```
user@R1> show rip neighbor

                          Local  Source          Destination     Send   Receive   In
Neighbor                  State  Address         Address         Mode   Mode     Met
```



```
--------          -----  -------         -----------     ----   -------  ---
fe-0/1/3.0(DC)       Up 23.1.1.1       23.1.1.2       unicast unicast    1
fe-0/1/3.0(DC)       Up 23.1.1.1       23.1.1.3       unicast unicast    1
```

From operational mode, run the **show rip statistics**, **show rip statistics peer *address***, or the **show rip statistics peer all** command.

```
user@R1> show rip statistics peer 23.1.1.2

RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              3              0              0              0

fe-0/1/3.0 Peer-Ip 23.1.1.2:  2 routes learned; 3 routes advertised; timeout 180s;
 update interval 0s
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
Updates Sent                        0            0            0
Triggered Updates Sent              3            0            0
Responses Sent                      0            0            0
Bad Messages                        0            0            0
RIPv1 Updates Received              0            0            0
RIPv1 Bad Route Entries             0            0            0
RIPv1 Updates Ignored               0            0            0
RIPv2 Updates Received              2            0            0
RIPv2 Bad Route Entries             0            0            0
RIPv2 Updates Ignored               0            0            0
Authentication Failures             0            0            0
RIP Requests Received               0            0            0
RIP Requests Ignored                0            0            0
none                                3            0            0

user@R1> show rip statistics peer 23.1.1.3

RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              3              0              0              0

fe-0/1/3.0 Peer-Ip 23.1.1.3:  2 routes learned; 3 routes advertised; timeout 180s;
 update interval 0s
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
Updates Sent                        0            0            0
Triggered Updates Sent              3            0            0
Responses Sent                      0            0            0
Bad Messages                        0            0            0
RIPv1 Updates Received              0            0            0
RIPv1 Bad Route Entries             0            0            0
RIPv1 Updates Ignored               0            0            0
RIPv2 Updates Received              2            0            0
RIPv2 Bad Route Entries             0            0            0
RIPv2 Updates Ignored               0            0            0
Authentication Failures             0            0            0
RIP Requests Received               0            0            0
RIP Requests Ignored                0            0            0
none                                3            0            0
```

Meaning The RIP network is up and running with the point-to-multipoint feature configured.

Example: Applying Policies to RIP Routes Imported from Neighbors

Understanding RIP Import Policy

The default RIP import policy is to accept all received RIP routes that pass a sanity check. To filter routes being imported by the local routing device from its neighbors, include the **import** statement, and list the names of one or more policies to be evaluated. If you specify more than one policy, they are evaluated in order (first to last) and the first matching policy is applied to the route. If no match is found, the local routing device does not import any routes.

Example: Applying Policies to RIP Routes Imported from Neighbors

This example shows how to configure an import policy in a RIP network.

Requirements

No special configuration beyond device initialization is required before configuring this example.

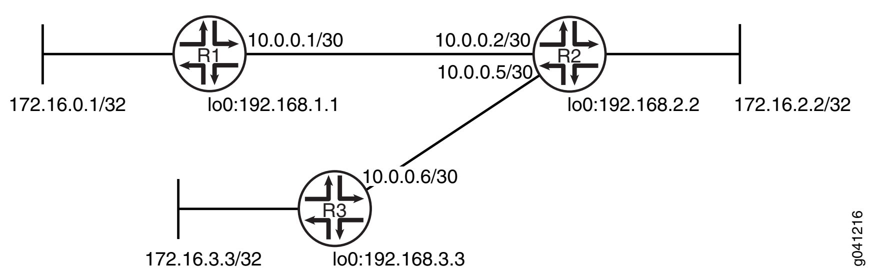
Overview

In this example, Device R1 has an import policy that accepts the 10/8 and 192.168/16 RIP routes and rejects all other RIP routes. This means that the 172.16/16 RIP routes are excluded from Device R1's routing table.

An export policy is also shown because an export policy is required as part of the minimum configuration for RIP.

Figure 10 on page 46 shows the topology used in this example.

Figure 10: RIP Import Policy Network Topology



"CLI Quick Configuration" on page 47 shows the configuration for all of the devices in Figure 10 on page 46. The section "Step-by-Step Procedure" on page 48 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip import rip-import
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
set policy-options policy-statement rip-import term 1 from protocol rip
set policy-options policy-statement rip-import term 1 from route-filter 10.0.0.0/8 orlonger
set policy-options policy-statement rip-import term 1 from route-filter 192.168.0.0/16
  orlonger
set policy-options policy-statement rip-import term 1 then accept
set policy-options policy-statement rip-import term 2 then reject
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```


Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a RIP import policy:

1. Configure the network interfaces.

   This example shows multiple loopback interface addresses to simulate attached networks.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30

   user@R1# set lo0 unit 1 family inet address 172.16.0.1/32
   user@R1# set lo0 unit 1 family inet address 192.168.1.1/32
   ```

2. Create the RIP group and add the interface.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled.

   You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   user@R1# set neighbor fe-1/2/0.1
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

   ```
   [edit policy-options policy-statement advertise-routes-through-rip term 1]
   user@R1# set from protocol direct
   user@R1# set from protocol rip
   user@R1# set then accept
   ```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

   ```
   [edit protocols rip group rip-group]
   user@R1# set export advertise-routes-through-rip
   ```

5. Configure the import policy.

   ```
   [edit policy-options policy-statement rip-import]
   user@R1# set term 1 from protocol rip
   user@R1# set term 1 from route-filter 10.0.0.0/8 orlonger
   user@R1# set term 1 from route-filter 192.168.0.0/16 orlonger
   user@R1# set term 1 then accept
   user@R1# set term 2 then reject
   ```

6. Apply the import policy.

   ```
   [edit protocols rip]
   user@R1# set import rip-import
   ```

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.


```
user@R1# show interfaces
fe-1/2/0 {
   unit 1 {
      family inet {
         address 10.0.0.1/30;
      }
   }
}
lo0 {
   unit 1 {
      family inet {
         address 172.16.0.1/32;
         address 192.168.1.1/32;
      }
   }
}
```

```
user@R1# show protocols
rip {
   import rip-import;
   group rip-group {
      export advertise-routes-through-rip;
      neighbor fe-1/2/0.1;
   }
}
```

```
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
   term 1 {
      from protocol [ direct rip ];
      then accept;
   }
}
policy-statement rip-import {
   term 1 {
      from {
         protocol rip;
         route-filter 10.0.0.0/8 orlonger;
         route-filter 192.168.0.0/16 orlonger;
      }
      then accept;
   }
   term 2 {
      then reject;
   }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Looking at the Routes That Device R2 Is Advertising to Device R1 on page 50
- Looking at the Routes That Device R1 Is Receiving from Device R2 on page 50

- Checking the Routing Table on page 50
- Testing the Import Policy on page 51

Looking at the Routes That Device R2 Is Advertising to Device R1

Purpose Verify that Device R2 is sending the expected routes.

Action From operational mode, enter the **show route advertising-protocol rip** command.

```
user@R2> show route advertising-protocol rip 10.0.0.2

inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.4/30        *[Direct/0] 2d 01:17:44
                    >    via fe-1/2/0.5
172.16.2.2/32      *[Direct/0] 2d 04:09:52
                    >    via lo0.2
172.16.3.3/32      *[RIP/100] 23:40:02, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
192.168.2.2/32     *[Direct/0] 2d 04:09:52
                    >    via lo0.2
192.168.3.3/32     *[RIP/100] 23:40:02, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
```

Meaning Device R2 is sending 172.16/16 routes to Device R1.

Looking at the Routes That Device R1 Is Receiving from Device R2

Purpose Verify that Device R1 is receiving the expected routes.

Action From operational mode, enter the **show route receive-protocol rip** command.

```
user@R1> show route receive-protocol rip 10.0.0.2
inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.4/30        *[RIP/100] 01:06:03, metric 2, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
192.168.2.2/32     *[RIP/100] 01:06:03, metric 2, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
192.168.3.3/32     *[RIP/100] 01:06:03, metric 3, tag 0
                    > to 10.0.0.2 via fe-1/2/0.1
```

Meaning The output shows that the 172.16/16 routes are excluded.

Checking the Routing Table

Purpose Verify that the routing table is populated with the expected routes.

Action From operational mode, enter the **show route protocol rip** command.

```
user@R1> show route protocol rip

inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```



```
10.0.0.4/30         *[RIP/100] 00:54:34, metric 2, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
192.168.2.2/32      *[RIP/100] 00:54:34, metric 2, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
192.168.3.3/32      *[RIP/100] 00:54:34, metric 3, tag 0
                     > to 10.0.0.2 via fe-1/2/0.1
224.0.0.9/32        *[RIP/100] 00:49:00, metric 1
                          MultiRecv
```

Meaning The output shows that the routes have been learned from Device R2 and Device R3.

If you delete or deactivate the import policy, the routing table contains the 172.16/16 routes.

Testing the Import Policy

Purpose By using the **test policy** command, monitor the number of rejected prefixes.

Action From operational mode, enter the **test policy rip-import 172.16/16** command.

```
user@R1> test policy rip-import 172.16/16
Policy rip-import: 0 prefix accepted, 1 prefix rejected
```

Meaning The output shows that the policy rejected one prefix.

Related Documentation

- Example: Configuring RIP on page 13

Examples: Controlling Traffic with Metrics in a RIP Network

Understanding RIP Traffic Control with Metrics

To tune a RIP network and control traffic flowing through the network, you increase or decrease the cost of the paths through the network. RIP provides two ways to modify the path cost: an incoming metric and an outgoing metric, which are each set to **1** by default. These metrics are attributes that manually specify the cost of any route advertised through a host. By increasing or decreasing the metrics—and thus the cost—of links throughout the network, you can control packet transmission across the network.

The incoming metric modifies the cost of an individual segment when a route across the segment is imported into the routing table. For example, if you set the incoming metric on the segment to **3**, the individual segment cost along the link is changed from **1** to **3**. The increased cost affects all route calculations through that link. Other routes that were previously excluded because of a high hop count might now be selected into the router's forwarding table.

The outgoing metric modifies the path cost for all the routes advertised out a particular interface. Unlike the incoming metric, the outgoing metric modifies the routes that other routers are learning and thereby controls the way they send traffic.

If an exported route was learned from a member of the same RIP group, the metric associated with that route is the normal RIP metric. For example, a RIP route with a metric of 5 learned from a neighbor configured with an incoming metric of 2 is advertised with a combined metric of 7 when advertised to neighbors in the same group. However, if this route was learned from a RIP neighbor in a different group or from a different protocol, the route is advertised with the metric value configured in the outgoing metric for that group.

Example: Controlling Traffic with an Incoming Metric

This example shows how to control traffic with an incoming metric.

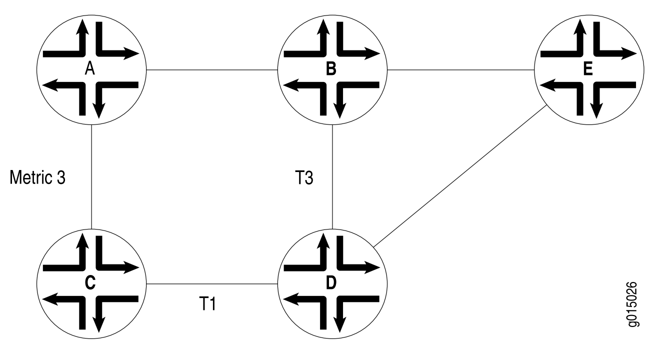
Requirements

Before you begin, define RIP groups, and add interfaces to the groups. Then configure a routing policy to export directly connected routes and routes learned through the RIP routing exchanges. See "Example: Configuring a Basic RIP Network" on page 14.

Overview

In this example, routes to Router D are received by Router A across both of its RIP-enabled interfaces as shown in Figure 11 on page 52. Because the route through Router B and the route through Router C have the same number of hops, both routes are imported into the forwarding table. However, because the T3 link from Router B to Router D has a higher bandwidth than the T1 link from Router C to Router D, you want traffic to flow from A through B to D.

Figure 11: Controlling Traffic in a RIP Network with the Incoming Metric



To force this flow, you can modify the route metrics as they are imported into Router A's routing table. By setting the incoming metric on the interface from Router A to Router C, you modify the metric on all routes received through that interface. Setting the incoming route metric on Router A changes only the routes in Router A's routing table, and affects only how Router A sends traffic to Router D. Router D's route selection is based on its own routing table, which, by default, includes no adjusted metric values.

In the example, Router C receives a route advertisement from Router D and readvertises the route to Router A. When Router A receives the route, it applies the incoming metric on the interface. Instead of incrementing the metric by 1 (the default), Router A increments it by 3 (the configured incoming metric), giving the route from Router A to Router D through Router C a total path metric of 4. Because the route through Router B has a metric of 2, it becomes the preferred route for all traffic from Router A to Router D.

This example uses a RIP group called **alpha 1** on interface **g3–0/0/0**.

Configuration

Step-by-Step Procedure

To control traffic with an incoming metric:

1. Create an interface.

   ```
   [edit]
   user@host# edit protocols rip group alpha1 neighbor ge-0/0/0
   ```

2. Set the incoming metric.

   ```
   [edit]
   user@host# set metric-in 3
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show protocols rip** command.

Example: Controlling Traffic with an Outgoing Metric

This example shows how to control traffic with an outgoing metric.

Requirements

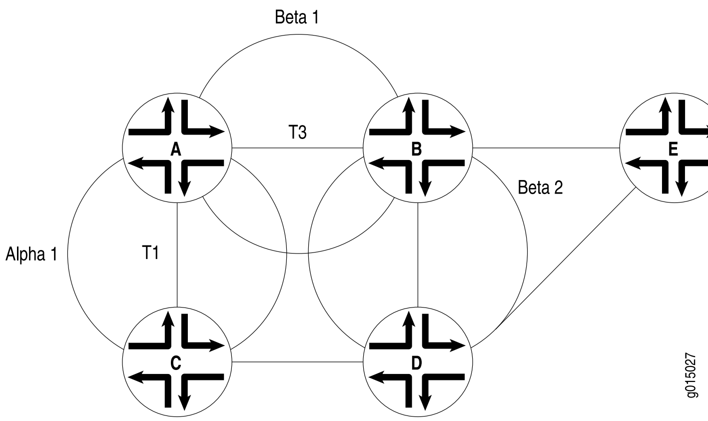
Before you begin:

- Define RIP groups, and add interfaces to the groups. Then configure a routing policy to export directly connected routes and routes learned through RIP routing exchanges. See "Example: Configuring a Basic RIP Network" on page 14.
- Control traffic with an incoming metric. See "Example: Controlling Traffic with an Incoming Metric" on page 52.

Overview

In this example, each route from Router A to Router D has two hops as shown in Figure 12 on page 54. However, because the link from Router A to Router B in RIP group Beta 1 has a higher bandwidth than the link from Router A to Router C in RIP group Alpha 1, you want traffic from Router D to Router A to flow through Router B. To control the way Router D sends traffic to Router A, you can alter the routes that Router D receives by configuring the outgoing metric on Router A's interfaces in the Alpha 1 RIP group.

Figure 12: Controlling Traffic in a RIP Network with the Outgoing Metric



If the outgoing metric for the Alpha 1 RIP group—the A-to-C link—is changed to 3, Router D calculates the total path metric from A through C as 4. In contrast, the unchanged default total path metric to A through B in the Beta 1 RIP group is 2. The fact that Router A's interfaces belong to two different RIP groups allows you to configure two different outgoing metrics on its interfaces, because you configure path metrics at the group level.

By configuring the outgoing metric, you control the way Router A sends traffic to Router D. By configuring the outgoing metric on the same router, you control the way Router D sends traffic to Router A.

This example uses an outgoing metric of **3**.

Configuration

Step-by-Step Procedure

To control traffic with an outgoing metric:

1. Create an interface.

   ```
   [edit]
   user@host# edit protocols rip group alpha1
   ```

2. Set the outgoing metric.


```
[edit]
user@host# set metric-out 3
```

3. If you are done configuring the device, commit the configuration.

```
[edit ]
user@host# commit
```

Verification

To verify the configuration is working properly, enter the **show protocols rip** command.

Example: Configuring the Metric Value Added to Imported RIP Routes

This example shows how to change the default metric to be added to incoming routes to control the route selection process.

Requirements

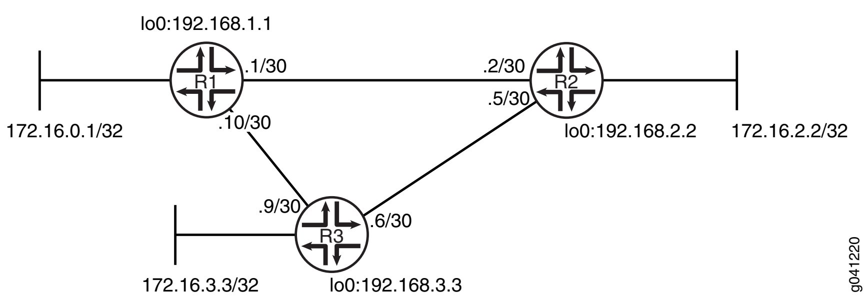
No special configuration beyond device initialization is required before configuring this example.

Overview

Normally, when multiple routes are available, RIP selects the route with the lowest hop count. Changing the default metric enables you to control the route selection process such that a route with a higher hop count can be preferred over of a route with a lower hop count.

Figure 13 on page 55 shows the topology used in this example.

Figure 13: RIP Incoming Metrics Network Topology



Device R1 has two potential paths to reach 172.16.2.2/32. The default behavior is to send traffic out the 0.1/30 interface facing Device R2. Suppose, though, that the path through Device R3 is less expensive to use or has higher bandwidth links. This example shows how to use the **metric-in** statement to ensure that Device R1 uses the path through Device R3 to reach 172.16.2.2/32. "CLI Quick Configuration" on page 56 shows the configuration for all of the devices in Figure 13 on page 55. The section "Step-by-Step Procedure" on page 57 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 description to-R2
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces ge-1/2/1 unit 10 description to-R3
set interfaces ge-1/2/1 unit 10 family inet address 10.0.0.10/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group primary export advertise-routes-through-rip
set protocols rip group primary neighbor ge-1/2/1.10
set protocols rip group secondary export advertise-routes-through-rip
set protocols rip group secondary neighbor fe-1/2/0.1 metric-in 4
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces ge-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor ge-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces ge-1/2/1 unit 9 family inet address 10.0.0.9/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set protocols rip group rip-group neighbor ge-1/2/1.9
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a RIP metrics:

1. Configure the network interfaces.

```
[edit interfaces]
user@R1# set fe-1/2/0 unit 1 description to-R2
user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30

user@R1# set ge-1/2/1 unit 10 description to-R3
user@R1# set ge-1/2/1 unit 10 family inet address 10.0.0.10/30

user@R1# set lo0 unit 1 family inet address 172.16.0.1/32
user@R1# set lo0 unit 1 family inet address 192.168.1.1/32
```

2. Create the RIP groups and add the interfaces.

   To configure RIP in Junos OS, you must configure one or more groups that contain the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   For the interface that is facing Device R2, the **metric-in 4** setting causes this route to be less likely to be chosen as the active route.

```
[edit protocols rip]
user@R1# set group primary neighbor ge-1/2/1.10
user@R1# set group secondary neighbor fe-1/2/0.1 metric-in 4
```

3. Create the routing policy to advertise both direct and RIP-learned routes.

```
[edit policy-options policy-statement advertise-routes-through-rip term 1]
user@R1# set from protocol direct
user@R1# set from protocol rip
user@R1# set then accept
```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

```
[edit protocols rip]
user@R1# set group primary export advertise-routes-through-rip
user@R1# set group secondary export advertise-routes-through-rip
```

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    description to-R2;
    family inet {
      address 10.0.0.1/30;
```

```
            }
        }
    }
    ge-1/2/1 {
        unit 10 {
            description to-R3;
            family inet {
                address 10.0.0.10/30;
            }
        }
    }
    lo0 {
        unit 1 {
            family inet {
                address 172.16.0.1/32;
                address 192.168.1.1/32;
            }
        }
    }
```

```
user@R1# show protocols
rip {
    group primary {
        export advertise-routes-through-rip;
        neighbor ge-1/2/1.10;
    }
    group secondary {
        export advertise-routes-through-rip;
        neighbor fe-1/2/0.1 {
            metric-in 4;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement advertise-routes-through-rip {
    term 1 {
        from protocol [ direct rip ];
        then accept;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying That the Expected Route Is Active on page 58
- Removing the metric-in Statement on page 59

Verifying That the Expected Route Is Active

Purpose Make sure that to reach 172.16.2.2/32, Device R1 uses the path through Device R3.

Action From operational mode, enter the **show route 172.16.2.2** command.


```
user@R1> show route 172.16.2.2
inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.2.2/32      *[RIP/100] 00:15:46, metric 3, tag 0
                    > to 10.0.0.9 via ge-1/2/1.10
```

Meaning The **to 10.0.0.9 via ge-1/2/1.10** output shows that Device R1 uses the path through Device R3 to reach 172.16.2.2/32. The metric for this route is 3.

Removing the metric-in Statement

Purpose Delete or deactivate the **metric-in** statement to see what happens to the 172.16.2.2/32 route.

Action

1. From configuration mode, deactivate the **metric-in** statement.

   ```
   [edit protocols rip group secondary neighbor fe-1/2/0.1]
   user@R1# deactivate metric-in
   user@R1# commit
   ```

2. From operational mode, enter the **show route 172.16.2.2** command.

   ```
   user@R1> show route 172.16.2.2
   inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
   + = Active Route, - = Last Active, * = Both

   172.16.2.2/32      *[RIP/100] 00:00:06, metric 2, tag 0
                       > to 10.0.0.2 via fe-1/2/0.1
   ```

Meaning The **to 10.0.0.2 via fe-1/2/0.1** output shows that Device R1 uses the path through Device R2 to reach 172.16.2.2/32. The metric for this route is 2.

Related Documentation

- Example: Applying Policies to RIP Routes Imported from Neighbors on page 46

Example: Configuring the Sending and Receiving of RIPv1 and RIPv2 Packets

- Understanding the Sending and Receiving of RIPv1 and RIPv2 Packets on page 59
- Example: Configuring the Sending and Receiving of RIPv1 and RIPv2 Packets on page 60

Understanding the Sending and Receiving of RIPv1 and RIPv2 Packets

RIP version 1 (RIPv1) and RIP version 2 (RIPv2) can run simultaneously. This might make sense when you are migrating a RIPv1 network to a RIPv2 network. This also allows interoperation with a device that supports RIPv1 but not RIPv2.

By default, when RIP is enabled on an interface, Junos OS receives both RIPv1 and RIPv2 packets and sends only RIPv2 packets. You can configure this behavior by including the send and receive statements in the RIP configuration.

Example: Configuring the Sending and Receiving of RIPv1 and RIPv2 Packets

This example shows how to configure whether the RIP update messages conform to RIP version 1 (RIPv1) only, to RIP version 2 (RIPv2) only, or to both versions. You can also disable the sending or receiving of update messages.

Requirements

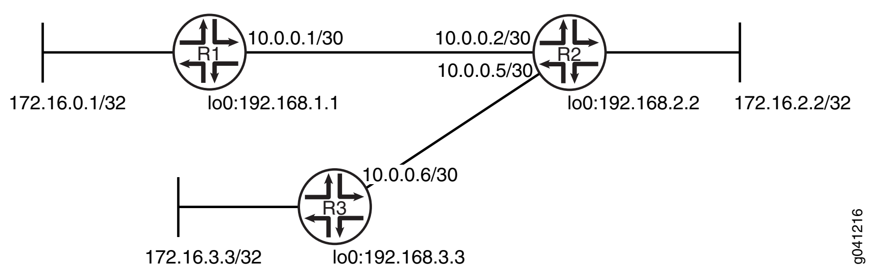
No special configuration beyond device initialization is required before configuring this example.

Overview

By default, when RIP is enabled on an interface, Junos OS receives both RIPv1 and RIPv2 packets and sends only RIPv2 packets.

Figure 14 on page 60 shows the topology used in this example.

Figure 14: Sending and Receiving RIPv1 and RIPv2 Packets Network Topology



In this example, Device R1 is configured to receive only RIPv2 packets.

"CLI Quick Configuration" on page 60 shows the configuration for all of the devices in Figure 14 on page 60. The section "Step-by-Step Procedure" on page 61 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1 receive version-2
```

```
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a RIP packet versions that can be received:

1. Configure the network interfaces.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30

   user@R1# set lo0 unit 1 family inet address 172.16.0.1/32
   user@R1# set lo0 unit 1 family inet address 192.168.1.1/32
   ```

2. Create the RIP groups and add the interfaces.

   To configure RIP in Junos OS, you must configure one or more groups that contain the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   For the interface that is facing Device R2, the **receive version-2** setting causes this interface to accept only RIPv2 packets.

   ```
   [edit protocols rip group rip-group]
   user@R1# set neighbor fe-1/2/0.1 receive version-2
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

```
[edit policy-options policy-statement advertise-routes-through-rip term 1]
user@R1# set from protocol direct
user@R1# set from protocol rip
user@R1# set then accept
```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

```
[edit protocols rip group rip-group]
user@R1# set export advertise-routes-through-rip
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
lo0 {
  unit 1 {
    family inet {
      address 172.16.0.1/32;
      address 192.168.1.1/32;
    }
  }
}

user@R1# show protocols
rip {
  group rip-group {
    export advertise-routes-through-rip;
    neighbor fe-1/2/0.1 {
      receive version-2;
    }
  }
}

user@R1# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Verifying That the Receive Mode Is Set to RIPv2 Only

Purpose Make sure that the interfacing Device R2 is configured to receive only RIPv2 packets, instead of both RIPv1 and RIPv2 packets.

Action From operational mode, enter the **show rip neighbor** command.

```
user@R1> show rip neighbor

                      Local  Source          Destination     Send   Receive    In
Neighbor              State  Address         Address         Mode   Mode       Met
--------              -----  -------         -----------     ----   -------    ---
fe-1/2/0.1               Up 10.0.0.1        224.0.0.9       mcast  v2 only     1
```

Meaning In the output, the **Receive Mode** field displays **v2 only**. The default **Receive Mode** is **both**.

Related Documentation

- Example: Configuring RIP on page 13

Example: Redistributing Routes Among RIP Instances

Understanding Route Redistribution Among RIP instances

You can redistribute routes among RIP processes. Another way to say this is to export RIP routes from one RIP instance to other RIP instances.

In Junos OS, route redistribution among routing instances is accomplished by using routing table groups, also called RIB groups. Routing table groups allow you to import and export routes from a protocol within one routing table into another routing table.

NOTE: In contrast, the policy-based import and export functions allow you import and export routes between different protocols within the same routing table.

Consider the following partial example:

```
protocols {
  rip {
    rib-group inet-to-voice;
  }
}
routing-instances {
  voice {
    protocols {
```

```
          rip {
            rib-group voice-to-inet;
          }
        }
      }
    }
    routing-options {
      rib-groups {
        inet-to-voice {
          import-rib [ inet.0 voice.inet.0 ];
        }
        voice-to-inet {
          import-rib [ voice.inet.0 inet.0 ];
        }
      }
    }
```

The way to read the **import-rib** statement is as follows. Take the routes from the protocol (RIP, in this case), and import them into the primary (or local) routing table and also into any other routing tables listed after this. The primary routing table is the routing table where the routing table group is being used. That would be either **inet.0** if used in the main routing instance or **voice.inet.0** if used within the routing instance. In the **inet-to-voice** routing table group, **inet.0** is listed first because this routing table group is used in the main routing instance. In the **voice-to-inet** routing table group, **voice.inet.0** is listed first because this routing table group is used in the voice routing instance.

Example: Redistributing Routes Between Two RIP Instances

This example shows how to configure a RIP routing instance and control the redistribution of RIP routes between the routing instance and the master instance.

Requirements

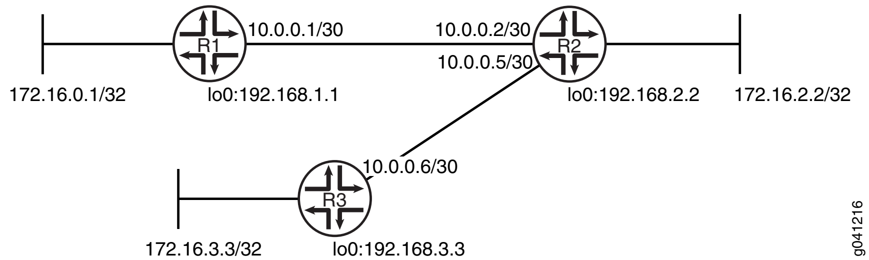
No special configuration beyond device initialization is required before configuring this example.

Overview

When you create a routing instance called voice, Junos OS creates a routing table called **voice.inet.0**. The example shows how to install routes learned through the master RIP instance into the **voice.inet.0** routing table. The example also shows how to install routes learned through the voice routing instance into **inet.0**. This is done by configuring routing table groups. RIP routes are installed into each routing table that belongs to a routing table group.

Figure 15 on page 65 shows the topology used in this example.

Figure 15: Redistributing Routes Between RIP Instances Network Topology



"CLI Quick Configuration" on page 65 shows the configuration for all of the devices in Figure 15 on page 65. The section "Step-by-Step Procedure" on page 66 describes the steps on Device R2.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group to-R2 export advertise-routes-through-rip
set protocols rip group to-R2 neighbor fe-1/2/0.1
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip rib-group inet-to-voice
set protocols rip group to-R3 export advertise-routes-through-rip
set protocols rip group to-R3 neighbor fe-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
set routing-instances voice protocols rip group to-R1 export advertise-routes-through-rip
set routing-instances voice interface fe-1/2/0.2
set routing-instances voice protocols rip rib-group voice-to-inet
set routing-instances voice protocols rip group to-R1 neighbor fe-1/2/0.2
set routing-options rib-groups inet-to-voice import-rib inet.0
set routing-options rib-groups inet-to-voice import-rib voice.inet.0
set routing-options rib-groups voice-to-inet import-rib voice.inet.0
set routing-options rib-groups voice-to-inet import-rib inet.0
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
```

```
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group to-R2 export advertise-routes-through-rip
set protocols rip group to-R2 neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To redistribute RIP routes between routing instances:

1. Configure the network interfaces.

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 2 family inet address 10.0.0.2/30

user@R2# set fe-1/2/1 unit 5 family inet address 10.0.0.5/30

user@R2# set lo0 unit 2 family inet address 192.168.2.2/32
user@R2# set lo0 unit 2 family inet address 172.16.2.2/32
```

2. Create the routing instance, and add one or more interfaces to the routing instance.

```
[edit routing-instances voice]
user@R2# set interface fe-1/2/0.2
```

3. Create the RIP groups and add the interfaces.

```
[edit protocols rip group to-R3]
user@R2# set neighbor fe-1/2/1.5

[edit routing-instances voice protocols rip group to-R1]
user@R2# set neighbor fe-1/2/0.2
```

4. Create the routing table groups.

```
[edit routing-options rib-groups]
user@R2# set inet-to-voice import-rib inet.0
user@R2# set inet-to-voice import-rib voice.inet.0

user@R2# set voice-to-inet import-rib voice.inet.0
user@R2# set voice-to-inet import-rib inet.0
```

5. Apply the routing table groups.

```
[edit protocols rip]
user@R2# set rib-group inet-to-voice

[edit routing-instances voice protocols rip]
user@R2# set rib-group voice-to-inet
```

6. Create the routing policy to advertise both direct and RIP-learned routes.

```
[edit policy-options policy-statement advertise-routes-through-rip term 1]
user@R2# set from protocol direct
user@R2# set from protocol rip
user@R2# set then accept
```

7. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

```
[edit protocols rip group to-R3]
user@R2# set export advertise-routes-through-rip

[edit routing-instances voice protocols rip group to-R1]
user@R2# set export advertise-routes-through-rip
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, **show routing-instances**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R2# show interfaces
fe-1/2/0 {
   unit 2 {
      family inet {
         address 10.0.0.2/30;
      }
   }
}
fe-1/2/1 {
   unit 5 {
      family inet {
         address 10.0.0.5/30;
      }
   }
}
lo0 {
   unit 2 {
      family inet {
         address 192.168.2.2/32;
         address 172.16.2.2/32;
      }
   }
}

user@R2# show protocols
rip {
   rib-group inet-to-voice;
   group to-R3 {
      export advertise-routes-through-rip;
      neighbor fe-1/2/1.5;
   }
}

user@R2# show policy-options
policy-statement advertise-routes-through-rip {
   term 1 {
```

```
        from protocol [ direct rip ];
        then accept;
    }
}
```

```
user@R2# show routing-instances
voice {
    interface fe-1/2/0.2;
    protocols {
        rip {
            rib-group voice-to-inet;
            group to-R1 {
                export advertise-routes-through-rip;
                neighbor fe-1/2/0.2;
            }
        }
    }
}
```

```
user@R2# show routing-options
rib-groups {
    inet-to-voice {
        import-rib [ inet.0 voice.inet.0 ];
    }
    voice-to-inet {
        import-rib [ voice.inet.0 inet.0 ];
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Checking the Routing Tables

Purpose Make sure that the routing tables contain the expected routes.

Action From operational mode, enter the **show route protocol rip** command.

```
user@R2> show route protocol rip
inet.0: 9 destinations, 9 routes (9 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.0.1/32      *[RIP/100] 01:58:14, metric 2, tag 0
                    > to 10.0.0.1 via fe-1/2/0.2
172.16.3.3/32      *[RIP/100] 02:06:03, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
192.168.1.1/32     *[RIP/100] 01:58:14, metric 2, tag 0
                    > to 10.0.0.1 via fe-1/2/0.2
192.168.3.3/32     *[RIP/100] 02:06:03, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
224.0.0.9/32       *[RIP/100] 01:44:13, metric 1
                         MultiRecv

voice.inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```



```
172.16.0.1/32      *[RIP/100] 02:06:03, metric 2, tag 0
                    > to 10.0.0.1 via fe-1/2/0.2
172.16.3.3/32      *[RIP/100] 01:58:14, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
192.168.1.1/32     *[RIP/100] 02:06:03, metric 2, tag 0
                    > to 10.0.0.1 via fe-1/2/0.2
192.168.3.3/32     *[RIP/100] 01:58:14, metric 2, tag 0
                    > to 10.0.0.6 via fe-1/2/0.5
224.0.0.9/32       *[RIP/100] 01:44:13, metric 1
                         MultiRecv
```

Meaning The output shows that both routing tables contain all of the RIP routes.

Related Documentation

- Example: Configuring RIP on page 13
- Example: Applying Policies to RIP Routes Imported from Neighbors on page 46

Example: Configuring RIP Timers

Understanding RIP Timers

RIP uses several timers to regulate its operation.

The update interval is the interval at which routes that are learned by RIP are advertised to neighbors. This timer controls the interval between routing updates. The update interval is set to 30 seconds, by default, with a small random amount of time added when the timer is reset. This added time prevents congestion that can occur if all routing devices update their neighbors simultaneously.

To configure the update time interval, include the **update-interval** statement:

update-interval *seconds*;

seconds can be a value from 10 through 60.

You can set a route timeout interval. If a route is not refreshed after being installed in the routing table by the specified time interval, the route is marked as invalid and is removed from the routing table after the hold-down period expires.

To configure the route timeout for RIP, include the **route-timeout** statement:

route-timeout *seconds*;

seconds can be a value from 30 through 360. The default value is 180 seconds.

RIP routes expire when either a route timeout limit is met or a route metric reaches infinity, and the route is no longer valid. However, the expired route is retained in the routing table for a specified period so that neighbors can be notified that the route has been dropped. This time period is set by configuring the hold-down timer. Upon expiration of the hold-down timer, the route is removed from the routing table.

To configure the hold-down timer for RIP, include the **holddown** statement:

```
holddown seconds;
```

seconds can be a value from 10 through 180. The default value is 120 seconds.

NOTE: **In Junos OS Release 11.1 and later, a retransmission timer is available for RIP demand circuits.**

Generally, we recommend against changing the RIP timers, unless the effects of a change are well understood. The route timeout should be at least three times the update interval. The hold-down timer must be greater than the route timeout. Normally, the default values are best left in effect for standard operations.

Example: Configuring RIP Timers

This example shows how to configure the RIP update interval and how to monitor the impact of the change.

Requirements

No special configuration beyond device initialization is required before configuring this example.

Overview

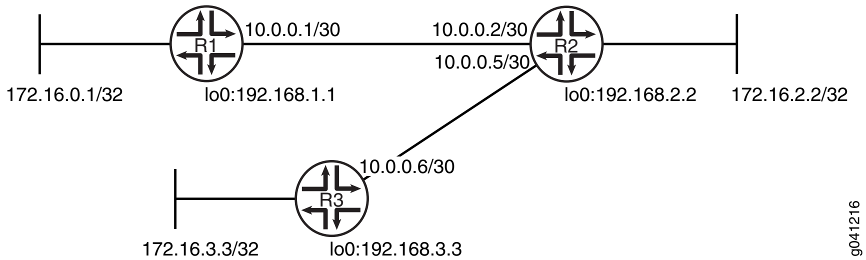
In this example, Device R2 has an update interval of 60 seconds for its neighbor, Device R1, and an update interval of 10 seconds for its neighbor, Device R3.

This example is not necessarily practical, but it is shown for demonstration purposes. Generally, we recommend against changing the RIP timers, unless the effects of a change are well understood. Normally, the default values are best left in effect for standard operations.

An export policy is also shown because an export policy is required as part of the minimum configuration for RIP.

Figure 16 on page 71 shows the topology used in this example.

Figure 16: RIP Timers Network Topology



"CLI Quick Configuration" on page 71 shows the configuration for all of the devices in Figure 16 on page 71. The section "Step-by-Step Procedure" on page 72 describes the steps on Device R2.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2 update-interval 60
set protocols rip group rip-group neighbor fe-1/2/1.5 update-interval 10
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
```

```
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure the RIP update interval:

1. Configure the network interfaces.

   This example shows multiple loopback interface addresses to simulate attached networks.

   ```
   [edit interfaces]
   user@R2# set fe-1/2/0 unit 2 family inet address 10.0.0.2/30

   user@R2# set fe-1/2/1 unit 5 family inet address 10.0.0.5/30

   user@R2# set lo0 unit 2 family inet address 192.168.2.2/32
   user@R2# set lo0 unit 2 family inet address 172.16.2.2/32
   ```

2. Configure different update intervals for the two RIP neighbors.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   user@R2# set neighbor fe-1/2/0.2 update-interval 60
   user@R2# set neighbor fe-1/2/1.5 update-interval 10
   ```

3. Create the routing policy to advertise both direct and RIP-learned routes.

   ```
   [edit policy-options policy-statement advertise-routes-through-rip term 1]
   user@R2# set from protocol direct
   user@R2# set from protocol rip
   user@R2# set then accept
   ```

4. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

   ```
   [edit protocols rip group rip-group]
   user@R2# set export advertise-routes-through-rip
   ```

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R2# show interfaces
fe-1/2/0 {
  unit 2 {
    family inet {
      address 10.0.0.2/30;
    }
  }
}
```

```
fe-1/2/1 {
  unit 5 {
    family inet {
      address 10.0.0.5/30;
    }
  }
}
lo0 {
  unit 2 {
    family inet {
      address 192.168.2.2/32;
      address 172.16.2.2/32;
    }
  }
}
```

```
user@R2# show protocols
rip {
  group rip-group {
    export advertise-routes-through-rip;
    neighbor fe-1/2/0.2 {
      update-interval 60;
    }
    neighbor fe-1/2/1.5 {
      update-interval 10;
    }
  }
}
```

```
user@R2# show policy-options
policy-statement advertise-routes-through-rip {
  term 1 {
    from protocol [ direct rip ];
    then accept;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Checking the RIP Updates Sent by Device R2 on page 73
- Checking the RIP Updates Received by Device R2 on page 74
- Checking the RIP Updates Received by Device R3 on page 75

Checking the RIP Updates Sent by Device R2

Purpose Make sure that the RIP update packets are sent at the expected interval.

Action From operational mode, enter the **show rip statistics** command.

```
user@R2> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
```

```
                4              2              0              0

fe-1/2/0.2:  2 routes learned; 5 routes advertised; timeout 180s; update interval
60s
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
Updates Sent                      123            5            1
Triggered Updates Sent              0            0            0
Responses Sent                      0            0            0
Bad Messages                        0            0            0
RIPv1 Updates Received              0            0            0
RIPv1 Bad Route Entries             0            0            0
RIPv1 Updates Ignored               0            0            0
RIPv2 Updates Received            244           10            2
RIPv2 Bad Route Entries             0            0            0
RIPv2 Updates Ignored               0            0            0
Authentication Failures             0            0            0
RIP Requests Received               0            0            0
RIP Requests Ignored                0            0            0
none                                0            0            0

fe-1/2/1.5:  2 routes learned; 5 routes advertised; timeout 180s; update interval
10s
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
Updates Sent                      734           32            6
Triggered Updates Sent              0            0            0
Responses Sent                      0            0            0
Bad Messages                        0            0            0
RIPv1 Updates Received              0            0            0
RIPv1 Bad Route Entries             0            0            0
RIPv1 Updates Ignored               0            0            0
RIPv2 Updates Received            245           11            2
RIPv2 Bad Route Entries             0            0            0
RIPv2 Updates Ignored               0            0            0
Authentication Failures             0            0            0
RIP Requests Received               0            0            0
RIP Requests Ignored                0            0            0
none                                0            0            0
```

Meaning The **update interval** field shows that the interval is 60 seconds for Neighbor R1 and 10 seconds for Neighbor R3. The **Updates Sent** field shows that Device R2 is sending updates to Device R1 at roughly 1/6 of the rate that it is sending updates to Device R3.

Checking the RIP Updates Received by Device R2

Purpose Make sure that the RIP update packets are sent at the expected interval.

Action From operational mode, enter the **show rip statistics** command.

```
user@R1> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              5              0              0              0

fe-1/2/0.1:  5 routes learned; 2 routes advertised; timeout 180s; update interval
 30s
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
```



```
Updates Sent                          312          10           2
Triggered Updates Sent                  2           0           0
Responses Sent                          0           0           0
Bad Messages                            0           0           0
RIPv1 Updates Received                  0           0           0
RIPv1 Bad Route Entries                 0           0           0
RIPv1 Updates Ignored                   0           0           0
RIPv2 Updates Received                181           5           1
RIPv2 Bad Route Entries                 0           0           0
RIPv2 Updates Ignored                   0           0           0
Authentication Failures                 0           0           0
RIP Requests Received                   1           0           0
RIP Requests Ignored                    0           0           0
none                                    0           0           0
```

Meaning The **RIPv2 Updates Received** field shows the number of updates received from Device R2.

Checking the RIP Updates Received by Device R3

Purpose Make sure that the RIP update packets are sent at the expected interval.

Action From operational mode, enter the **show rip statistics** command.

```
user@R3> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
              5              0              0              0

fe-1/2/0.6:  5 routes learned; 2 routes advertised; timeout 180s; update interval
 30s
Counter                              Total   Last 5 min  Last minute
-------                        -----------  -----------  -----------
Updates Sent                          314          11           2
Triggered Updates Sent                  1           0           0
Responses Sent                          0           0           0
Bad Messages                            0           0           0
RIPv1 Updates Received                  0           0           0
RIPv1 Bad Route Entries                 0           0           0
RIPv1 Updates Ignored                   0           0           0
RIPv2 Updates Received                827          31           6
RIPv2 Bad Route Entries                 0           0           0
RIPv2 Updates Ignored                   0           0           0
Authentication Failures                 0           0           0
RIP Requests Received                   0           0           0
RIP Requests Ignored                    0           0           0
none                                    0           0           0
```

Meaning The **RIPv2 Updates Received** field shows the number of updates received from Device R2.

Related Documentation

- Example: Configuring RIP on page 13
- Example: Configuring RIP Demand Circuits on page 76

Example: Configuring RIP Demand Circuits

RIP Demand Circuits Overview

RIP periodically sends routing information (RIP packets) to neighboring devices. These periodic broadcasts can consume bandwidth resources and interfere with network traffic by preventing WAN circuits from being closed. Demand circuits for RIP is defined in RFC 2091 and overcomes these issues by exchanging incremental updates on demand.

A demand circuit is a point-to-point connection between two neighboring interfaces configured for RIP. Demand circuits preserve bandwidth by establishing a link when data needs to be transferred, and terminating the link when the data transfer is complete. Demand circuits increase the efficiency of RIP on the configured interfaces by offering minimal network overhead in terms of messages passed between the demand circuit end points, conserving resources, and reducing costs.

By configuring RIP demand circuits, a specific event triggers the device to send an update, thereby eliminating the periodic transmission of RIP packets over the neighboring interface. To save overhead, the device sends RIP information only when changes occur in the routing database, such as:

- The device is first powered on
- The device receives a request for route update information
- A change occurs in the network
- The demand circuit goes down or comes up

The device sends update requests, update responses, and acknowledgments. In addition, the device retransmits updates and requests until valid acknowledgments are received. The device dynamically learns RIP neighbors. If the neighboring interface goes down, RIP flushes routes learned from the neighbor's IP address.

Routes learned from demand circuits do not age like other RIP entries because demand circuits are in a permanent state. Routes in a permanent state are only removed under the following conditions:

- A formerly reachable route changes to unreachable in an incoming response
- The demand circuit is down due to an excessive number of unacknowledged retransmissions

You can also set the RIP hold-down timer and the RIP demand circuit retransmission timer to regulate performance. The demand circuit uses these timers to determine if there is a change that requires update messages to be sent. There is also a database timer that runs only when RIP flushes learned routes from the routing table.

This topic includes the following sections:

- RIP Demand Circuit Packets on page 77
- Timers Used by RIP Demand Circuits on page 78

RIP Demand Circuit Packets

When you configure an interface for RIP demand circuits, the supported command field packet types are different than those for RIP version 1 and RIP version 2. RIP packets for RIP demand circuits contain three additional packet types and an extended 4-byte update header. Both RIP version 1 and RIP version 2 support the three packet types and the extended 4-byte header. Table 5 on page 77 describes the three packet types.

Table 5: RIP Demand Circuit Packet Types

Packet Type	Description
Update Request	Update request messages seek information for the device's routing table. This message is sent when the device is first powered on or when a down demand circuit comes up. The device sends this message every 5 seconds (by default) until an update response message is received.
Update Response	Update response messages are sent in response to an update request message, which occurs when the device is first powered on or when a down demand circuit comes up. Each update response message contains a sequence number that the neighbor uses to acknowledge the update request.
Update Acknowledge	Update acknowledge messages are sent in response to every update response message received by the neighbor.

NOTE: These packets are only valid on interfaces configured for RIP demand circuits. If a demand circuit receives a RIP packet that does not contain these packet types, it silently discards the packet and logs an error message similar to the following:

Ignoring RIP packet with invalid version 0 from neighbor 10.0.0.0 and source 10.0.0.1

Timers Used by RIP Demand Circuits

RIP demand circuits use the RIP hold-down timer and the RIP demand circuit retransmission timer to regulate performance and to determine if there is a change in the network that requires the device to send update messages. The hold-down timer is a global RIP timer that affects the entire RIP configuration; whatever range you configure for RIP applies to RIP demand circuits. The retransmission timer affects only RIP demand circuits. In addition, there is a database timer that runs only when RIP flushes learned routes from the routing table.

- Hold-down timer (global RIP timer)—Use the hold-down timer to configure the number of seconds that RIP waits before updating the routing table. The value of the hold-down timer affects the entire RIP configuration, not just the demand circuit interfaces. The hold-down timer starts when a route timeout limit is met, when a formerly reachable route is unreachable, or when a demand circuit interface is down. When the hold-down timer is running, routes are advertised as unreachable on other interfaces. When the hold-down timer expires, the route is removed from the routing table if all destinations are aware that the route is unreachable or the remaining destinations are down. By default, RIP waits 120 seconds between routing table updates. The range is from 10 to 180 seconds.
- Retransmission timer (RIP demand circuit timer)—RIP demand circuits send update messages every 5 seconds to an unresponsive peer. Use the retransmission timer to limit the number of times a demand circuit resends update messages to an unresponsive peer. If the configured retransmission threshold is reached, routes from the next hop router are marked as unreachable and the hold-down timer starts. The value of the retransmission timer affects only the demand circuit interfaces. To determine the number of times to resend the update message, use the following calculation:

  5 seconds * number of retransmissions = retransmission seconds

  The retransmission range is from 5 through 180 seconds, which corresponds to sending an update message a minimum of 1 time (5 seconds) and a maximum of 36 times (180 seconds).
- Database timer (global timeout timer)—Routes learned from demand circuits do not age like other RIP entries because demand circuits are in a permanent state. On a RIP demand circuit, the database timer starts upon receipt of the update response message with the flush flag sent from a RIP demand circuit peer. When the neighbor receives this message, all routes from that peer are flushed, and the database timer starts and runs for the configured route timeout interval. When the database timer is running, routes are still advertised as reachable on other interfaces. When the database timer expires, the device advertises all routes from its peer as unreachable.

Example: Configuring RIP Demand Circuits

This example describes how to configure an interface as a RIP demand circuit.

Requirements

Before you begin, configure the device interfaces. See the *Junos OS Interfaces Fundamentals Configuration Guide* or the *Junos OS Interfaces Configuration Guide for Security Devices*.

Overview

A demand circuit is a point-to-point connection between two neighboring interfaces configured for RIP. Demand circuits increase the efficiency of RIP on the configured interfaces by eliminating the periodic transmission of RIP packets. Demand circuits preserve bandwidth by establishing a link when data needs to be transferred, and terminating the link when the data transfer is complete. In this example two devices are connected using SONET/SDH interfaces.

NOTE: **When you configure RIP demand circuits, any silent removal of the RIP configuration goes unnoticed by the RIP peer and leads to stale entries in the routing table. To clear the stale entries, deactivate and reactivate RIP on the neighboring devices.**

In this example, you configure interface **so-0/1/0** with the following settings:

- **demand-circuit**—Configures the interface as a demand circuit. To complete the demand circuit, you must configure both ends of the pair as demand circuits.
- **max-retrans-time**—RIP demand circuits send update messages every 5 seconds to an unresponsive peer. Use the retransmission timer to limit the number of times a demand circuit resends update messages to an unresponsive peer. If the configured retransmission threshold is reached, routes from the next-hop router are marked as unreachable, and the hold-down timer starts. The value of the retransmission timer affects only the demand circuit interfaces. To determine the number of times to resend the update message, use the following calculation:

  5 seconds * retransmissions = retransmission seconds

  For example, if you want the demand circuit to send only two update messages to an unresponsive peer, the calculation is: 5 * 2 = 10. When you configure the retransmission timer, you enter 10 seconds.

  The retransmission range is from 5 through 180 seconds, which corresponds to sending an update message a minimum of 1 time (5 seconds) and a maximum of 36 times (180 seconds).

Configuration

In the following example, you configure a neighboring interface to be a RIP demand circuit and save the configuration.

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands in the CLI at the **[edit]** hierarchy level.

```
set interfaces so-0/1/0 unit 0 family inet address 192.0.2.0/24
set protocols rip group group1 neighbor so-0/1/0 demand-circuit
set protocols rip group group1 neighbor so-0/1/0 max-retrans-time 10
```

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For instructions on how to do that, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure a RIP demand circuit on one neighboring interface:

1. Configure the interface.

   ```
   [edit]
   user@host# set interfaces so-0/1/0 unit 0 family inet address 192.0.2.0/24
   ```

2. Enter RIP configuration mode.

   ```
   [edit]
   user@host# edit protocols rip
   ```

3. Configure the neighbor as a demand circuit.

   ```
   [edit protocols rip]
   user@host# set group group1 neighbor so-0/1/0 demand-circuit
   ```

4. Configure the demand circuit retransmission timer.

   ```
   [edit protocols rip]
   user@host# set group group1 neighbor so-0/1/0 max-retrans-time 10
   ```

5. If you are done configuring the device, commit the configuration.

   ```
   [edit protocols rip]
   user@host# commit
   ```

NOTE: **Repeat this entire configuration on the other neighboring interface.**

Confirm your configuration by entering the **show interfaces** and **show protocols rip** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show interfaces
so-0/1/0 {
  unit 0 {
    family inet {
      address 192.0.2.0/24;
    }
  }
}
user@host# show protocols rip
```



```
group group1 {
  neighbor so-0/1/0 {
    demand-circuit;
    max-retrans-time 10;
  }
}
```

Verification

Verifying a Demand Circuit Configuration

Purpose Verify that the demand circuit configuration is working.

Action To verify that the demand circuit configuration is in effect, use the show rip neighbor operational mode command.

```
user@host# show rip neighbor
                                 Source          Destination     Send   Receive   In
Neighbor            State   Address         Address         Mode   Mode      Met
--------            -----   --------        -----------     ----   -------   ---
so-0/1/0.0(DC)         Up   10.10.10.2      224.0.0.9       mcast  both        1
```

When you configure demand circuits, the **show rip neighbor** command displays a DC flag next to the neighboring interface configured for demand circuits.

NOTE: If you configure demand circuits at the **[edit protocols rip group *group-name* neighbor *neighbor-name*]** hierarchy level, the output shows only the neighboring interface that you specifically configured as a demand circuit. If you configure demand circuits at the **[edit protocols rip group *group-name*]** hierarchy level, all of the interfaces in the group are configured as demand circuits. Therefore, the output shows all of the interfaces in that group as demand circuits.

Related Documentation

- Example: Configuring RIP Timers on page 69

Example: Tracing RIP Protocol Traffic

- Understanding RIP Trace Operations on page 81
- Example: Tracing RIP Protocol Traffic on page 83

Understanding RIP Trace Operations

You can trace various types of RIP protocol traffic to help debug RIP protocol issues.

To trace RIP protocol traffic, include the **traceoptions** statement at the **[edit protocols rip]** hierarchy level:

```
traceoptions {
  file filename <files number> <size size> <world-readable | no-world-readable>;
```



```
    flag flag <flag-modifier> <disable>;
  }
```

You can specify the following RIP protocol-specific trace options using the **flag** statement:

- **auth**—RIP authentication
- **error**—RIP error packets
- **expiration**—RIP route expiration processing
- **holddown**—RIP hold-down processing
- **nsr-synchronization**—Nonstop active routing synchronization events
- **packets**—All RIP packets
- **request**—RIP information packets
- **trigger**—RIP triggered updates
- **update**—RIP update packets

You can optionally specify one or more of the following flag modifiers:

- **detail**—Detailed trace information
- **receive**—Packets being received
- **send**—Packets being transmitted

NOTE: **Use the detail flag modifier only when necessary as this might cause the CPU to become very busy.**

Global tracing options are inherited from the configuration set by the **traceoptions** statement at the **[edit routing-options]** hierarchy level. You can override the following global trace options for the RIP protocol using the **traceoptions flag** statement included at the **[edit protocols rip]** hierarchy level:

- **all**—All tracing operations
- **general**—All normal operations and routing table changes (a combination of the normal and route trace operations)
- **normal**—Normal events
- **policy**—Policy processing
- **route**—Routing information
- **state**—State transitions
- **task**—Routing protocol task processing
- **timer**—Routing protocol timer processing

NOTE: Use the trace flag all only when necessary because this might cause the CPU to become very busy.

Example: Tracing RIP Protocol Traffic

This example shows how to trace RIP protocol operations.

- Requirements on page 83
- Overview on page 83
- Configuration on page 83
- Verification on page 86

Requirements

No special configuration beyond device initialization is required before configuring this example.

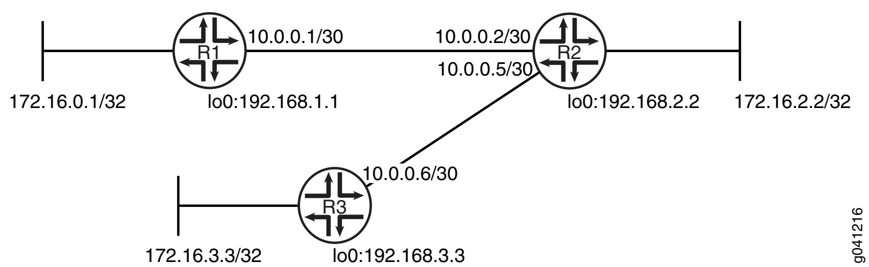
Overview

In this example, Device R1 is set to trace routing information updates.

An export policy is also shown because an export policy is required as part of the minimum configuration for RIP.

Figure 17 on page 83 shows the topology used in this example.

Figure 17: RIP Trace Operations Network Topology



"CLI Quick Configuration" on page 83 shows the configuration for all of the devices in Figure 17 on page 83. The section "Step-by-Step Procedure" on page 84 describes the steps on Device R1.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device R1

```
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.1/30
set interfaces lo0 unit 1 family inet address 172.16.0.1/32
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols rip traceoptions file rip-trace-file
```

```
set protocols rip traceoptions flag route
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.1
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R2

```
set interfaces fe-1/2/0 unit 2 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 5 family inet address 10.0.0.5/30
set interfaces lo0 unit 2 family inet address 192.168.2.2/32
set interfaces lo0 unit 2 family inet address 172.16.2.2/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.2
set protocols rip group rip-group neighbor fe-1/2/1.5
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Device R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 3 family inet address 192.168.3.3/32
set interfaces lo0 unit 3 family inet address 172.16.3.3/32
set protocols rip group rip-group export advertise-routes-through-rip
set protocols rip group rip-group neighbor fe-1/2/0.6
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  direct
set policy-options policy-statement advertise-routes-through-rip term 1 from protocol
  rip
set policy-options policy-statement advertise-routes-through-rip term 1 then accept
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see Using the CLI Editor in Configuration Mode in the *Junos OS CLI User Guide*.

To configure the RIP update interval:

1. Configure the network interfaces.

   This example shows multiple loopback interface addresses to simulate attached networks.

   ```
   [edit interfaces]
   user@R1# set fe-1/2/0 unit 1 family inet address 10.0.0.1/30

   user@R1# set lo0 unit 1 family inet address 172.16.0.1/32
   user@R1# set lo0 unit 1 family inet address 192.168.1.1/32
   ```

2. Configure the RIP group, and add the interface to the group.

   To configure RIP in Junos OS, you must configure a group that contains the interfaces on which RIP is enabled. You do not need to enable RIP on the loopback interface.

   ```
   [edit protocols rip group rip-group]
   ```



```
user@R1# set neighbor fe-1/2/0.1
```

3. Configure RIP tracing operations.

```
[edit protocols rip traceoptions]
user@R1# set file rip-trace-file
user@R1# set flag route
```

4. Create the routing policy to advertise both direct and RIP-learned routes.

```
[edit policy-options policy-statement advertise-routes-through-rip term 1]
user@R1# set from protocol direct
user@R1# set from protocol rip
user@R1# set then accept
```

5. Apply the routing policy.

   In Junos OS, you can only apply RIP export policies at the group level.

```
[edit protocols rip group rip-group]
user@R1# set export advertise-routes-through-rip
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, and **show policy-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@R1# show interfaces
fe-1/2/0 {
  unit 1 {
    family inet {
      address 10.0.0.1/30;
    }
  }
}
lo0 {
  unit 1 {
    family inet {
      address 172.16.0.1/32;
      address 192.168.1.1/32;
    }
  }
}

user@R1# show protocols
rip {
  traceoptions {
    file rip-trace-file;
    flag route;
  }
  group rip-group {
    export advertise-routes-through-rip;
    neighbor fe-1/2/0.1;
  }
}

user@R1# show policy-options
policy-statement advertise-routes-through-rip {
```

```
    term 1 {
        from protocol [ direct rip ];
        then accept;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Checking the Log File

Purpose Make sure that the RIP route updates are logged in the configured log file.

Action

1. Deactivate the extra loopback interface address on Device R3.

   ```
   [edit interfaces lo0 unit 3 family inet]
   user@R3# deactivate address 172.16.3.3/32
   user@R3# commit
   ```

2. From operational mode on Device R1, enter the **show log rip-trace-file** command with the **| match 172.16.3.3** option.

   ```
   user@R1> show log rip-trace-file | match 172.16.3.3
   Mar  1 11:39:53.975192 Setting RIPv2 rtbit on route 172.16.3.3/32, tsi =
   0xbb69228
   Mar  1 11:39:59.847118  172.16.3.3/32: metric-in: 16, change: 3 -> 16; # gw:
   1, pkt_upd_src 10.0.0.2, inx: 0, rte_upd_src 10.0.0.2
   Mar  1 11:39:59.847568 CHANGE   172.16.3.3/32       nhid 591 gw 10.0.0.2
      RIP      pref 100/0 metric 3/0 fe-1/2/0.1 <Delete Int>
   Mar  1 11:39:59.847629 Best route to 172.16.3.3/32 got deleted. Doing route calculation
    on the stored rte-info
   ```

Meaning The output shows that the route to 172.16.3.3/32 was deleted.

Related Documentation

- Example: Configuring RIP on page 13

Verifying a RIP Configuration

To verify a RIP configuration, perform the following tasks:

Verifying the Exchange of RIP Messages

Purpose Verify that RIP messages are being sent and received on all RIP-enabled interfaces.

Action From the CLI, enter the **show rip statistics** command.

Sample Output

```
user@host> show rip statistics
RIPv2 info: port 520; holddown 120s.
    rts learned  rts held down  rqsts dropped  resps dropped
             10              0              0              0

t1-0/0/2.0:  0 routes learned; 13 routes advertised; timeout 120s; update interval
 45s
Counter                          Total   Last 5 min  Last minute
-------                    -----------  -----------  -----------
Updates Sent                      2855           11            2
Triggered Updates Sent               5            0            0
Responses Sent                       0            0            0
Bad Messages                         0            0            0
RIPv1 Updates Received               0            0            0
RIPv1 Bad Route Entries              0            0            0
RIPv1 Updates Ignored                0            0            0
RIPv2 Updates Received              41            0            0
RIPv2 Bad Route Entries              0            0            0
RIPv2 Updates Ignored                0            0            0
Authentication Failures              0            0            0
RIP Requests Received                0            0            0
RIP Requests Ignored                 0            0            0

ge-0/0/1.0:  10 routes learned; 3 routes advertised; timeout 180s; update interval
 30s
Counter                          Total   Last 5 min  Last minute
-------                    -----------  -----------  -----------
Updates Sent                      2855           11            2
Triggered Updates Sent               3            0            0
Responses Sent                       0            0            0
Bad Messages                         1            0            0
RIPv1 Updates Received               0            0            0
RIPv1 Bad Route Entries              0            0            0
RIPv1 Updates Ignored                0            0            0
RIPv2 Updates Received            2864           11            2
RIPv2 Bad Route Entries             14            0            0
RIPv2 Updates Ignored                0            0            0
Authentication Failures              0            0            0
RIP Requests Received                0            0            0
RIP Requests Ignored                 0            0            0
```

Meaning The output shows the number of RIP routes learned. It also shows the number of RIP updates sent and received on the RIP-enabled interfaces. Verify the following information:

- The number of RIP routes learned matches the number of expected routes learned. Subnets learned by direct connectivity through an outgoing interface are not listed as RIP routes.
- RIP updates are being sent on each RIP-enabled interface. If no updates are being sent, the routing policy might not be configured to export routes.
- RIP updates are being received on each RIP-enabled interface. If no updates are being received, the routing policy might not be configured to export routes on the host connected to that subnet. The lack of updates might also indicate an authentication error.

Verifying the RIP-Enabled Interfaces

Purpose Verify that all the RIP-enabled interfaces are available and active.

Action From the CLI, enter the **show rip neighbor** command.

Sample Output

```
user@host> show rip neighbor
Source          Destination     Send   Receive   In
Neighbor          State  Address          Address        Mode   Mode     Met
--------          -----  --------         -----------    ----   -------  ---
ge-0/0/0.0           Dn (null)           (null)        mcast  both       1
ge-0/0/1.0           Up 192.168.220.5   224.0.0.9      mcast  both       1
```

Meaning The output shows a list of the RIP neighbors that are configured on the device. Verify the following information:

- Each configured interface is present. Interfaces are listed in alphabetical order.
- Each configured interface is up. The state of the interface is listed in the **Destination State** column. A state of **Up** indicates that the link is passing RIP traffic. A state of **Dn** indicates that the link is not passing RIP traffic. In a point-to-point link, this state generally means that either the end point is not configured for RIP or the link is unavailable.

Verifying Reachability of All Hosts in the RIP Network

Purpose By using the traceroute tool on each loopback address in the network, verify that all hosts in the RIP network are reachable from each Juniper Networks device.

Action For each device in the RIP network:

1. In the J-Web interface, select **Troubleshoot>Traceroute**.
2. In the Remote Host box, type the name of a host for which you want to verify reachability from the device.
3. Click **Start**. Output appears on a separate page.

Sample Output

```
1 172.17.40.254 (172.17.40.254) 0.362 ms 0.284 ms 0.251 ms
2 routera-fxp0.englab.mycompany.net (192.168.71.246) 0.251 ms 0.235 ms 0.200 ms
```

Meaning Each numbered row in the output indicates a routing hop in the path to the host. The three-time increments indicate the round-trip time (RTT) between the device and the hop for each traceroute packet.

To ensure that the RIP network is healthy, verify the following information:

- The final hop in the list is the host you want to reach.

- The number of expected hops to the host matches the number of hops in the traceroute output. The appearance of more hops than expected in the output indicates that a network segment is probably unreachable. It might also indicate that the incoming or outgoing metric on one or more hosts has been set unexpectedly.

Related Documentation

- *Junos OS Feature Support Reference for SRX Series and J Series Devices*
- RIP Configuration Overview on page 7
- **show rip statistics on page 142** in the *Junos OS Routing Protocols and Policies Command Reference*
- **show rip neighbor on page 140** in the *Junos OS Routing Protocols and Policies Command Reference*
- traceroute in the *Junos OS System Basics and Services Command Reference*
- RIP Overview on page 3

CHAPTER 4

Configuration Statements

[edit protocols rip] Hierarchy Level

The following statement hierarchy can also be included at the **[edit logical-systems *logical-system-name*]** hierarchy level.

```
protocols {
  rip {
    authentication-key password;
    authentication-type type;
    (check-zero | no-check-zero);
    graceful-restart {
      disable;
      restart-time seconds;
    }
    group group-name {
      ... the group subhierarchy appears after the main [edit protocols rip] hierarchy ...
    }
    holddown seconds;
    import [ policy-names ];
    message-size number;
    metric-in metric;
    receive (both | none | version-1 | version-2);
    rib-group group-name;
    route-timeout seconds;
    send (broadcast | multicast | none | version-1);
    traceoptions {
      file filename <files number> <size maximum-file-size> <world-readable |
        no-world-readable>;
      flag flag <flag-modifier> <disable>;
    }
    update-interval seconds;
  }

  rip {
    group group-name {
      bfd-liveness-detection {
        authentication {
          algorithm (keyed-md5 | keyed-sha-1 | meticulous-keyed-md5 |
            meticulous-keyed-sha-1 | simple-password);
```

```
                key-chain key-chain-name;
                loose-check;
            }
            detection-time {
                threshold milliseconds;
            }
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            version (1 | automatic);
        }
        demand-circuit;
        export [ policy-names ];
        import [ policy-names ];
        max-retrans-time seconds;
        metric-out metric;
        neighbor interface-name {
            ... the neighbor subhierarchy appears after the main [edit protocols rip group
                group-name] hierarchy level ...
        }
        preference preference;
        route-timeout seconds;
        update-interval seconds;
    }

    group group-name {
        neighbor neighbor-name {
            any-sender;
            authentication-key password;
            authentication-type type;
            bfd-liveness-detection {
                ... same statements as at the [edit protocols rip group group-name
                    bfd-liveness-detection] hierarchy level ...
            }
            (check-zero | no-check-zero);
            demand-circuit;
            import [ policy-names ];
            max-retrans-time seconds;
            message-size number;
            metric-in metric;
            receive (both | none | version-1 | version-2);
            route-timeout seconds;
            send (broadcast | multicast | none | version-1);
            update-interval seconds;
        }
    }
  }
}
```


Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit protocols] Hierarchy Level

any-sender

Syntax any-sender;

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information

Statement introduced in Junos OS Release 8.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Disable strict sender address checks.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- OBSOLETE - Disabling Strict Address Checking for RIP Messages

authentication-key

Syntax authentication-key *password*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Require authentication for RIP route queries received on an interface.

Options *password*—Authentication password. If the password does not match, the packet is rejected. The password can be from 1 through 16 contiguous characters long and can include any ASCII strings.

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

Related Documentation
- Example: Configuring Route Authentication for RIP on page 20

authentication-type

Syntax authentication-type *type*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure the type of authentication for RIP route queries received on an interface.

Default If you do not include this statement and the **authentication-key** statement, RIP authentication is disabled.

Options *type*—Authentication type:

- **md5**—Use the MD5 algorithm to create an encoded checksum of the packet. The encoded checksum is included in the transmitted packet. The receiving routing device uses the authentication key to verify the packet, discarding it if the digest does not match. This algorithm provides a more secure authentication scheme.
- **none**—Disable authentication. If **none** is configured, the configured authentication key is ignored.
- **simple**—Use a simple password. The password is included in the transmitted packet, which makes this method of authentication relatively insecure. The password can be from 1 through 16 contiguous letters or digits long.

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

Related Documentation

- **authentication-key on page 94**
- Example: Configuring Route Authentication for RIP on page 20

bfd-liveness-detection

Syntax

```
bfd-liveness-detection {
  authentication {
    algorithm algorithm-name;
    key-chain key-chain-name;
    loose-check;
  }
  detection-time {
    threshold milliseconds;
  }
  minimum-interval milliseconds;
  minimum-receive-interval milliseconds;
  multiplier number;
  no-adaptation;
  transmit-interval {
    minimum-interval milliseconds;
    threshold milliseconds;
  }
  version (1 | automatic);
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information

Statement introduced in Junos OS Release 8.0.
detection-time threshold and **transmit-interval threshold** options introduced in Junos OS Release 8.2.
Support for logical systems introduced in Junos OS Release 8.3.
no-adaptation option introduced in Junos OS Release 9.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
authentication algorithm, **authentication key-chain**, and **authentication loose-check** options introduced in Junos OS Release 9.6.
authentication algorithm, **authentication key-chain**, and **authentication loose-check** options introduced in Junos OS Release 9.6 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description

Configure bidirectional failure detection timers and authentication.

The remaining statements are explained separately.

Options

authentication algorithm ***algorithm-name*** —Configure the algorithm used to authenticate the specified BFD session: **simple-password**, **keyed-md5**, **keyed-sha-1**, **meticulous-keyed-md5**, or **meticulous-keyed-sha-1**.

authentication key-chain ***key-chain-name***—Associate a security key with the specified BFD session using the name of the security keychain. The name you specify must match one of the keychains configured in the **authentication-key-chains key-chain** statement at the **[edit security]** hierarchy level.

authentication loose-check—(Optional) Configure loose authentication checking on the BFD session. Use only for transitional periods when authentication may not be configured at both ends of the BFD session.

detection-time threshold ***milliseconds***—Configure a threshold for the adaptation of the BFD session detection time. When the detection time adapts to a value equal to or greater than the threshold, a single trap and a single system log message are sent.

minimum-interval ***milliseconds***—Configure the minimum interval after which the local routing device transmits a hello packet and then expects to receive a reply from the neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can specify the minimum transmit and receive intervals separately using the **transmit-interval minimum-interval** and **minimum-receive-interval** statements.

Range: 1 through 255,000 milliseconds

minimum-receive-interval ***milliseconds***—Configure the minimum interval after which the local routing device expects to receive a reply from a neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can configure the minimum receive interval using the **minimum-interval** statement.

Range: 1 through 255,000 milliseconds

multiplier ***number***—Configure the number of hello packets not received by a neighbor that causes the originating interface to be declared down.

Range: 1 through 255

Default: 3

no-adaptation—Configure BFD sessions not to adapt to changing network conditions. We recommend that you not disable BFD adaptation unless it is preferable not to have BFD adaptation enabled in your network.

transmit-interval threshold ***milliseconds***—Configure the threshold for the adaptation of the BFD session transmit interval. When the transmit interval adapts to a value greater than the threshold, a single trap and a single system message are sent. The interval threshold must be greater than the minimum transmit interval.

Range: 0 through 4,294,967,295 (2^{32} – 1)

transmit-interval minimum-interval ***milliseconds***—Configure a minimum interval after which the local routing device transmits hello packets to a neighbor. Optionally, instead of using this statement, you can configure the minimum transmit interval using the **minimum-interval** statement.

Range: 1 through 255,000

version—Configure the BFD version to detect: **1** (BFD version 1) or **automatic** (autodetect the BFD version).

Default: **automatic**

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

Related Documentation
- Example: Configuring BFD for RIP on page 27
- Example: Configuring BFD Authentication for RIP on page 34

check-zero

Syntax
(check-zero | no-check-zero);

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description
Check whether the reserved fields in a RIP packet are zero:

- **check-zero**—Discard version 1 packets that have nonzero values in the reserved fields and version 2 packets that have nonzero values in the fields that must be zero. This default behavior implements the RIP version 1 and version 2 specifications.
- **no-check-zero**—Receive RIP version 1 packets with nonzero values in the reserved fields or RIP version 2 packets with nonzero values in the fields that must be zero. This is in spite of the fact that they are being sent in violation of the specifications in RFC 1058 and RFC 2453.

Default
check-zero

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

Related Documentation
- Accepting RIP Packets with Nonzero Values in Reserved Fields

demand-circuit (Protocols RIP)

Syntax demand-circuit;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip group *group-name*],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced in Release 11.1 of Junos OS.

Description Configure a neighboring interface to act as a RIP demand circuit. To complete the demand circuit, you must configure both ends of the pair as demand circuits. When configured, the device sends RIP information only when changes occur in the routing database.

Default Disabled. You must explicitly configure two neighboring interfaces to act as a RIP demand circuit.

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

Related Documentation

- Example: Configuring RIP Demand Circuits on page 78
- RIP Demand Circuits Overview on page 76
- **max-retrans-time on page 104**

export

Syntax export [*policy-names*];

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Apply a policy to routes being exported to the neighbors.

Options ***policy-names***—Name of one or more policies.

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

Related Documentation

- import on page 103
- Configuring Group-Specific RIP Properties
- *Junos OS Policy Framework Configuration Guide*

graceful-restart

Syntax

```
graceful-restart {
  disable;
  restart-time seconds;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip],
[edit protocols rip]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description

Configure graceful restart for RIP.

Options

disable—Disables graceful restart for RIP.

seconds—Estimated time for the restart to finish, in seconds.

Range: 1 through 600 seconds

Default: 60 seconds

The remaining statements are explained separately.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- *Junos OS High Availability Configuration Guide*

holddown

Syntax holddown *seconds*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit protocols rip],
[edit routing-instances *routing-instance-name* protocols rip]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure how long the expired route is retained in the routing table before being removed.

When the hold-down timer runs on RIP demand circuits, routes are advertised as unreachable on other interfaces. When the hold-down timer expires, the route is removed from the routing table if all destinations detect that the route is unreachable or the remaining destinations are down.

Options *seconds*—Estimated time to wait before making updates to the routing table.

Range: 10 through 180 seconds

Default: 180 seconds

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

Related Documentation

- Example: Configuring RIP Timers on page 70
- RIP Demand Circuits Overview on page 76

import

Syntax import [*policy-names*];

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Apply one or more policies to routes being imported by the local routing device from neighbors.

Options ***policy-names***—Name of one or more policies.

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

Related Documentation

- export on page 100
- Example: Applying Policies to RIP Routes Imported from Neighbors on page 46

- *Junos OS Policy Framework Configuration Guide*

max-retrans-time

Syntax max-retrans-time *seconds*;

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip group *group-name*],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced in Release 11.1 of Junos OS.

Description RIP demand circuits send update messages every 5 seconds to an unresponsive peer. Configure the retransmission timer to limit the number of times the demand circuit resends update messages to an unresponsive peer. If the configured retransmission threshold is reached, routes from the next hop router are marked as unreachable and the hold-down timer starts. You must configure a pair of RIP demand circuits for this timer to take effect.

To determine the number of times to resend the update message, use the following calculation:

5 seconds * number of retransmissions = retransmission seconds

Options ***seconds***—The total amount of time the demand circuit resends update messages to an unresponsive peer. The seconds range corresponds to sending an update message a minimum of 1 time (5 seconds) and a maximum of 36 times (180 seconds).

Range: 5 through 180 seconds

Default: 5 seconds

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

Related Documentation

- Example: Configuring RIP Demand Circuits on page 78
- RIP Demand Circuits Overview on page 76
- **demand-circuit on page 99**

message-size

Syntax message-size *number*;

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Specify the number of route entries to be included in every RIP update message. To ensure interoperability with other vendors' equipment, use the standard of 25 route entries per message.

Options *number*—Number of route entries per update message.

Range: 25 through 255 entries

Default: 25 entries

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

Related Documentation
- Configuring the Number of Route Entries in RIP Update Messages

metric-in

Syntax metric-in *metric*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Specify the metric to add to incoming routes when the routing device advertises into RIP routes that were learned from other protocols. Use this statement to configure the routing device to prefer RIP routes learned through a specific neighbor.

Options *metric*—Metric value.

Range: 1 through 16

Default: 1

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

Related Documentation

- Example: Configuring the Metric Value Added to Imported RIP Routes on page 55

metric-out

Syntax metric-out *metric*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the metric value to add to routes transmitted to the neighbor. Use this statement to control how other routing devices prefer RIP routes sent from this neighbor.

Options *metric*—Metric value.

Range: 1 through 16

Default: 1

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

Related Documentation
- Configuring Group-Specific RIP Properties

neighbor

Syntax

```
neighbor neighbor-name {
  authentication-key password;
  authentication-type type;
  bfd-liveness-detection {
    authentication {
      algorithm algorithm-name;
      key-chain key-chain-name;
      loose-check;
    }
    detection-time {
      threshold milliseconds;
    }
    minimum-interval milliseconds;
    minimum-receive-interval milliseconds;
    transmit-interval {
      threshold milliseconds;
      minimum-interval milliseconds;
    }
    multiplier number;
    version (0 | 1 | automatic);
  }
  (check-zero | no-check-zero);
  demand-circuit;
  import policy-name;
  max-retrans-time seconds;
  message-size number;
  metric-in metric;
  metric-out metric;
  receive receive-options;
  route-timeout seconds;
  send send-options;
  update-interval seconds;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description

Configure neighbor-specific RIP parameters, thereby overriding the defaults set for the routing device.

Options

neighbor-name—Name of an interface over which a routing device communicates to its neighbors.

The remaining statements are explained separately.

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

Related Documentation
- OBSOLETE - Overview of RIP Neighbor Properties

preference

Syntax
preference *preference*;

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description
Specify the preference of external routes learned by RIP as compared to those learned from other routing protocols.

Options
preference—Preference value. A lower value indicates a more preferred route.

Range: 0 through 4,294,967,295 (2^{32} – 1)

Default: 100

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

Related Documentation
- Configuring Group-Specific RIP Properties

receive

Syntax receive *receive-options*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure RIP receive options.

Options *receive-options*—One of the following:

- **both**—Accept both RIP version 1 and version 2 packets.
- **none**—Do not receive RIP packets.
- **version-1**—Accept only RIP version 1 packets.
- **version-2**—Accept only RIP version 2 packets.

Default: both

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

Related Documentation

- send on page 114
- Example: Configuring the Sending and Receiving of RIPv1 and RIPv2 Packets on page 60

rib-group

Syntax rib-group *group-name*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit protocols rip],
[edit routing-instances *routing-instance-name* protocols rip]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Install RIP routes into multiple routing tables by configuring a routing table group.

Options ***group-name***—Name of the routing table group.

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

Related Documentation

- Example: Redistributing Routes Between Two RIP Instances on page 64

rip

Syntax rip {...}

Hierarchy Level [edit logical-systems *logical-system-name* protocols],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols],
[edit protocols],
[edit routing-instances *routing-instance-name* protocols]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Enable RIP routing on the routing device.

Default RIP is disabled on the routing device.

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

Related Documentation

- Minimum RIP Configuration

route-timeout

Syntax route-timeout *seconds*;

Hierarchy Level [edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name*],
[edit protocols rip],
[edit protocols rip group *group-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name*]

Release Information Statement introduced in Junos OS Release 7.6.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure the route timeout interval for RIP.

Options *seconds*—Estimated time to wait before making updates to the routing table.

Range: 30 through 360 seconds

Default: 180 seconds

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

Related Documentation

- Example: Configuring RIP Timers on page 70
- RIP Demand Circuits Overview on page 76

routing-instances

Syntax routing-instances *routing-instance-name* { ... }

Hierarchy Level [edit],
[edit logical-systems *logical-system-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure an additional routing entity for a router. You can create multiple instances of BGP, IS-IS, OSPF, OSPFv3, and RIP for a router. You can also create multiple routing instances for separating routing tables, routing policies, and interfaces for individual wholesale subscribers (retailers) in a Layer 3 wholesale network.

Default Routing instances are disabled for the router.

Options *routing-instance-name*—Name of the routing instance. This must be a non-reserved string of not more than 128 characters.

All special characters, except spaces, are allowed.

NOTE: **In Junos OS Release 9.6 and later, you can include a slash (/) in a routing-instance name only if a logical system is not configured. That is, you cannot include the slash character in a routing-instance name if a logical system other than the default is explicitly configured.**

The remaining statements are explained separately.

NOTE: **In Junos OS Release 9.0 and later, you cannot specify a routing-instance name of default.**

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

Related Documentation

- OBSOLETE - Complete Routing Instances Configuration Statements
- Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
- *Junos OS Policy Framework Configuration Guide*

send

Syntax

send *send-options*;

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*],
[edit protocols rip],
[edit protocols rip group *group-name* neighbor *neighbor-name*],
[edit routing-instances *routing-instance-name* protocols rip],
[edit routing-instances *routing-instance-name* protocols rip group *group-name* neighbor *neighbor-name*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description

Configure RIP send options.

Options

send-options—One of the following:

- **broadcast**—Broadcast RIP version 2 packets (RIP version 1 compatible).
- **multicast**—Multicast RIP version 2 packets. This is the default.
- **none**—Do not send RIP updates.
- **version-1**—Broadcast RIP version 1 packets.

Default: multicast

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- receive on page 110
- Example: Configuring the Sending and Receiving of RIPv1 and RIPv2 Packets on page 60

traceoptions

Syntax

```
traceoptions {
  file filename <files number> <size size> <world-readable | no-world-readable>;
  flag flag <flag-modifier> <disable>;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit protocols rip],
[edit routing-instances *routing-instance-name* protocols rip]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description

Set RIP protocol-level tracing options.

NOTE: **The traceoptions statement is not supported on QFabric systems.**

Default

The default RIP protocol-level trace options are inherited from the global **traceoptions** statement.

Options

disable—(Optional) Disable the tracing operation. One use of this option is to disable a single operation when you have defined a broad group of tracing operations, such as **all**.

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name in quotation marks. We recommend that you place RIP tracing output in the file **/var/log/rip-log**.

files *number*—(Optional) Maximum number of trace files. When a trace file named ***trace-file*** reaches its maximum size, it is renamed ***trace-file*.0**, then ***trace-file*.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten. If you specify a maximum number of files, you must also specify a maximum file size with the **size** option.

Range: 2 through 1000 files

Default: 10 files

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

RIP Tracing Options

- **auth**—RIP authentication
- **error**—RIP error packets

- **expiration**—RIP route expiration processing
- **holddown**—RIP hold-down processing
- **nsr-synchronization**—Nonstop routing synchronization events
- **packets**—All RIP packets
- **request**—RIP information packets such as request, poll, and poll entry packets
- **trigger**—RIP triggered updates
- **update**—RIP update packets

Global Tracing Options

- **all**—All tracing operations
- **general**—A combination of the **normal** and **route** trace operations
- **normal**—All normal operations

Default: If you do not specify this option, only unusual or abnormal operations are traced.

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Routing protocol task processing
- **timer**—Routing protocol timer processing

flag-modifier—(Optional) Modifier for the tracing flag. You can specify one or more of these modifiers:

- **detail**—Provide detailed trace information.
- **receive**—Trace the packets being received.
- **receive-detail**—Provide detailed trace information for packets being received.
- **send**—Trace the packets being transmitted.
- **send-detail**—Provide detailed trace information for packets being transmitted.

no-world-readable—(Optional) Prevent any user from reading the log file.

size ***size***—(Optional) Maximum size of each trace file, in kilobytes (KB) or megabytes (MB). When a trace file named ***trace-file*** reaches this size, it is renamed ***trace-file*.0**. When the ***trace-file*** again reaches its maximum size, ***trace-file*.0** is renamed ***trace-file*.1** and ***trace-file*** is renamed ***trace-file*.0**. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten. If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option.

Syntax: ***x*k** to specify KB, ***x*m** to specify MB, or ***x*g** to specify GB

Range: 10 KB through the maximum file size supported on your system

Default: 128 KB

world-readable—(Optional) Allow any user to read the log file.

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

Related Documentation
- Example: Tracing RIP Protocol Traffic on page 83

update-interval

Syntax
update-interval *seconds*;

Hierarchy Level
[edit logical-systems *logical-system-name* protocols rip],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols rip],
[edit protocols rip],
[edit routing-instances *routing-instance-name* protocols rip]

Release Information
Statement introduced in Junos OS Release 7.6.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description
Configure the interval at which routes learned by RIP are sent to neighbors.

Options
seconds—Estimated time to wait before making updates to the routing table.

Range: 10 through 60 seconds

Default: 30 seconds

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

Related Documentation
- Example: Configuring RIP Timers on page 70

PART 3

Administration

CHAPTER 5

Operational Commands

clear rip general-statistics

Syntax
clear rip general-statistics
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switch and QFX Series)
clear rip general-statistics

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.1 for the QFX Series.

Description
Clear Routing Information Protocol (RIP) general statistics.

Options
none—Clear RIP general statistics.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level
clear

Related Documentation
- show rip general-statistics on page 138

List of Sample Output
clear rip general-statistics on page 122

Output Fields
When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear rip general-statistics

`user@host>` **clear rip general-statistics**

clear rip statistics

Syntax

clear rip statistics
<instance (all | *instance-name*)>
<logical-system (all | *logical-system-name*)>
<peer (all | *address*)>

Syntax (EX Series Switches and QFX Series)

clear rip statistics
<instance (all | *instance-name*)>
<*neighbor*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.1 for the QFX Series.

Description

Clear RIP statistics.

Options

none—Reset RIP counters for all neighbors for all routing instances.

instance (all | *instance-name*)—(Optional) Clear RIP statistics for all instances or for the specified routing instance only.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

peer (all | *address*)—(Optional) Clear RIP statistics for a single peer or all peers.

Required Privilege Level

clear

Related Documentation

- show rip statistics on page 142

List of Sample Output

clear rip statistics on page 123

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear rip statistics

`user@host>` **clear rip statistics**

restart

Syntax

restart
<adaptive-services |ancpd-service | application-identification |audit-process | auto-configuration |captive-portal-content-delivery |ce-l2tp-service |chassis-control | class-of-service |clksyncd-service |database-replication|datapath-trace-service |dhcp-service | diameter-service | disk-monitoring | dynamic-flow-capture | ecc-error-logging | ethernet-connectivity-fault-management |ethernet-link-fault-management |event-processing | firewall |general-authentication-service | gracefully | iccp-service |idp-policy | immediately |interface-control | ipsec-key-management | kernel-replication | l2-learning | l2cpd-service | l2tp-service | l2tp-universal-edge | lacp | license-service |link-management |local-policy-decision-function |mac-validation |mib-process | mobile-ip | mountd-service |mpls-traceroute |mspd | multicast-snooping |named-service | nfsd-service | packet-triggered-subscribers |peer-selection-service |pgcp-service | pgm | pic-services-logging | pki-service |ppp | ppp-service |pppoe | protected-system-domain-service | redundancy-interface-process | remote-operations | root-system-domain-service | routing <logical-system *logical-system-name*> | sampling | sbc-configuration-process | sdk-service |service-deployment | services | services pgcp gateway *gateway-name* | snmp |soft |static-subscribers |statistics-service| subscriber-management | subscriber-management-helper | tunnel-oamd |usb-control| vrrp |web-management>
<gracefully | immediately | soft>

Syntax (EX Series Switches)

restart
<autoinstallation | chassis-control | class-of-service | database-replication | dhcp | dhcp-service | diameter-service | dot1x-protocol | ethernet-link-fault-management | ethernet-switching | event-processing | firewall | general-authentication-service | interface-control | kernel-replication | l2-learning | lacp | license-service | link-management | lldpd-service | mib-process | mountd-service | multicast-snooping | pgm | redundancy-interface-process | remote-operations | routing | secure-neighbor-discovery | service-deployment | sflow-service | snmp | vrrp | web-management>
<gracefully | immediately | soft>

Syntax (TX Matrix Routers)

restart
<adaptive-services | audit-process | chassis-control | class-of-service | dhcp-service | diameter-service | disk-monitoring | dynamic-flow-capture | ecc-error-logging | event-processing | firewall | interface-control | ipsec-key-management | kernel-replication | l2-learning | l2tp-service | lacp | link-management | mib-process |pgm | pic-services-logging | ppp | pppoe | redundancy-interface-process | remote-operations | routing <logical-system *logical-system-name*> | sampling | service-deployment | snmp| statistics-service>
<all-chassis | all-lcc | lcc *number* | scc>
<gracefully | immediately | soft>

Syntax (TX Matrix Plus Routers)

restart
<adaptive-services | audit-process | chassis-control | class-of-service | dhcp-service | diameter-service | disk-monitoring | dynamic-flow-capture | ecc-error-logging | event-processing | firewall | interface-control | ipsec-key-management | kernel-replication | l2-learning | l2tp-service | lacp | link-management | mib-process | pgm | pic-services-logging | ppp | pppoe | redundancy-interface-process | remote-operations | routing <logical-system *logical-system-name*> | sampling | service-deployment | snmp| statistics-service>
<all-chassis | all-lcc | all-sfc | lcc *number* | sfc *number*>
<gracefully | immediately | soft>

Syntax (MX Series Routers)

restart
<adaptive-services | ancpd-service |application-identification|audit-process |
auto-configuration |captive-portal-content-delivery |ce-l2tp-service |chassis-control |
class-of-service |clksyncd-service |database-replication| datapath-trace-service
|dhcp-service | diameter-service | disk-monitoring | dynamic-flow-capture |
ecc-error-logging | ethernet-connectivity-fault-management
|ethernet-link-fault-management |event-processing | firewall |
general-authentication-service | gracefully |iccp-service |idp-policy |immediately
|interface-control | ipsec-key-management | kernel-replication | l2-learning |l2cpd-service
|l2tp-service | l2tp-universal-edge | lacp | license-service |link-management
|local-policy-decision-function |mac-validation |mib-process | mobile-ip |mountd-service
|mpls-traceroute |mspd | multicast-snooping |named-service | nfsd-service |
packet-triggered-subscribers |peer-selection-service | pgcp-service | pgm |
pic-services-logging | pki-service |ppp | ppp-service |pppoe |
protected-system-domain-service | redundancy-interface-process | remote-operations
|root-system-domain-service | routing |routing <logical-system *logical-system-name*> |
sampling | sbc-configuration-process | sdk-service |service-deployment |services | services
pgcp gateway *gateway-name* |snmp |soft |static-subscribers |statistics-service|
subscriber-management | subscriber-management-helper | tunnel-oamd | usb-control|
vrrp |web-management>
<all-members>
<gracefully | immediately | soft>
<local>
<member *member-id*>

Syntax (J Series Routers)

restart
<adaptive-services | audit-process | chassis-control | class-of-service | dhcp | dhcp-service
| dialer-services | diameter-service | dlsw | event-processing | firewall | interface-control |
ipsec-key-management | isdn-signaling | l2ald | l2-learning | l2tp-service | mib-process |
network-access-service | pgm | ppp | pppoe | remote-operations | routing <logical-system
logical-system-name> | sampling | service-deployment | snmp | usb-control |
web-management>
<gracefully | immediately | soft>

Syntax (QFX Series)

restart
<adaptive-services | audit-process | chassis-control | class-of-service | dialer-services |
diameter-service | dlsw | ethernet-connectivity | event-processing | fibre-channel | firewall
| general-authentication-service | igmp-host-services | interface-control |
ipsec-key-management | isdn-signaling | l2ald | l2-learning | l2tp-service | mib-process |
named-service | network-access-service | nstrace-process | pgm | ppp | pppoe |
redundancy-interface-process | remote-operations |*logical-system-name*> | routing |
sampling |secure-neighbor-discovery | service-deployment | snmp | usb-control |
web-management>
<gracefully | immediately | soft>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Options added:

- **dynamic-flow-capture** in Junos OS Release 7.4.
- **dlsw** in Junos OS Release 7.5.
- **event-processing** in Junos OS Release 7.5.

- **ppp** in Junos OS Release 7.5.
- **l2ald** in Junos OS Release 8.0.
- **link-management** in Release 8.0.
- **pgcp-service** in Junos OS Release 8.4.
- **sbc-configuration-process** in Junos OS Release 9.5.
- **services pgcp gateway** in Junos OS Release 9.6.
- **sfc** and **all-sfc** for the TX Matrix Router in Junos OS Release 9.6.

Description Restart a Junos OS process.

CAUTION: **Never restart a software process unless instructed to do so by a customer support engineer. A restart might cause the router or switch to drop calls and interrupt transmission, resulting in possible loss of data.**

Options **none**—Same as **gracefully**.

adaptive-services—(Optional) Restart the configuration management process that manages the configuration for stateful firewall, Network Address Translation (NAT), intrusion detection services (IDS), and IP Security (IPsec) services on the Adaptive Services PIC.

all-chassis—(TX Matrix and TX Matrix Plus routers only) (Optional) Restart the software process on all chassis.

all-lcc—(TX Matrix and TX Matrix Plus routers only) (Optional) For a TX Matrix router, restart the software process on all T640 routers connected to the TX Matrix router. For a TX Matrix Plus router, restart the software process on all T1600 routers connected to the TX Matrix Plus router.

all-members—(MX Series routers only) (Optional) Restart the software process for all members of the Virtual Chassis configuration.

all-sfc—(TX Matrix Plus routers only) (Optional) For a TX Matrix Plus router, restart the software processes for the TX Matrix Plus router (or switch-fabric chassis).

ancpd-service—(Optional) Restart the Access Node Control Protocol (ANCP) process, which works with a special Internet Group Management Protocol (IGMP) session to collect outgoing interface mapping events in a scalable manner.

application-identification—(Optional) Restart the process that identifies an application using intrusion detection and prevention (IDP) to allow or deny traffic based on applications running on standard or nonstandard ports.

audit-process—(Optional) Restart the RADIUS accounting process that gathers statistical data that can be used for general network monitoring, analyzing and tracking usage patterns, for billing a user based upon the amount of time or type of services accessed.

auto-configuration—(Optional) Restart the Interface Auto-Configuration process.

autoinstallation—(EX Series switches only) (Optional) Restart the autoinstallation process.

captive-portal-content-delivery—(Optional) Restart the HTTP redirect service by specifying the location to which a subscriber's initial Web browser session is redirected, enabling initial provisioning and service selection for the subscriber.

ce-l2tp-service—(M10, M10i, M7i, and MX Series routers only) (Optional) Restart the Universal Edge Layer 2 Tunneling Protocol (L2TP) process, which establishes L2TP tunnels and Point-to-Point Protocol (PPP) sessions through L2TP tunnels.

chassis-control—(Optional) Restart the chassis management process.

class-of-service—(Optional) Restart the class-of-service (CoS) process, which controls the router's or switch's CoS configuration.

clksyncd-service—(Optional) Restart the external clock synchronization process, which uses synchronous Ethernet (SyncE).

database-replication—(EX Series switches and MX Series routers) (Optional) Restart the database replication process.

datapath-trace-service—(Optional) Restart the packet path tracing process.

dhcp—(J Series routers and EX Series switches only) (Optional) Restart the software process for a Dynamic Host Configuration Protocol (DHCP) server. A DHCP server allocates network IP addresses and delivers configuration settings to client hosts without user intervention.

dhcp-service— (Optional) Restart the Dynamic Host Configuration Protocol process.

dialer-services—(J Series routers and EX Series switches only) (Optional) Restart the ISDN dial-out process.

diameter-service—(Optional) Restart the diameter process.

disk-monitoring—(Optional) Restart disk monitoring, which checks the health of the hard disk drive on the Routing Engine.

dlsw—(J Series routers and QFX Series only) (Optional) Restart the data link switching (DLSw) service.

dot1x-protocol—(EX Series switches only) (Optional) Restart the port-based network access control process.

dynamic-flow-capture—(Optional) Restart the dynamic flow capture (DFC) process, which controls DFC configurations on Monitoring Services III PICs.

ecc-error-logging—(Optional) Restart the error checking and correction (ECC) process, which logs ECC parity errors in memory on the Routing Engine.

ethernet-connectivity-fault-management—(Optional) Restart the process that provides IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management (CFM) database information for CFM maintenance association end points (MEPs) in a CFM session.

ethernet-link-fault-management—(EX Series switches and MX Series routers only) (Optional) Restart the process that provides the OAM link fault management (LFM) information for Ethernet interfaces.

ethernet-switching—(EX Series switches only) (Optional) Restart the Ethernet switching process.

event-processing—(Optional) Restart the event process (eventd).

fibre-channel—(QFX Series only) (Optional) Restart the Fibre Channel process.

firewall—(Optional) Restart the firewall management process, which manages the firewall configuration and enables accepting or rejecting packets that are transiting an interface on a router or switch.

general-authentication-service—(EX Series switches and MX Series routers) (Optional) Restart the general authentication process.

gracefully—(Optional) Restart the software process.

iccp-service—(Optional) Restart the Inter-Chassis Communication Protocol (ICCP) process.

idp-policy—(Optional) Restart the intrusion detection and prevention (IDP) protocol process.

immediately—(Optional) Immediately restart the software process.

interface-control—(Optional) Restart the interface process, which controls the router's or switch's physical interface devices and logical interfaces.

ipsec-key-management—(Optional) Restart the IPsec key management process.

isdn-signaling—(J Series routers and QFX Series only) (Optional) Restart the ISDN signaling process, which initiates ISDN connections.

kernel-replication—(Optional) Restart the kernel replication process, which replicates the state of the backup Routing Engine when graceful Routing Engine switchover (GRES) is configured.

l2-learning—(Optional) Restart the Layer 2 address flooding and learning process.

l2cpd-service—(Optional) Restart the Layer 2 Control Protocol process, which enables features such as Layer 2 protocol tunneling and nonstop bridging.

l2tp-service— (M10, M10i, M7i, and MX Series routers only) (Optional) Restart the Layer 2 Tunneling Protocol (L2TP) process, which sets up client services for establishing Point-to-Point Protocol (PPP) tunnels across a network and negotiating Multilink PPP if it is implemented.

l2tp-universal-edge—(MX Series routers) (Optional) Restart the L2TP process, which establishes L2TP tunnels and PPPsessions through L2TP tunnels.

lacp—(Optional) Restart the Link Aggregation Control Protocol (LACP) process. LACP provides a standardized means for exchanging information between partner systems on a link to allow their link aggregation control instances to reach agreement on the identity of the LAG to which the link belongs, and then to move the link to that LAG, and to enable the transmission and reception processes for the link to function in an orderly manner.

lcc *number*—(TX Matrix and TX Matrix Plus routers only) (Optional) For a TX Matrix router, restart the software process for a specific T640 router that is connected to the TX Matrix router. For a TX Matrix Plus router, restart the software process for a specific T1600 router that is connected to the TX Matrix Plus router. Replace ***number*** with a value from **0** through **3**.

license-service—(EX Series switches) (Optional) Restart the feature license management process.

link-management— (TX Matrix and TX Matrix Plus routers and EX Series switches only) (Optional) Restart the Link Management Protocol (LMP) process, which establishes and maintains LMP control channels.

lldpd-service—(EX Series switches only) (Optional) Restart the Link Layer Discovery Protocol (LLDP) process.

local—(MX Series routers only) (Optional) Restart the software process for the local Virtual Chassis member.

local-policy-decision-function— (Optional) Restart the process for the Local Policy Decision Function, which regulates collection of statistics related to applications and application groups and tracking of information about dynamic subscribers and static interfaces.

mac-validation— (Optional) Restart the Media Access Control (MAC) validation process, which configures MAC address validation for subscriber interfaces created on demux interfaces in dynamic profiles on MX Series routers.

member *member-id*—(MX Series routers only) (Optional) Restart the software process for a specific member of the Virtual Chassis configuration. Replace ***member-id*** with a value of **0** or **1**.

mib-process—(Optional) Restart the Management Information Base (MIB) version II process, which provides the router's MIB II agent.

mobile-ip—(Optional) Restart the Mobile IP process, which configures Junos OS Mobile IP features.

mountd-service—(EX Series switches and MX Series router) (Optional) Restart the service for NFS mount requests.

mpls-traceroute—(Optional) Restart the MPLS Periodic Traceroute process.

mspd—(Optional) Restart the Multiservice process.

multicast-snooping—(EX Series switches and MX Series routers) (Optional) Restart the multicast snooping process, which makes Layer 2 devices, such as VLAN switches, aware of Layer 3 information, such as the media access control (MAC) addresses of members of a multicast group.

named-service—(Optional) Restart the DNS Server process, which is used by a router or a switch to resolve hostnames into addresses.

network-access-service—(J Series routers and QFX Series only) (Optional) Restart the network access process, which provides the router's Challenge Handshake Authentication Protocol (CHAP) authentication service.

nfsd-service—(Optional) Restart the Remote NFS Server process, which provides remote file access for applications that need NFS-based transport.

packet-triggered-subscribers—(Optional) Restart the packet-triggered subscribers and policy control (PTSP) process, which allows the application of policies to dynamic subscribers that are controlled by a subscriber termination device.

peer-selection-service—(Optional) Restart the Peer Selection Service process.

pgcp-service—(Optional) Restart the pgcpd service process running on the Routing Engine. This option does not restart pgcpd processes running on mobile station PICs. To restart pgcpd processes running on mobile station PICs, use the **services pgcp gateway** option.

pgm—(Optional) Restart the process that implements the Pragmatic General Multicast (PGM) protocol for assisting in the reliable delivery of multicast packets.

pic-services-logging—(Optional) Restart the logging process for some PICs. With this process, also known as fsad (the file system access daemon), PICs send special logging information to the Routing Engine for archiving on the hard disk.

pki-service—(Optional) Restart the PKI Service process.

ppp—(Optional) Restart the Point-to-Point Protocol (PPP) process, which is the encapsulation protocol process for transporting IP traffic across point-to-point links.

ppp-service—(Optional) Restart the Universal edge PPP process, which is the encapsulation protocol process for transporting IP traffic across universal edge routers.

pppoe—(Optional) Restart the Point-to-Point Protocol over Ethernet (PPPoE) process, which combines PPP that typically runs over broadband connections with the Ethernet link-layer protocol that allows users to connect to a network of hosts over a bridge or access concentrator.

protected-system-domain-service—(Optional) Restart the Protected System Domain (PSD) process.

redundancy-interface-process—(Optional) Restart the ASP redundancy process.

remote-operations—(Optional) Restart the remote operations process, which provides the ping and traceroute MIBs.

root-system-domain-service—(Optional) Restart the Root System Domain (RSD) service.

routing—(QFX Series, EX Series switches, and MX Series routers only) (Optional) Restart the routing protocol process.

routing <logical-system *logical-system-name*>—(Optional) Restart the routing protocol process, which controls the routing protocols that run on the router or switch and maintains the routing tables. Optionally, restart the routing protocol process for the specified logical system only.

sampling—(Optional) Restart the sampling process, which performs packet sampling based on particular input interfaces and various fields in the packet header.

sbc-configuration-process—(Optional) Restart the session border controller (SBC) process of the border signaling gateway (BSG).

scc—(TX Matrix routers only) (Optional) Restart the software process on the TX Matrix router (or switch-card chassis).

sdk-service—(Optional) Restart the SDK Service process, which runs on the Routing Engine and is responsible for communications between the SDK application and Junos OS. Although the SDK Service process is present on the router, it is turned off by default.

secure-neighbor-discovery—(QFX Series, EX Series switches, and MX Series routers only) (Optional) Restart the secure Neighbor Discovery Protocol (NDP) process, which provides support for protecting NDP messages.

sfc *number*—(TX Matrix Plus routers only) (Optional) Restart the software process on the TX Matrix Plus router (or switch-fabric chassis). Replace ***number*** with **0**.

service-deployment—(Optional) Restart the service deployment process, which enables Junos OS to work with the Session and Resource Control (SRC) software.

services—(Optional) Restart a service.

services pgcp gateway *gateway-name*—(Optional) Restart the pgcpd process for a specific border gateway function (BGF) running on an MS-PIC. This option does not restart the pgcpd process running on the Routing Engine. To restart the pgcpd process on the Routing Engine, use the **pgcp-service** option.

sflow-service—(EX Series switches only) (Optional) Restart the flow sampling (sFlow technology) process.

snmp—(Optional) Restart the SNMP process, which enables the monitoring of network devices from a central location and provides the router's or switch's SNMP master agent.

soft—(Optional) Reread and reactivate the configuration without completely restarting the software processes. For example, BGP peers stay up and the routing table stays constant. Omitting this option results in a graceful restart of the software process.

static-subscribers—(Optional) Restart the Static subscribers process, which associates subscribers with statically configured interfaces and provides dynamic service activation and activation for these subscribers.

statistics-service—(Optional) Restart the process that manages the Packet Forwarding Engine statistics.

subscriber-management—(Optional) Restart the Subscriber Management process.

subscriber-management-helper—(Optional) Restart the Subscriber Management Helper process.

tunnel-oamd—(Optional) Restart the Tunnel OAM process, which enables the Operations, Administration, and Maintenance of Layer 2 tunneled networks. Layer 2 protocol tunneling (L2PT) allows service providers to send Layer 2 protocol data units (PDUs) across the provider's cloud and deliver them to Juniper Networks EX Series Ethernet Switches that are not part of the local broadcast domain.

usb-control—(J Series routers and MX Series routers) (Optional) Restart the USB control process.

vrrp—(EX Series switches and MX Series routers) (Optional) Restart the Virtual Router Redundancy Protocol (VRRP) process, which enables hosts on a LAN to make use of redundant routing platforms on that LAN without requiring more than the static configuration of a single default route on the hosts.

web-management—(J Series routers, QFX Series, EX Series switches, and MX Series routers) (Optional) Restart the Web management process.

Required Privilege Level reset

Related Documentation
- Overview of Junos OS CLI Operational Mode Commands

List of Sample Output restart interfaces on page 132

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

restart interfaces

```
user@host> restart interfaces
```



```
interfaces process terminated
interfaces process restarted
```

show policy

Syntax

show policy
<logical-system (all | *logical-system-name*)>
<*policy-name*>

Syntax (EX Series Switches)

show policy
<*policy-name*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display information about configured routing policies.

Options

none—List the names of all configured routing policies.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

policy-name—(Optional) Show the contents of the specified policy.

Required Privilege Level

view

Related Documentation

- show policy damping

List of Sample Output

show policy on page 134
show policy policy-name on page 135
show policy (Multicast Scoping) on page 135

Output Fields

Table 6 on page 134 lists the output fields for the **show policy** command. Output fields are listed in the approximate order in which they appear.

Table 6: show policy Output Fields

Field Name	Field Description
policy-name	Name of the policy listed.
term	Policy term listed.
from	Match condition for the policy.
then	Action for the policy.

Sample Output

show policy

```
user@host> show policy
Configured policies:
__vrf-export-red-internal__
__vrf-import-red-internal__
```

```
red-export
all_routes
```

show policy policy-name

```
user@host> show policy test-statics
Policy test-statics:
    from
         3.0.0.0/8  accept
         3.1.0.0/16  accept
    then reject
```

show policy (Multicast Scoping)

```
user@host> show policy test-statics
Policy test-statics:
    from
         multicast-scoping == 8
```

show policy conditions

Syntax

show policy conditions
<*condition-name*>
<detail>
<dynamic>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show policy conditions
<*condition-name*>
<detail>
<dynamic>

Release Information

Command introduced in Junos OS Release 9.0.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display all the configured conditions as well as the routing tables with which the configuration manager is interacting. If the **detail** keyword is included, the output also displays dependent routes for each condition.

Options

none—Display all configured conditions and associated routing tables.

condition-name—(Optional) Display information about the specified condition only.

detail—(Optional) Display the specified level of output.

dynamic—(Optional) Display information about the conditions in the dynamic database.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show policy conditions detail on page 137

Output Fields

Table 7 on page 136 lists the output fields for the **show policy conditions** command. Output fields are listed in the approximate order in which they appear.

Table 7: show policy conditions Output Fields

Field Name	Field Description	Level of Output
Condition	Name of configured condition.	All levels
event	Condition type. If the **if-route-exists** option is configured, the event type is: **Existence of a route in a specific routing table**.	All levels
Dependent routes	List of routes dependent on the condition, along with the latest generation number.	**detail**
Condition tables	List of routing tables associated with the condition, along with the latest generation number and number of dependencies.	All levels

Table 7: show policy conditions Output Fields *(continued)*

Field Name	Field Description	Level of Output
If-route-exists conditions	List of conditions configured to look for a route in the specified table.	All levels

Sample Output

show policy conditions detail

```
user@host> show policy conditions detail
Configured conditions:
Condition cond1, event: Existence of a route in a specific routing table
Dependent routes:
 4.4.4.4/32, generation 3
 6.6.6.6/32, generation 3
 10.10.10.10/32, generation 3

Condition cond2, event: Existence of a route in a specific routing table
Dependent routes:
None

Condition tables:
Table inet.0, generation 4, dependencies 3, If-route-exists conditions: cond1
(static) cond2 (static)
```

show rip general-statistics

Syntax

show rip general-statistics
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switch and QFX Series)

show rip general-statistics

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.1 for the QFX Series.

Description

Display brief Routing Information Protocol (RIP) statistics.

Options

none—Display brief RIP statistics.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

Related Documentation

- clear rip general-statistics on page 122

List of Sample Output

show rip general-statistics on page 138

Output Fields

Table 8 on page 138 lists the output fields for the **show rip general-statistics** command. Output fields are listed in the approximate order in which they appear.

Table 8: show rip general-statistics Output Fields

Field Name	Field Description
bad msgs	Number of invalid messages received.
no recv intf	Number of packets received with no matching interface.
curr memory	Amount of memory currently used by RIP.
max memory	Most memory used by RIP.

Sample Output

show rip general-statistics

```
user@host> show rip general-statistics
RIPv2 I/O info:
     bad msgs       :         0
     no recv intf   :         0
```



```
curr memory    :          0
max memory     :          0
```

show rip neighbor

Syntax

show rip neighbor
<instance (all | *instance-name*)>
<logical-system (all | *logical-system-name*)>
<*name*>

Syntax (EX Series Switches and QFX Series)

show rip neighbor
<instance (all | *instance-name*)>
<*name*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.1 for the QFX Series.

Description

Display information about RIP neighbors.

Options

none—Display information about all RIP neighbors for all instances.

instance (all | *instance-name*)—(Optional) Display RIP neighbor information for all instances or for only the specified routing instance.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

name—(Optional) Display detailed information about only the specified RIP neighbor.

Required Privilege Level

view

List of Sample Output

show rip neighbor on page 141
show rip neighbor (With Demand Circuits Configured) on page 141

Output Fields

Table 9 on page 140 lists the output fields for the **show rip neighbor** command. Output fields are listed in the approximate order in which they appear.

Table 9: show rip neighbor Output Fields

Field Name	Field Description
Neighbor	Name of the RIP neighbor. NOTE: Beginning with Junos OS Release 11.1, when you configure demand circuits, the output displays a demand circuit (DC) flag next to neighbor interfaces configured for demand circuits. If you configure demand circuits at the **[edit protocols rip group *group-name* neighbor *neighbor-name*]** hierarchy level, the output shows only the neighboring interface that you specifically configured as a demand circuit. If you configure demand circuits at the **[edit protocols rip group *group-name*]** hierarchy level, all of the interfaces in the group are configured as demand circuits. Therefore, the output shows all of the interfaces in that group as demand circuits.

Table 9: show rip neighbor Output Fields *(continued)*

Field Name	Field Description
State	State of the connection: **Up** or **Dn** (Down).
Source Address	Source address.
Destination Address	Destination address.
Send Mode	Send options: **broadcast**, **multicast**, **none**, or **version 1**.
Receive Mode	Type of packets to accept: **both**, **none**, **version 1**, or **version 2**.
In Met	Metric added to incoming routes when advertising into RIP routes that were learned from other protocols.

Sample Output

show rip neighbor

```
user@host> show rip neighbor
                  Local  Source          Destination     Send   Receive  In
Neighbor          State  Address         Address         Mode   Mode     Met
--------          -----  -------         -----------     ----   -------  ---
ge-2/3/0.0           Up  192.168.9.105   192.168.9.107   bcast  both       1
at-5/1/1.42          Dn  (null)          (null)          mcast  v2 only    3
at-5/1/0.42          Dn  (null)          (null)          mcast  both       3
at-5/1/0.0           Up  20.0.0.1        224.0.0.9       mcast  both       3
so-0/0/0.0           Up  192.168.9.97    224.0.0.9       mcast  both       3
```

show rip neighbor (With Demand Circuits Configured)

```
user@host# show rip neighbor
                  Local  Source          Destination     Send   Receive  In
Neighbor          State  Address         Address         Mode   Mode     Met
--------          -----  -------         -----------     ----   -------  ---
so-0/1/0.0(DC)       Up  10.10.10.2      224.0.0.9       mcast  both      1
so-0/2/0.0(DC)       Up  13.13.13.2      224.0.0.9       mcast  both      1
```

show rip statistics

Syntax

show rip statistics
<instance (all | *instance-name*)>
<logical-system (all | *logical-system-name*)>
<*name*>
<peer (all | *address*)>

Syntax (EX Series Switches and QFX Series)

show rip statistics
<instance (all | *instance-name*)>
<*name*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.1 for the QFX Series.

Description

Display RIP statistics about messages sent and received on an interface, as well as information received from advertisements from other routing devices.

Options

none—Display RIP statistics for all routing instances.

instance (all | ***instance-name*****)**—(Optional) Display RIP statistics for all instances or for only the specified routing instance.

logical-system (all | ***logical-system-name*****)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

name—(Optional) Display detailed information about only the specified RIP neighbor.

peer (all | ***address*****)**—(Optional) Display RIP statistics for a single peer or all peers.

Required Privilege Level

view

Related Documentation

- clear rip statistics on page 123

List of Sample Output

show rip statistics on page 143

Output Fields

Table 10 on page 143 lists the output fields for the **show rip statistics** command. Output fields are listed in the approximate order in which they appear.

Table 10: show rip statistics Output Fields

Field Name	Field Description
RIP info	Information about RIP on the specified interface: • **port**—UDP port number used for RIP. • **update interval**—Interval between routing table updates, in seconds. • **holddown**—Hold-down interval, in seconds. • **timeout**—Timeout interval, in seconds. • **restart in progress**—Graceful restart status. Displayed when RIP is or has been in the process of graceful restart. • **restart time**—Estimated time for the graceful restart to finish, in seconds. • **restart will complete in**—Remaining time for the graceful restart to finish, in seconds. • **rts learned**—Number of routes learned through RIP. • **rts held down**—Number of routes held down by RIP. • **rqsts dropped**—Number of received request packets that were dropped. • **resps dropped**—Number of received response packets that were dropped.
logical-interface	Name of the logical interface and its statistics: • **routes learned**—Number of routes learned on the logical interface. • **routes advertised**—Number of routes advertised by the logical interface.
Counter	List of counter types: • **Updates Sent**—Number of update messages sent. • **Triggered Updates Sent**—Number of triggered update messages sent. • **Responses Sent**—Number of response messages sent. • **Bad Messages**—Number of invalid messages received. • **RIPv1 Updates Received**—Number of RIPv1 update messages received. • **RIPv1 Bad Route Entries**—Number of RIPv1 invalid route entry messages received. • **RIPv1 Updates Ignored**—Number of RIPv1 update messages ignored. • **RIPv2 Updates Received**—Number of RIPv2 update messages received. • **RIPv2 Bad Route Entries**—Number of RIPv2 invalid route entry messages received. • **RIPv2 Updates Ignored**—Number of RIPv2 update messages that were ignored. • **Authentication Failures**—Number of received update messages that failed authentication. • **RIP Requests Received**—Number of RIP request messages received. • **RIP Requests Ignored**—Number of RIP request messages ignored.
Total	Total number of packets for the selected counter.
Last 5 min	Number of packets for the selected counter in the most recent 5-minute period.
Last minute	Number of packets for the selected counter in the most recent 1-minute period.

Sample Output

show rip statistics

```
user@host> show rip statistics so-0/0/0.0
RIP info: port 520; update interval: 30s; holddown 180s; timeout 120s
restart in progress: restart time 60s; restart will complete in 55s
```

```
    rts learned  rts held down  rqsts dropped  resps dropped
              0              0              0              0
so-0/0/0.0:  0 routes learned; 501 routes advertised
Counter                         Total   Last 5 min  Last minute
-------                   -----------  -----------  -----------
Updates Sent                        0            0            0
Triggered Updates Sent              0            0            0
Responses Sent                      0            0            0
Bad Messages                        0            0            0
RIPv1 Updates Received              0            0            0
RIPv1 Bad Route Entries             0            0            0
RIPv1 Updates Ignored               0            0            0
RIPv2 Updates Received              0            0            0
RIPv2 Bad Route Entries             0            0            0
RIPv2 Updates Ignored               0            0            0
Authentication Failures             0            0            0
RIP Requests Received               0            0            0
RIP Requests Ignored                0            0            0
```


show route

Syntax

show route
<all>
<*destination-prefix*>
<logical-system (all | *logical-system-name*)>
<private>

Syntax (EX Series Switches)

show route
<all>
<*destination-prefix*>
<private>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
private option introduced in Junos OS Release 9.5.
private option introduced in Junos OS Release 9.5 for EX Series switches.

Description

Display the active entries in the routing tables.

Options

none—Display brief information about all active entries in the routing tables.

all—(Optional) Display information about all routing tables, including private, or internal, routing tables.

destination-prefix—(Optional) Display active entries for the specified address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

private—(Optional) Display information only about all private, or internal, routing tables.

Required Privilege Level

view

List of Sample Output

show route on page 147
show route destination-prefix on page 148
show route extensive on page 148

Output Fields

Table 11 on page 145 describes the output fields for the **show route** command. Output fields are listed in the approximate order in which they appear.

Table 11: show route Output Fields

Field Name	Field Description
routing-table-name	Name of the routing table (for example, **inet.0**).
number **destinations**	Number of destinations for which there are routes in the routing table.

Table 11: show route Output Fields *(continued)*

Field Name	Field Description
number **routes**	Number of routes in the routing table and total number of routes in the following states: • **active** (routes that are active). • **holddown** (routes that are in the pending state before being declared inactive). A holddown route was once the active route and is no longer the active route. The route is in the holddown state because a protocol still has interest in the route, meaning that the interest bit is set. A protocol might have its interest bit set on the previously active route because the protocol is still advertising the route. The route will be deleted after all protocols withdraw their advertisement of the route and remove their interest bit. A persistent holddown state often means that the interested protocol is not releasing its interest bit properly. However, if you have configured advertisement of multiple routes (with the **add-path** or **advertise-inactive** statement), the holddown bit is most likely set because BGP is advertising the route as an active route. In this case, you can ignore the holddown state because nothing is wrong. • **hidden** (routes that are not used because of a routing policy).

destination-prefix	Route destination (for example:**10.0.0.1/24)**. Sometimes the route information is presented in another format, such as:
	• *MPLS-label* (for example, **80001**).
	• *interface-name* (for example, **ge-1/0/2**).
	• *neighbor-address*:*control-word-status*:*encapsulation type*:*vc-id* :*source* (Layer 2 circuit only; for example, **10.1.1.195:NoCtrlWord:1:1:Local/96**):
	  ◦ *neighbor-address*—Address of the neighbor.
	  ◦ *control-word-status*—Whether the use of the control word has been negotiated for this virtual circuit: **NoCtrlWord** or **CtrlWord**.
	  ◦ *encapsulation type*—Type of encapsulation, represented by a number: (1) Frame Relay DLCI, (2) ATM AAL5 VCC transport, (3) ATM transparent cell transport, (4) Ethernet, (5) VLAN Ethernet, (6) HDLC, (7) PPP, (8) ATM VCC cell transport, (10) ATM VPC cell transport.
	  ◦ *vc-id*—Virtual circuit identifier.
	  ◦ *source*—Source of the advertisement: **Local** or **Remote**.

[*protocol*, *preference* **]**	Protocol from which the route was learned and the preference value for the route. • **+**—A plus sign indicates the active route, which is the route installed from the routing table into the forwarding table. • **-** —A hyphen indicates the last active route. • *****—An asterisk indicates that the route is both the active and the last active route. An asterisk before a **to** line indicates the best subpath to the route. In every routing metric except for the BGP **LocalPref** attribute, a lesser value is preferred. In order to use common comparison routines, Junos OS stores the 1's complement of the **LocalPref** value in the **Preference2** field. For example, if the **LocalPref** value for Route 1 is 100, the **Preference2** value is -101. If the **LocalPref** value for Route 2 is 155, the **Preference2** value is -156. Route 2 is preferred because it has a higher **LocalPref** value and a lower **Preference2** value.
weeks:days hours:minutes:seconds	How long the route been known (for example, **2w4d 13:11:14**, or 2 weeks, 4 days, 13 hours, 11 minutes, and 14 seconds).
metric	Cost value of the indicated route. For routes within an AS, the cost is determined by IGP and the individual protocol metrics. For external routes, destinations, or routing domains, the cost is determined by a preference value.

Table 11: show route Output Fields *(continued)*

Field Name	Field Description
localpref	Local preference value included in the route.
from	Interface from which the route was received.
AS path	AS path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated. When AS path numbers are included in the route, the format is as follows: • **[ ]**—Brackets enclose the local AS number associated with the AS path if more than one AS number is configured on the routing device, or if AS path prepending is configured. • **{ }**—Braces enclose AS sets, which are groups of AS numbers in which the order does not matter. A set commonly results from route aggregation. The numbers in each AS set are displayed in ascending order. • **( )**—Parentheses enclose a confederation. • **([ ])**—Parentheses and brackets enclose a confederation set. NOTE: In Junos OS Release 10.3 and later, the AS path field displays an unrecognized attribute and associated hexadecimal value if BGP receives attribute 128 (attribute set) and you have not configured an independent domain in any routing instance.
to	Next hop to the destination. An angle bracket (>) indicates that the route is the selected route.
via	Interface used to reach the next hop. If there is more than one interface available to the next hop, the interface that is actually used is followed by the word **Selected**. This field can also contain the following information: • **Weight**—Value used to distinguish primary, secondary, and fast reroute backup routes. Weight information is available when MPLS label-switched path (LSP) link protection, node-link protection, or fast reroute is enabled, or when the standby state is enabled for secondary paths. A lower weight value is preferred. Among routes with the same weight value, load balancing is possible. • **Balance**—Balance coefficient indicating how traffic of unequal cost is distributed among next hops when a routing device is performing unequal-cost load balancing. This information is available when you enable BGP multipath load balancing. • ***lsp-path-name***—Name of the LSP used to reach the next hop. • ***label-action***—MPLS label and operation occurring at the next hop. The operation can be **pop** (where a label is removed from the top of the stack), **push** (where another label is added to the label stack), or **swap** (where a label is replaced by another label).

Sample Output

show route

```
user@host> show route
inet.0: 10 destinations, 10 routes (9 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
0.0.0.0/0          *[Static/5] 1w5d 20:30:29
                      Discard
10.255.245.51/32   *[Direct/0] 2w4d 13:11:14
                    > via lo0.0
```

```
172.16.0.0/12      *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.0.0/18     *[Static/5] 1w5d 20:30:29
                    > to 192.168.167.254 via fxp0.0
192.168.40.0/22    *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.64.0/18    *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.164.0/22   *[Direct/0] 2w4d 13:11:14
                    > via fxp0.0
192.168.164.51/32  *[Local/0] 2w4d 13:11:14
                      Local via fxp0.0
207.17.136.192/32  *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0

green.inet.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
100.101.0.0/16     *[Direct/0] 1w5d 20:30:28
                    > via fe-0/0/3.0
100.101.2.3/32     *[Local/0] 1w5d 20:30:28
                      Local via fe-0/0/3.0
224.0.0.5/32       *[OSPF/10] 1w5d 20:30:29, metric 1
                      MultiRecv

red.inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
10.10.10.10/32     *[Direct/0] 01:08:46
                    > via lo0.1
10.255.245.212/32  *[BGP/170] 00:01:40, localpref 100, from 10.255.245.204
                      AS path: 300 I
                    > to 100.1.2.2 via ge-1/1/0.0, label-switched-path to_fix
10.255.245.213/32  *[BGP/170] 00:40:47, localpref 100
                      AS path: 100 I
                    > to 100.1.1.1 via so-0/0/1.0
```

show route destination-prefix

```
user@host> show route 172.16.0.0/12

inet.0: 10 destinations, 10 routes (9 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.0.0/12      *[Static/5] 2w4d 12:54:27
                    > to 192.168.167.254 via fxp0.0
```

show route extensive

```
user@host> show route extensive
inet.0: 335844 destinations, 335845 routes (335395 active, 0 holddown, 450 hidden)
1.9.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 1.9.0.0/16 -> {indirect(342)}
Page 0 idx 1 Type 1 val db31a80
    Nexthop: Self
    AS path: [69] 10458 14203 2914 4788 4788 I
    Communities: 2914:410 2914:2403 2914:3400
Path 1.9.0.0 from 192.168.69.71 Vector len 4.  Val: 1
        *BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 1006553
                Source: 192.168.69.71
                Next hop type: Router, Next hop index: 324
                Next hop: 192.168.167.254 via fxp0.0, selected
                Protocol next hop: 192.168.69.71
                Indirect next hop: 8e166c0 342
```



```
                State: <Active Ext>
                Local AS:    69 Peer AS: 10458
                Age: 6d 10:58:10        Metric2: 0
                Task: BGP_10458.192.168.69.71+179
                Announcement bits (3): 0-KRT 2-BGP RT Background 3-Resolve tree
1
                AS path: 10458 14203 2914 4788 4788 I
                Communities: 2914:410 2914:2403 2914:3400
                Accepted
                Localpref: 100
                Router ID: 207.17.136.192
                Indirect next hops: 1
                        Protocol next hop: 192.168.69.71
                        Indirect next hop: 8e166c0 342
                        Indirect path forwarding next hops: 1
                                Next hop type: Router
                                Next hop: 192.168.167.254 via fxp0.0
                        192.168.0.0/16 Originating RIB: inet.0
                          Node path count: 1
                          Forwarding nexthops: 1
                                Nexthop: 192.168.167.254 via fxp0.0
```

show route active-path

Syntax

show route active-path
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route active-path
<brief | detail | extensive | terse>

Release Information

Command introduced in Junos OS Release 8.0.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display all active routes for destinations. An active route is a route that is selected as the best path. Inactive routes are not displayed.

Options

none—Display all active routes.

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route active-path on page 150
show route active-path brief on page 151
show route active-path detail on page 151
show route active-path extensive on page 152
show route active-path terse on page 153

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route active-path

```
user@host> show route active-path

inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

10.255.70.19/32    *[Direct/0] 21:33:52
                    > via lo0.0
10.255.71.50/32    *[IS-IS/15] 00:18:13, metric 10
                    > to 100.1.2.1 via so-2/1/3.0
100.1.2.0/24       *[Direct/0] 00:18:36
                    > via so-2/1/3.0
100.1.2.2/32       *[Local/0] 00:18:41
                      Local via so-2/1/3.0
192.168.64.0/21    *[Direct/0] 21:33:52
                    > via fxp0.0
```

```
192.168.70.19/32   *[Local/0] 21:33:52
                      Local via fxp0.0
```

show route active-path brief

The output for the **show route active-path brief** command is identical to that for the **show route active-path** command. For sample output, see show route active-path on page 150.

show route active-path detail

```
user@host> show route active-path detail

inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)

10.255.70.19/32 (1 entry, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via lo0.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:37:10
                Task: IF
                Announcement bits (3): 2-IS-IS 5-Resolve tree 2 6-Resolve tree 3

                AS path: I

10.255.71.50/32 (1 entry, 1 announced)
        *IS-IS  Preference: 15
                Level: 1
                Next hop type: Router, Next hop index: 397
                Next-hop reference count: 4
                Next hop: 100.1.2.1 via so-2/1/3.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:31      Metric: 10
                Task: IS-IS
                Announcement bits (4): 0-KRT 2-IS-IS 5-Resolve tree 2 6-Resolve
tree 3
                AS path: I

100.1.2.0/24 (1 entry, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via so-2/1/3.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:54
                Task: IF
                Announcement bits (3): 2-IS-IS 5-Resolve tree 2 6-Resolve tree 3

                AS path: I

100.1.2.2/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 11
                Interface: so-2/1/3.0
                State: ‹Active NoReadvrt Int›
                Local AS:   200
                Age: 21:59
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
```



```
                AS path: I

192.168.64.0/21 (1 entry, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via fxp0.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:37:10
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
                AS path: I

192.168.70.19/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 11
                Interface: fxp0.0
                State: ‹Active NoReadvrt Int›
                Local AS:   200
                Age: 21:37:10
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
                AS path: I
```

show route active-path extensive

```
user@host> show route active-path extensive

inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)
10.255.70.19/32 (1 entry, 1 announced)
TSI:
IS-IS level 1, LSP fragment 0
IS-IS level 2, LSP fragment 0
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via lo0.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:39:47
                Task: IF
                Announcement bits (3): 2-IS-IS 5-Resolve tree 2 6-Resolve tree 3

                AS path: I

10.255.71.50/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.255.71.50/32 -> {100.1.2.1}
IS-IS level 2, LSP fragment 0
        *IS-IS  Preference: 15
                Level: 1
                Next hop type: Router, Next hop index: 397
                Next-hop reference count: 4
                Next hop: 100.1.2.1 via so-2/1/3.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 24:08      Metric: 10
                Task: IS-IS
                Announcement bits (4): 0-KRT 2-IS-IS 5-Resolve tree 2 6-Resolve
tree 3
                AS path: I
```



```
100.1.2.0/24 (1 entry, 1 announced)
TSI:
IS-IS level 1, LSP fragment 0
IS-IS level 2, LSP fragment 0
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via so-2/1/3.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 24:31
                Task: IF
                Announcement bits (3): 2-IS-IS 5-Resolve tree 2 6-Resolve tree 3

                AS path: I

100.1.2.2/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 11
                Interface: so-2/1/3.0
                State: ‹Active NoReadvrt Int›
                Local AS:   200
                Age: 24:36
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
                AS path: I

192.168.64.0/21 (1 entry, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 3
                Next hop: via fxp0.0, selected
                State: ‹Active Int›
                Local AS:   200
                Age: 21:39:47
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
                AS path: I

192.168.70.19/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 11
                Interface: fxp0.0
                State: ‹Active NoReadvrt Int›
                Local AS:   200
                Age: 21:39:47
                Task: IF
                Announcement bits (2): 5-Resolve tree 2 6-Resolve tree 3
                AS path: I
```

show route active-path terse

```
user@host> show route active-path terse

inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.255.70.19/32    D   0                       >lo0.0
```

```
* 10.255.71.50/32    I  15        10            >100.1.2.1
* 100.1.2.0/24       D   0                      >so-2/1/3.0
* 100.1.2.2/32       L   0                       Local
* 192.168.64.0/21    D   0                      >fxp0.0
* 192.168.70.19/32   L   0                       Local
```

show route advertising-protocol

Syntax

show route advertising-protocol *protocol neighbor-address*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display the routing information as it has been prepared for advertisement to a particular neighbor of a particular dynamic routing protocol.

Options

protocol—Protocol transmitting the route:

- **bgp**—Border Gateway Protocol
- **dvmrp**—Distance Vector Multicast Routing Protocol
- **msdp**—Multicast Source Discovery Protocol
- **pim**—Protocol Independent Multicast
- **rip**—Routing Information Protocol
- **ripng**—Routing Information Protocol next generation

neighbor-address—Address of the neighboring router to which the route entry is being transmitted.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

logical-system (all | ***logical-system-name*****)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

Additional Information

Routes displayed are routes that the routing table has exported into the routing protocol and that have been filtered by the associated protocol's **export** routing policy statements. For more information, see the *Junos Routing Protocols Configuration Guide*.

Required Privilege Level

view

List of Sample Output

show route advertising-protocol bgp (Layer 3 VPN) on page 157
show route advertising-protocol bgp detail on page 157
show route advertising-protocol bgp detail (Layer 2 VPN) on page 158
show route advertising-protocol bgp detail (Layer 3 VPN) on page 158
show route advertising-protocol bgp extensive all (Next Hop Self with RIB-out IP Address) on page 158

Output Fields

Table 12 on page 156 lists the output fields for the **show route advertising-protocol** command. Output fields are listed in the approximate order in which they appear.

Table 12: show route advertising-protocol Output Fields

Field Name	Field Description	Level of Output
routing-table-name	Name of the routing table—for example, **inet.0**.	All levels
number **destinations**	Number of destinations for which there are routes in the routing table.	All levels
number **routes**	Number of routes in the routing table and total number of routes in the following states: • **active** (routes that are active) • **holddown** (routes that are in the pending state before being declared inactive) • **hidden** (the routes are not used because of a routing policy)	All levels
Prefix	Destination prefix.	**brief** none
destination-prefix **(entry , announced)**	Destination prefix. The **entry** value is the number of routes for this destination, and the **announced** value is the number of routes being announced for this destination.	**detail extensive**
BGP group and type	BGP group name and type (**Internal** or **External**).	**detail extensive**
Route Distinguisher	Unique 64-bit prefix augmenting each IP subnet.	**detail extensive**
Advertised Label	Incoming label advertised by the Label Distribution Protocol (LDP). When an IP packet enters a label-switched path (LSP), the ingress router examines the packet and assigns it a label based on its destination, placing the label in the packet's header. The label transforms the packet from one that is forwarded based on its IP routing information to one that is forwarded based on information associated with the label.	**detail extensive**
Label-Base, range	First label in a block of labels and label block size. A remote PE router uses this first label when sending traffic toward the advertising PE router.	**detail extensive**
VPN Label	Virtual private network (VPN) label. Packets are sent between CE and PE routers by advertising VPN labels. VPN labels transit over either a Resource Reservation Protocol (RSVP) or a Label Distribution Protocol (LDP) label-switched path (LSP) tunnel.	**detail extensive**
Nexthop	Next hop to the destination. An angle bracket (>) indicates that the route is the selected route. If the next-hop advertisement to the peer is **Self**, and the RIB-out next hop is a specific IP address, the RIB-out IP address is included in the extensive output. See show route advertising-protocol bgp extensive all (Next Hop Self with RIB-out IP Address) on page 158.	All levels
MED	Multiple exit discriminator value included in the route.	**brief**
Lclpref or **Localpref**	Local preference value included in the route.	All levels

Table 12: show route advertising-protocol Output Fields *(continued)*

Field Name	Field Description	Level of Output
AS path	AS path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated. When AS path numbers are included in the route, the format is as follows: • **[ ]**—Brackets enclose the local AS number associated with the AS path if configured on the router, or if AS path prepending is configured. • **{ }**—Braces enclose AS sets, which are groups of AS numbers in which the order does not matter. A set commonly results from route aggregation. The numbers in each AS set are displayed in ascending order. • **( )**—Parentheses enclose a confederation. • **([ ])**—Parentheses and brackets enclose a confederation set. NOTE: In Junos OS Release 10.3 and later, the AS path field displays an unrecognized attribute and associated hexadecimal value if BGP receives attribute 128 (attribute set) and you have not configured an independent domain in any routing instance.	All levels
Communities	Community path attribute for the route. see the output field table for the show route detail command for all possible values for this field.	**detail extensive**
AIGP	Accumulated interior gateway protocol (AIGP) BGP attribute.	**detail extensive**
Attrset AS	Number, local preference, and path of the autonomous system (AS) that originated the route. These values are stored in the **Attrset** attribute at the originating router.	**detail extensive**
Layer2-info: encaps	Layer 2 encapsulation (for example, VPLS).	**detail extensive**
control flags	Control flags: **none** or **Site Down**.	**detail extensive**
mtu	Maximum transmission unit (MTU) of the Layer 2 circuit.	**detail extensive**

Sample Output

show route advertising-protocol bgp (Layer 3 VPN)

```
user@host> show route advertising-protocol bgp 10.255.14.171
      VPN-A.inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
      Prefix             Nexthop                 MED    Lclpref AS path
      10.255.14.172/32   Self                     1        100 I
      VPN-B.inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
      Prefix             Nexthop                 MED    Lclpref AS path
      10.255.14.181/32   Self                     2        100 I
```

show route advertising-protocol bgp detail

```
user@host> show route advertising-protocol bgp 111.222.1.3 detail
bgp20.inet.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
111.222.1.11/32 (1 entry, 1 announced)
 BGP group pe-pe type Internal
```



```
      Route Distinguisher: 111.255.14.11:69
      Advertised Label: 100000
      next hop: Self
      Localpref: 100
      AS path: 2 I
      Communities: target:69:20
      AIGP 210
111.8.0.0/16 (1 entry, 1 announced)
 BGP group pe-pe type Internal
      Route Distinguisher: 111.255.14.11:69
      Advertised Label: 100000
      Next hop: Self
      Localpref: 100
      AS path: 2 I
      Communities: target:69:20
      AIGP 210
```

show route advertising-protocol bgp detail (Layer 2 VPN)

```
user@host> show route advertising-protocol bgp 192.168.24.1 detail
vpn-a.l2vpn.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
192.168.16.1:1:1:1/96 (1 entry, 1 announced)
 BGP group int type Internal
      Route Distinguisher: 192.168.16.1:1
      Label-base : 32768, range : 3
      Nexthop: Self
      Localpref: 100
      AS path: I
      Communities: target:65412:100
      AIGP 210
      Layer2-info: encaps:VLAN, control flags:, mtu:
```

show route advertising-protocol bgp detail (Layer 3 VPN)

```
user@host> show route advertising-protocol bgp 10.255.14.176 detail
vpna.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
* 10.49.0.0/30 (1 entry, 1 announced)
 BGP group ibgp type Internal
      Route Distinguisher: 10.255.14.174:2
      VPN Label: 101264
      Nexthop: Self
      Localpref: 100
      AS path: I
      Communities: target:200:100
      AIGP 210
      AttrSet AS: 100
          Localpref: 100
          AS path: I
...
```

show route advertising-protocol bgp extensive all (Next Hop Self with RIB-out IP Address)

```
user@host> show route advertising-protocol bgp 200.0.0.2 170.0.1.0/24 extensive all
inet.0: 13 destinations, 19 routes (13 active, 0 holddown, 6 hidden)
  170.0.1.0/24 (2 entries, 1 announced)
 BGP group eBGP-INTEROP type External
      Nexthop: Self (rib-out 10.100.3.2)
      AS path: [4713] 200 I
...
```


show route all

Syntax
show route all
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)
show route all

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description
Display information about all routes in all routing tables, including private, or internal, tables.

Options
none—Display information about all routes in all routing tables, including private, or internal, tables.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level
view

List of Sample Output
show route all on page 159

Output Fields
In Junos OS Release 9.5 and later, only the output fields for the **show route all** command display all routing tables, including private, or hidden, routing tables. The output field table of the show route command does not display entries for private, or hidden, routing tables in Junos OS Release 9.5 and later.

Sample Output

show route all
The following example displays a snippet of output from the **show route** command and then displays the same snippet of output from the **show route all** command:

```
user@host> show route
mpls.0: 7 destinations, 7 routes (5 active, 0 holddown, 2 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
0                  *[MPLS/0] 2d 02:24:39, metric 1
                      Receive
1                  *[MPLS/0] 2d 02:24:39, metric 1
                      Receive
2                  *[MPLS/0] 2d 02:24:39, metric 1
                      Receive
800017             *[VPLS/7] 1d 14:00:16
                    > via vt-3/2/0.32769, Pop
800018             *[VPLS/7] 1d 14:00:26
                    > via vt-3/2/0.32772, Pop

user@host> show route all
mpls.0: 7 destinations, 7 routes (5 active, 0 holddown, 2 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
0                  *[MPLS/0] 2d 02:19:12, metric 1
```

```
                       Receive
1                   *[MPLS/0] 2d 02:19:12, metric 1
                       Receive
2                   *[MPLS/0] 2d 02:19:12, metric 1
                       Receive
800017              *[VPLS/7] 1d 13:54:49
                     > via vt-3/2/0.32769, Pop
800018              *[VPLS/7] 1d 13:54:59
                     > via vt-3/2/0.32772, Pop
vt-3/2/0.32769       [VPLS/7] 1d 13:54:49
                       Unusable
vt-3/2/0.32772       [VPLS/7] 1d 13:54:59
                       Unusable
```


show route best

Syntax

show route best *destination-prefix*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route best *destination-prefix*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display the route in the routing table that is the best route to the specified address or range of addresses. The best route is the longest matching route.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

destination-prefix—Address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route best on page 161
show route best detail on page 162
show route best extensive on page 162
show route best terse on page 163

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route best

```
user@host> show route best 10.255.70.103
inet.0: 24 destinations, 25 routes (23 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
10.255.70.103/32    *[OSPF/10] 1d 13:19:20, metric 2
                     > to 10.31.1.6 via ge-3/1/0.0
                       via so-0/3/0.0

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
10.255.70.103/32    *[RSVP/7] 1d 13:20:13, metric 2
                     > via so-0/3/0.0, label-switched-path green-r1-r3

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
10.0.0.0/8          *[Direct/0] 2d 01:43:34
```

```
                    > via fxp2.0
                    [Direct/0] 2d 01:43:34
                    > via fxp1.0
```

show route best detail

```
user@host> show route best 10.255.70.103 detail
inet.0: 24 destinations, 25 routes (23 active, 0 holddown, 1 hidden)
Restart Complete
10.255.70.103/32 (1 entry, 1 announced)
        *OSPF   Preference: 10
                Next-hop reference count: 9
                Next hop: 10.31.1.6 via ge-3/1/0.0, selected
                Next hop: via so-0/3/0.0
                State: <Active Int>
                Local AS:    69
                Age: 1d 13:20:06        Metric: 2
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete
10.255.70.103/32 (1 entry, 1 announced)
        State: <FlashAll>
        *RSVP   Preference: 7
                Next-hop reference count: 5
                Next hop: via so-0/3/0.0 weight 0x1, selected
                Label-switched-path green-r1-r3
                Label operation: Push 100016
                State: <Active Int>
                Local AS:    69
                Age: 1d 13:20:59        Metric: 2
                Task: RSVP
                Announcement bits (1): 1-Resolve tree 2
                AS path: I

private1__inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)
10.0.0.0/8 (2 entries, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via fxp2.0, selected
                State: <Active Int>
                Age: 2d 1:44:20
                Task: IF
                AS path: I
         Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via fxp1.0, selected
                State: <NotBest Int>
                Inactive reason: No difference
                Age: 2d 1:44:20
                Task: IF
                AS path: I
```

show route best extensive

The output for the **show route best extensive** command is identical to that for the **show route best detail** command. For sample output, see show route best detail on page 162.

show route best terse

```
user@host> show route best 10.255.70.103 terse
inet.0: 24 destinations, 25 routes (23 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.255.70.103/32   O  10          2            >10.31.1.6
                                                  so-0/3/0.0

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.255.70.103/32   R   7          2            >so-0/3/0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.0.0.0/8         D   0                       >fxp2.0
                     D   0                       >fxp1.0
```


show route brief

Syntax

show route brief
<*destination-prefix*>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route brief
<*destination-prefix*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display brief information about the active entries in the routing tables.

Options

none—Display all active entries in the routing table.

destination-prefix—(Optional) Display active entries for the specified address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route brief on page 164

Output Fields

For information about output fields, see the Output Field table of the show route command.

Sample Output

show route brief

```
user@host> show route brief
inet.0: 10 destinations, 10 routes (9 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Static/5] 1w5d 20:30:29
                      Discard
10.255.245.51/32   *[Direct/0] 2w4d 13:11:14
                    > via lo0.0
172.16.0.0/12      *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.0.0/18     *[Static/5] 1w5d 20:30:29
                    > to 192.168.167.254 via fxp0.0
192.168.40.0/22    *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.64.0/18    *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
192.168.164.0/22   *[Direct/0] 2w4d 13:11:14
                    > via fxp0.0
192.168.164.51/32  *[Local/0] 2w4d 13:11:14
                      Local via fxp0.0
207.17.136.192/32  *[Static/5] 2w4d 13:11:14
                    > to 192.168.167.254 via fxp0.0
```

```
green.inet.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
100.101.0.0/16     *[Direct/0] 1w5d 20:30:28
                    > via fe-0/0/3.0
100.101.2.3/32     *[Local/0] 1w5d 20:30:28
                      Local via fe-0/0/3.0
224.0.0.5/32       *[OSPF/10] 1w5d 20:30:29, metric 1
                      MultiRecv
```

show route detail

Syntax

show route detail
<*destination-prefix*>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route detail
<*destination-prefix*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display detailed information about the active entries in the routing tables.

Options

none—Display all active entries in the routing table on all systems.

destination-prefix—(Optional) Display active entries for the specified address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route detail on page 175
show route detail (with BGP Multipath) on page 180

Output Fields

Table 13 on page 166 describes the output fields for the **show route detail** command. Output fields are listed in the approximate order in which they appear.

Table 13: show route detail Output Fields

Field Name	Field Description
routing-table-name	Name of the routing table (for example, **inet.0**).
number destinations	Number of destinations for which there are routes in the routing table.
number routes	Number of routes in the routing table and total number of routes in the following states: • **active** (routes that are active) • **holddown** (routes that are in the pending state before being declared inactive) • **hidden** (routes that are not used because of a routing policy)

Table 13: show route detail Output Fields *(continued)*

Field Name	Field Description
route-destination **(entry, announced)**	Route destination (for example:**10.0.0.1/24**). The **entry** value is the number of routes for this destination, and the **announced** value is the number of routes being announced for this destination. Sometimes the route destination is presented in another format, such as: • ***MPLS-label*** (for example, **80001**). • ***interface-name*** (for example, **ge-1/0/2**). • ***neighbor-address*:*control-word-status*:*encapsulation type*:*vc-id*:*source*** (Layer 2 circuit only; for example, **10.1.1.195:NoCtrlWord:1:1:Local/96**). • ***neighbor-address***—Address of the neighbor. • ***control-word-status***—Whether the use of the control word has been negotiated for this virtual circuit: **NoCtrlWord** or **CtrlWord**. • ***encapsulation type***—Type of encapsulation, represented by a number: (1) Frame Relay DLCI, (2) ATM AAL5 VCC transport, (3) ATM transparent cell transport, (4) Ethernet, (5) VLAN Ethernet, (6) HDLC, (7) PPP, (8) ATM VCC cell transport, (10) ATM VPC cell transport • ***vc-id***—Virtual circuit identifier. • ***source***—Source of the advertisement: **Local** or **Remote**.
label stacking	(Next-to-the-last-hop routing device for MPLS only) Depth of the MPLS label stack, where the label-popping operation is needed to remove one or more labels from the top of the stack. A pair of routes is displayed, because the pop operation is performed only when the stack depth is two or more labels. • **S=0 route** indicates that a packet with an incoming label stack depth of 2 or more exits this routing device with one fewer label (the label-popping operation is performed). • If there is no **S=** information, the route is a normal MPLS route, which has a stack depth of 1 (the label-popping operation is not performed).
[*protocol*, *preference*]	Protocol from which the route was learned and the preference value for the route. • **+**—A plus sign indicates the active route, which is the route installed from the routing table into the forwarding table. • **-** —A hyphen indicates the last active route. • *****—An asterisk indicates that the route is both the active and the last active route. An asterisk before a **to** line indicates the best subpath to the route. In every routing metric except for the BGP **LocalPref** attribute, a lesser value is preferred. In order to use common comparison routines, Junos OS stores the 1's complement of the **LocalPref** value in the **Preference2** field. For example, if the **LocalPref** value for Route 1 is 100, the **Preference2** value is -101. If the **LocalPref** value for Route 2 is 155, the **Preference2** value is -156. Route 2 is preferred because it has a higher **LocalPref** value and a lower **Preference2** value.
Level	(IS-IS only). In IS-IS, a single AS can be divided into smaller groups called areas. Routing between areas is organized hierarchically, allowing a domain to be administratively divided into smaller areas. This organization is accomplished by configuring Level 1 and Level 2 intermediate systems. Level 1 systems route within an area; when the destination is outside an area, they route toward a Level 2 system. Level 2 intermediate systems route between areas and toward other ASs.
Route Distinguisher	IP subnet augmented with a 64-bit prefix.
Next-hop type	Type of next hop. For a description of possible values for this field, see Table 14 on page 170.

Table 13: show route detail Output Fields *(continued)*

Field Name	Field Description
Next-hop reference count	Number of references made to the next hop.
Flood nexthop branches exceed maximum message	Indicates that the number of flood next-hop branches exceeded the system limit of 32 branches, and only a subset of the flood next-hop branches were installed in the kernel.
Source	IP address of the route source.
Next hop	Network layer address of the directly reachable neighboring system.
via	Interface used to reach the next hop. If there is more than one interface available to the next hop, the name of the interface that is actually used is followed by the word **Selected**. This field can also contain the following information: • Weight—Value used to distinguish primary, secondary, and fast reroute backup routes. Weight information is available when MPLS label-switched path (LSP) link protection, node-link protection, or fast reroute is enabled, or when the standby state is enabled for secondary paths. A lower weight value is preferred. Among routes with the same weight value, load balancing is possible. • Balance—Balance coefficient indicating how traffic of unequal cost is distributed among next hops when a routing device is performing unequal-cost load balancing. This information is available when you enable BGP multipath load balancing.
Label-switched-path ***lsp-path-name***	Name of the LSP used to reach the next hop.
Label operation	MPLS label and operation occurring at this routing device. The operation can be **pop** (where a label is removed from the top of the stack), **push** (where another label is added to the label stack), or **swap** (where a label is replaced by another label).
Interface	(Local only) Local interface name.
Protocol next hop	Network layer address of the remote routing device that advertised the prefix. This address is used to derive a forwarding next hop.
Indirect next hop	Index designation used to specify the mapping between protocol next hops, tags, kernel export policy, and the forwarding next hops.
State	State of the route (a route can be in more than one state). See Table 15 on page 172.
Local AS	AS number of the local routing device.
Age	How long the route has been known.
AIGP	Accumulated interior gateway protocol (AIGP) BGP attribute.
Metric*n*	Cost value of the indicated route. For routes within an AS, the cost is determined by IGP and the individual protocol metrics. For external routes, destinations, or routing domains, the cost is determined by a preference value.

Table 13: show route detail Output Fields *(continued)*

Field Name	Field Description
MED-plus-IGP	Metric value for BGP path selection to which the IGP cost to the next-hop destination has been added.
TTL-Action	For MPLS LSPs, state of the TTL propagation attribute. Can be enabled or disabled for all RSVP-signaled and LDP-signaled LSPs or for specific VRF routing instances. For sample output, see show route table.
Task	Name of the protocol that has added the route.
Announcement bits	List of protocols that announce this route. ***n*-Resolve inet** indicates that the route is used for route resolution for next hops found in the routing table. ***n*** is an index used by Juniper Networks customer support only.
AS path	AS path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated. When AS path numbers are included in the route, the format is as follows: • **[ ]**—Brackets enclose the number that precedes the AS path. This number represents the number of ASs present in the AS path, when calculated as defined in RFC 4271. This value is used in the AS-path merge process, as defined in RFC 4893. • **[ ]**—If more than one AS number is configured on the routing device, or if AS path prepending is configured, brackets enclose the local AS number associated with the AS path. • **{ }**—Braces enclose AS sets, which are groups of AS numbers in which the order does not matter. A set commonly results from route aggregation. The numbers in each AS set are displayed in ascending order. • **( )**—Parentheses enclose a confederation. • **([ ])**—Parentheses and brackets enclose a confederation set. NOTE: In Junos OS Release 10.3 and later, the AS path field displays an unrecognized attribute and associated hexadecimal value if BGP receives attribute 128 (attribute set) and you have not configured an independent domain in any routing instance.
VC Label	MPLS label assigned to the Layer 2 circuit virtual connection.
MTU	Maximum transmission unit (MTU) of the Layer 2 circuit.
VLAN ID	VLAN identifier of the Layer 2 circuit.
Prefixes bound to route	Forwarding Equivalent Class (FEC) bound to this route. Applicable only to routes installed by LDP.
Communities	Community path attribute for the route. See Table 16 on page 174 for all possible values for this field.
Layer2-info: encaps	Layer 2 encapsulation (for example, VPLS).
control flags	Control flags: **none** or **Site Down**.

Table 13: show route detail Output Fields *(continued)*

Field Name	Field Description
mtu	Maximum transmission unit (MTU) information.
Label-Base, range	First label in a block of labels and label block size. A remote PE routing device uses this first label when sending traffic toward the advertising PE routing device.
status vector	Layer 2 VPN and VPLS network layer reachability information (NLRI).
Accepted Multipath	Current active path when BGP multipath is configured.
Accepted MultipathContrib	Path currently contributing to BGP multipath.
Localpref	Local preference value included in the route.
Router ID	BGP router ID as advertised by the neighbor in the open message.
Primary Routing Table	In a routing table group, the name of the primary routing table in which the route resides.
Secondary Tables	In a routing table group, the name of one or more secondary tables in which the route resides.

Table 14 on page 170 describes all possible values for the **Next-hop Types** output field.

Table 14: Next-hop Types Output Field Values

Next-Hop Type	Description
Broadcast (bcast)	Broadcast next hop.
Deny	Deny next hop.
Discard	Discard next hop.
Flood	Flood next hop. Consists of components called branches, up to a maximum of 32 branches. Each flood next-hop branch sends a copy of the traffic to the forwarding interface. Used by P2MP RSVP, P2MP LDP, P2MP CCC, and multicast.
Hold	Next hop is waiting to be resolved into a unicast or multicast type.
Indexed (idxd)	Indexed next hop.
Indirect (indr)	Used with applications that have a protocol next hop address that is remote. You are likely to see this next-hop type for internal BGP (IBGP) routes when the BGP next hop is a BGP neighbor that is not directly connected.

Table 14: Next-hop Types Output Field Values *(continued)*

Next-Hop Type	Description
Interface	Used for a network address assigned to an interface. Unlike the **router** next hop, the **interface** next hop does not reference any specific node on the network.
Local (locl)	Local address on an interface. This next-hop type causes packets with this destination address to be received locally.
Multicast (mcst)	Wire multicast next hop (limited to the LAN).
Multicast discard (mdsc)	Multicast discard.
Multicast group (mgrp)	Multicast group member.
Receive (recv)	Receive.
Reject (rjct)	Discard. An ICMP unreachable message was sent.
Resolve (rslv)	Resolving next hop.
Routed multicast (mcrt)	Regular multicast next hop.
Router	A specific node or set of nodes to which the routing device forwards packets that match the route prefix. To qualify as next-hop type router, the route must meet the following criteria: • Must not be a direct or local subnet for the routing device. • Must have a next hop that is directly connected to the routing device.
Table	Routing table next hop.
Unicast (ucst)	Unicast.
Unilist (ulst)	List of unicast next hops. A packet sent to this next hop goes to any next hop in the list.

Table 15 on page 172 describes all possible values for the **State** output field. A route can be in more than one state (for example, **<Active NoReadvrt Int Ext>**).

Table 15: State Output Field Values

Value	Description
Accounting	Route needs accounting.
Active	Route is active.
Always Compare MED	Path with a lower multiple exit discriminator (MED) is available.
AS path	Shorter AS path is available.
Clone	Route is a clone.
Cisco Non-deterministic MED selection	Cisco nondeterministic MED is enabled and a path with a lower MED is available.
Cluster list length	Length of cluster list sent by the route reflector.
Delete	Route has been deleted.
Ex	Exterior route.
Ext	BGP route received from an external BGP neighbor.
FlashAll	Forces all protocols to be notified of a change to any route, active or inactive, for a prefix. When not set, protocols are informed of a prefix only when the active route changes.
Hidden	Route not used because of routing policy.
IfCheck	Route needs forwarding RPF check.
IGP metric	Path through next hop with lower IGP metric is available.
Inactive reason	Flags for this route, which was not selected as best for a particular destination.
Initial	Route being added.
Int	Interior route.
Int Ext	BGP route received from an internal BGP peer or a BGP confederation peer.
Interior > Exterior > Exterior via Interior	Direct, static, IGP, or EBGP path is available.

Table 15: State Output Field Values *(continued)*

Value	Description
Local Preference	Path with a higher local preference value is available.
Martian	Route is a martian (ignored because it is obviously invalid).
MartianOK	Route exempt from martian filtering.
Next hop address	Path with lower metric next hop is available.
No difference	Path from neighbor with lower IP address is available.
NoReadvrt	Route not to be advertised.
NotBest	Route not chosen because it does not have the lowest MED.
Not Best in its group	Incoming BGP AS is not the best of a group (only one AS can be the best).
NotInstall	Route not to be installed in the forwarding table.
Number of gateways	Path with a greater number of next hops is available.
Origin	Path with a lower origin code is available.
Pending	Route pending because of a hold-down configured on another route.
Release	Route scheduled for release.
RIB preference	Route from a higher-numbered routing table is available.
Route Distinguisher	64-bit prefix added to IP subnets to make them unique.
Route Metric or MED comparison	Route with a lower metric or MED is available.
Route Preference	Route with lower preference value is available
Router ID	Path through a neighbor with lower ID is available.
Secondary	Route not a primary route.
Unusable path	Path is not usable because of one of the following conditions: • The route is damped. • The route is rejected by an import policy. • The route is unresolved.
Update source	Last tiebreaker is the lowest IP address value.

Table 16 on page 174 describes the possible values for the **Communities** output field.

Table 16: Communities Output Field Values

Value	Description
area-number	4 bytes, encoding a 32-bit area number. For AS-external routes, the value is **0**. A nonzero value identifies the route as internal to the OSPF domain, and as within the identified area. Area numbers are relative to a particular OSPF domain.
bandwidth: *local AS number:link-bandwidth-number*	Link-bandwidth community value used for unequal-cost load balancing. When BGP has several candidate paths available for multipath purposes, it does not perform unequal-cost load balancing according to the link-bandwidth community unless all candidate paths have this attribute.
domain-id	Unique configurable number that identifies the OSPF domain.
domain-id-vendor	Unique configurable number that further identifies the OSPF domain.
link-bandwidth-number	Link-bandwidth number: from **0** through **4,294,967,295** (bytes per second).
local AS number	Local AS number: from **1** through **65,535**.
options	1 byte. Currently this is only used if the route type is **5** or **7**. Setting the least significant bit in the field indicates that the route carries a type 2 metric.
origin	(Used with VPNs) Identifies where the route came from.
ospf-route-type	1 byte, encoded as **1** or **2** for intra-area routes (depending on whether the route came from a type 1 or a type 2 LSA); **3** for summary routes; **5** for external routes (area number must be**0**); **7** for NSSA routes; or **129** for sham link endpoint addresses.
rte-type	Displays the area number, OSPF route type, and option of the route. This is configured using the BGP extended community attribute **0x0306**. The format is ***area-number:ospf-route-type:options***.
route-type-vendor	Displays the area number, OSPF route type, and option of the route. This is configured using the BGP extended community attribute **0x8000**. The format is ***area-number:ospf-route-type:options***.
target	Defines which VPN the route participates in; **target** has the format ***32-bit IP address:16-bit number***. For example, **10.19.0.0:100**.
unknown IANA	Incoming IANA codes with a value between **0x1** and **0x7fff**. This code of the BGP extended community attribute is accepted, but it is not recognized.
unknown OSPF vendor community	Incoming IANA codes with a value above **0x8000**. This code of the BGP extended community attribute is accepted, but it is not recognized.

Sample Output

show route detail

```
user@host> show route detail

inet.0: 22 destinations, 23 routes (21 active, 0 holddown, 1 hidden)
10.10.0.0/16 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 29
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 1:31:43
                Task: RT
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

10.31.1.0/30 (2 entries, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 2
                Next hop: via so-0/3/0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:30:17
                Task: IF
                Announcement bits (1): 3-Resolve tree 2
                AS path: I
         OSPF   Preference: 10
                Next-hop reference count: 1
                Next hop: via so-0/3/0.0, selected
                State: <Int>
                Inactive reason: Route Preference
                Local AS:    69
                Age: 1:30:17    Metric: 1
                Area: 0.0.0.0
                Task: OSPF
                AS path: I

10.31.1.1/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 7
                Interface: so-0/3/0.0
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:30:20
                Task: IF
                Announcement bits (1): 3-Resolve tree 2
                AS path: I

...
```

```
10.31.2.0/30 (1 entry, 1 announced)
        *OSPF   Preference: 10
                Next-hop reference count: 9
                Next hop: via so-0/3/0.0
                Next hop: 10.31.1.6 via ge-3/1/0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:29:56    Metric: 2
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

...

224.0.0.2/32 (1 entry, 1 announced)
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:31:45
                Task: PIM Recv
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

...

224.0.0.22/32 (1 entry, 1 announced)
        *IGMP   Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:31:43
                Task: IGMP
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

10.255.70.103/32 (1 entry, 1 announced)
        State: <FlashAll>
        *RSVP   Preference: 7
                Next-hop reference count: 6
                Next hop: 10.31.1.6 via ge-3/1/0.0 weight 0x1, selected
                Label-switched-path green-r1-r3
                Label operation: Push 100096
                State: <Active Int>
                Local AS:    69
                Age: 1:25:49    Metric: 2
                Task: RSVP
                Announcement bits (2): 1-Resolve tree 1 2-Resolve tree 2
                AS path: I

10.255.71.238/32 (1 entry, 1 announced)
        State: <FlashAll>
        *RSVP   Preference: 7
                Next-hop reference count: 6
                Next hop: via so-0/3/0.0 weight 0x1, selected
                Label-switched-path green-r1-r2
                State: <Active Int>
                Local AS:    69
```



```
                Age: 1:25:49    Metric: 1
                Task: RSVP
                Announcement bits (2): 1-Resolve tree 1 2-Resolve tree 2
                AS path: I

private__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

47.0005.80ff.f800.0000.0108.0001.0102.5507.1052/152 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:31:44
                Task: IF
                AS path: I

mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
0   (1 entry, 1 announced)
        *MPLS   Preference: 0
                Next hop type: Receive
                Next-hop reference count: 6
                State: <Active Int>
                Local AS:    69
                Age: 1:31:45    Metric: 1
                Task: MPLS
                Announcement bits (1): 0-KRT
                AS path: I

...

mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
299776 (1 entry, 1 announced)
TSI:
KRT in-kernel 299776 /52 -> {Flood}
        *RSVP   Preference: 7
                Next hop type: Flood
                Next-hop reference count: 130
                Flood nexthop branches exceed maximum
                Address: 0x8ea65d0
...

800010 (1 entry, 1 announced)
        *VPLS   Preference: 7
                Next-hop reference count: 2
                Next hop: via vt-3/2/0.32769, selected
                Label operation: Pop
                State: <Active Int>
                Age: 1:29:30
                Task: Common L2 VC
                Announcement bits (1): 0-KRT
                AS path: I

vt-3/2/0.32769 (1 entry, 1 announced)
        *VPLS   Preference: 7
                Next-hop reference count: 2
                Next hop: 10.31.1.6 via ge-3/1/0.0 weight 0x1, selected
                Label-switched-path green-r1-r3
```



```
                Label operation: Push 800012, Push 100096(top)
                Protocol next hop: 10.255.70.103
                Push 800012
                Indirect next hop: 87272e4 1048574
                State: <Active Int>
                Age: 1:29:30    Metric2: 2
                Task: Common L2 VC
                Announcement bits (2): 0-KRT 1-Common L2 VC
                AS path: I
                Communities: target:11111:1 Layer2-info: encaps:VPLS,
                control flags:, mtu: 0

inet6.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)

abcd::10:255:71:52/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:31:44
                Task: IF
                AS path: I

fe80::280:42ff:fe10:f179/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:31:44
                Task: IF
                AS path: I

ff02::2/128 (1 entry, 1 announced)
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:31:45
                Task: PIM Recv6
                Announcement bits (1): 0-KRT
                AS path: I

ff02::d/128 (1 entry, 1 announced)
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:31:45
                Task: PIM Recv6
                Announcement bits (1): 0-KRT
                AS path: I

ff02::16/128 (1 entry, 1 announced)
        *MLD    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
```



```
                Age: 1:31:43
                Task: MLD
                Announcement bits (1): 0-KRT
                AS path: I

private.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

fe80::280:42ff:fe10:f179/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.16385, selected
                State: <Active NoReadvrt Int>
                Age: 1:31:44
                Task: IF
                AS path: I

green.l2vpn.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)

10.255.70.103:1:3:1/96 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Route Distinguisher: 10.255.70.103:1
                Next-hop reference count: 7
                Source: 10.255.70.103
                Protocol next hop: 10.255.70.103
                Indirect next hop: 2 no-forward
                State: <Secondary Active Int Ext>
                Local AS:    69 Peer AS:    69
                Age: 1:25:49    Metric2: 1
                AIGP 210
                Task: BGP_69.10.255.70.103+179
                Announcement bits (1): 0-green-l2vpn
                AS path: I
                Communities: target:11111:1 Layer2-info: encaps:VPLS,
                control flags:, mtu: 0
                Label-base: 800008, range: 8
                Localpref: 100
                Router ID: 10.255.70.103
                Primary Routing Table bgp.l2vpn.0

10.255.71.52:1:1:1/96 (1 entry, 1 announced)
        *L2VPN  Preference: 170/-1
                Next-hop reference count: 5
                Protocol next hop: 10.255.71.52
                Indirect next hop: 0 -
                State: <Active Int Ext>
                Age: 1:31:40    Metric2: 1
                Task: green-l2vpn
                Announcement bits (1): 1-BGP.0.0.0.0+179
                AS path: I
                Communities: Layer2-info: encaps:VPLS, control flags:Site-Down,
                mtu: 0
                Label-base: 800016, range: 8, status-vector: 0x9F

10.255.71.52:1:5:1/96 (1 entry, 1 announced)
        *L2VPN  Preference: 170/-101
                Next-hop reference count: 5
                Protocol next hop: 10.255.71.52
                Indirect next hop: 0 -
                State: <Active Int Ext>
                Age: 1:31:40    Metric2: 1
```

```
                Task: green-l2vpn
                Announcement bits (1): 1-BGP.0.0.0.0+179
                AS path: I
                Communities: Layer2-info: encaps:VPLS, control flags:, mtu: 0
                Label-base: 800008, range: 8, status-vector: 0x9F

...

l2circuit.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
10.245.255.63:CtrlWord:4:3:Local/96 (1 entry, 1 announced)
        *L2CKT  Preference: 7
                Next hop: via so-1/1/2.0 weight 1, selected
                Label-switched-path my-lsp
                Label operation: Push 100000[0]
                Protocol next hop: 10.245.255.63 Indirect next hop: 86af000 296
                State: <Active Int>
                Local AS:    99
                Age: 10:21
                Task: l2 circuit
                Announcement bits (1): 0-LDP
                AS path: I
                VC Label 100000, MTU 1500, VLAN ID 512
```

show route detail (with BGP Multipath)

```
user@host> show route detail

10.1.1.8/30 (2 entries, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 262142
                Address: 0x901a010
                Next-hop reference count: 2
                Source: 10.1.1.2
                Next hop: 10.1.1.2 via lt-0/3/0.1, selected
                Next hop: 10.1.1.6 via lt-0/3/0.5
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 5:04:43
                Task: BGP_2.10.1.1.2+59955
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Accepted Multipath
                Localpref: 100
                Router ID: 1.1.1.2
         BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 678
                Address: 0x8f97520
                Next-hop reference count: 9
                Source: 10.1.1.6
                Next hop: 10.1.1.6 via lt-0/3/0.5, selected
                State: <NotBest Ext>
                Inactive reason: Not Best in its group - Active preferred
                Local AS:     1 Peer AS:     2
                Age: 5:04:43
                Task: BGP_2.10.1.1.6+58198
                AS path: 2 I
                Accepted MultipathContrib
                Localpref: 100
                Router ID: 1.1.1.3
```


show route exact

Syntax

show route exact *destination-prefix*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route exact *destination-prefix*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display only the routes that exactly match the specified address or range of addresses.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

destination-prefix—Address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route exact on page 181
show route exact detail on page 181
show route exact extensive on page 182
show route exact terse on page 182

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route exact

```
user@host> show route exact 207.17.136.0/24

inet.0: 24 destinations, 25 routes (23 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
207.17.136.0/24    *[Static/5] 2d 03:30:22
                    > to 192.168.71.254 via fxp0.0
```

show route exact detail

```
user@host> show route exact 207.17.136.0/24 detail

inet.0: 24 destinations, 25 routes (23 active, 0 holddown, 1 hidden)
Restart Complete
207.17.136.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 29
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
```



```
                Age: 2d 3:30:26
                Task: RT
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I
```

show route exact extensive

```
user@host> show route exact 207.17.136.0/24 extensive
inet.0: 22 destinations, 23 routes (21 active, 0 holddown, 1 hidden)
207.17.136.0/24 (1 entry, 1 announced)
TSI:
KRT in-kernel 207.17.136.0/24 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 29
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 1:25:18
                Task: RT
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I
```

show route exact terse

```
user@host> show route exact 207.17.136.0/24 terse

inet.0: 22 destinations, 23 routes (21 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 207.17.136.0/24    S   5                       >192.168.71.254
```


show route export

Syntax
show route export
<brief | detail>
<instance <*instance-name*> | *routing-table-name*>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)
show route export
<brief | detail>
<instance <*instance-name*> | *routing-table-name*>

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description
Display policy-based route export information. Policy-based export simplifies the process of exchanging route information between routing instances.

Options

none—(Same as **brief**.) Display standard information about policy-based export for all instances and routing tables on all systems.

brief | detail—(Optional) Display the specified level of output.

instance <*instance-name*>—(Optional) Display a particular routing instance for which policy-based export is currently enabled.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

routing-table-name—(Optional) Display information about policy-based export for all routing tables whose name begins with this string (for example, **inet.0** and **inet6.0** are both displayed when you run the **show route export inet** command).

Required Privilege Level
view

List of Sample Output
show route export on page 184
show route export detail on page 184
show route export instance detail on page 184

Output Fields
Table 17 on page 183 lists the output fields for the **show route export** command. Output fields are listed in the approximate order in which they appear.

Table 17: show route export Output Fields

Field Name	Field Description	Level of Output
Table or ***table-name***	Name of the routing tables that either import or export routes.	All levels
Routes	Number of routes exported from this table into other tables. If a particular route is exported to different tables, the counter will only increment by one.	**brief** none
Export	Whether the table is currently exporting routes to other tables: **Y** or **N** (Yes or No).	**brief** none

Table 17: show route export Output Fields *(continued)*

Field Name	Field Description	Level of Output
Import	Tables currently importing routes from the originator table. (Not displayed for tables that are not exporting any routes.)	detail
Flags	(**instance** keyword only) Flags for this feature on this instance: • **config auto-policy**—The policy was deduced from the configured IGP export policies. • **cleanup**—Configuration information for this instance is no longer valid. • **config**—The instance was explicitly configured.	detail
Options	(**instance** keyword only) Configured option displays the type of routing tables the feature handles: • **unicast**—Indicates ***instance*.inet.0**. • **multicast**—Indicates ***instance*.inet.2**. • **unicast multicast**—Indicates ***instance*.inet.0** and ***instance*.inet.2**.	detail
Import policy	(**instance** keyword only) Policy that **route export** uses to construct the import-export matrix. Not displayed if the instance type is **vrf**.	detail
Instance	(**instance** keyword only) Name of the routing instance.	detail
Type	(**instance** keyword only) Type of routing instance: **forwarding**, **non-forwarding**, or **vrf**.	detail

Sample Output

show route export

```
user@host> show route export
Table                               Export            Routes
inet.0                              N                      0
black.inet.0                        Y                      3
red.inet.0                          Y                      4
```

show route export detail

```
user@host>  show route export detail
inet.0                                              Routes:        0
black.inet.0                                        Routes:        3
  Import: [ inet.0 ]
red.inet.0                                          Routes:        4
  Import: [ inet.0 ]
```

show route export instance detail

```
user@host>  show route export instance detail
Instance: master                        Type: forwarding
  Flags: <config auto-policy> Options: <unicast multicast>
  Import policy: [ (ospf-master-from-red || isis-master-from-black) ]
Instance: black                         Type: non-forwarding
Instance: red                           Type: non-forwarding
```

show route extensive

Syntax

show route extensive
<*destination-prefix*>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route extensive
<*destination-prefix*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display extensive information about the active entries in the routing tables.

Options

none—Display all active entries in the routing table.

destination-prefix—(Optional) Display active entries for the specified address or range of addresses.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route extensive on page 190
show route extensive (Access Route) on page 197
show route extensive (Route Reflector) on page 198

Output Fields

Table 18 on page 185 describes the output fields for the **show route extensive** command. Output fields are listed in the approximate order in which they appear.

Table 18: show route extensive Output Fields

Field Name	Field Description
routing-table-name	Name of the routing table (for example, **inet.0**).
***number* destinations**	Number of destinations for which there are routes in the routing table.
***number* routes**	Number of routes in the routing table and total number of routes in the following states: • **active** (routes that are active). • **holddown** (routes that are in the pending state before being declared inactive). • **hidden** (routes that are not used because of a routing policy).

Table 18: show route extensive Output Fields *(continued)*

Field Name	Field Description
route-destination **(entry, announced)**	Route destination (for example:**10.0.0.1/24**). The **entry** value is the number of route for this destination, and the **announced** value is the number of routes being announced for this destination. Sometimes the route destination is presented in another format, such as: • ***MPLS-label*** (for example, **80001**). • ***interface-name*** (for example, **ge-1/0/2**). • ***neighbor-address*:*control-word-status*:*encapsulation type*:*vc-id*:*source*** (Layer 2 circuit only; for example, **10.1.1.195:NoCtrlWord:1:1:Local/96**). • ***neighbor-address***—Address of the neighbor. • ***control-word-status***—Whether the use of the control word has been negotiated for this virtual circuit: **NoCtrlWord** or **CtrlWord**. • ***encapsulation type***—Type of encapsulation, represented by a number: (1) Frame Relay DLCI, (2) ATM AAL5 VCC transport, (3) ATM transparent cell transport, (4) Ethernet, (5) VLAN Ethernet, (6) HDLC, (7) PPP, (8) ATM VCC cell transport, (10) ATM VPC cell transport. • ***vc-id***—Virtual circuit identifier. • ***source***—Source of the advertisement: **Local** or **Remote**.
TSI	Protocol header information.
label stacking	(Next-to-the-last-hop routing device for MPLS only) Depth of the Multiprotocol Label Switching (MPLS) label stack, where the label-popping operation is needed to remove one or more labels from the top of the stack. A pair of routes is displayed, because the pop operation is performed only when the stack depth is two or more labels. • **S=0 route** indicates that a packet with an incoming label stack depth of two or more exits this router with one fewer label (the label-popping operation is performed). • If there is no **S=** information, the route is a normal MPLS route, which has a stack depth of 1 (the label-popping operation is not performed).
[*protocol*, *preference*]	Protocol from which the route was learned and the preference value for the route. • **+**—A plus sign indicates the active route, which is the route installed from the routing table into the forwarding table. • **-** —A hyphen indicates the last active route. • *****—An asterisk indicates that the route is both the active and the last active route. An asterisk before a **to** line indicates the best subpath to the route. In every routing metric except for the BGP **LocalPref** attribute, a lesser value is preferred. In order to use common comparison routines, Junos OS stores the 1's complement of the **LocalPref** value in the **Preference2** field. For example, if the **LocalPref** value for Route 1 is 100, the **Preference2** value is -101. If the **LocalPref** value for Route 2 is 155, the **Preference2** value is -156. Route 2 is preferred because it has a higher **LocalPref** value and a lower **Preference2** value.
Level	(IS-IS only). In IS-IS, a single autonomous system (AS) can be divided into smaller groups called areas. Routing between areas is organized hierarchically, allowing a domain to be administratively divided into smaller areas. This organization is accomplished by configuring Level 1 and Level 2 intermediate systems. Level 1 systems route within an area; when the destination is outside an area, they route toward a Level 2 system. Level 2 intermediate systems route between areas and toward other ASs.

Table 18: show route extensive Output Fields *(continued)*

Field Name	Field Description
Route Distinguisher	IP subnet augmented with a 64-bit prefix.
Next-hop type	Type of next hop. For a description of possible values for this field, see the Output Field table in the show route detail command.
Next-hop reference count	Number of references made to the next hop.
Flood nexthop branches exceed maximum message	Indicates that the number of flood next-hop branches exceeded the system limit of 32 branches, and only a subset of the flood next-hop branches were installed in the kernel.
Source	IP address of the route source.
Next hop	Network layer address of the directly reachable neighboring system.
via	Interface used to reach the next hop. If there is more than one interface available to the next hop, the name of the interface that is actually used is followed by the word **Selected**. This field can also contain the following information: • Weight—Value used to distinguish primary, secondary, and fast reroute backup routes. Weight information is available when Multiprotocol Label Switching (MPLS) label-switched path (LSP) link protection, node-link protection, or fast reroute is enabled, or when the standby state is enabled for secondary paths. A lower weight value is preferred. Among routes with the same weight value, load balancing is possible. • Balance—Balance coefficient indicating how traffic of unequal cost is distributed among next hops when a routing device is performing unequal-cost load balancing. This information is available when you enable Border Gateway Protocol (BGP) multipath load balancing.
Label-switched-path ***lsp-path-name***	Name of the label-switched path (LSP) used to reach the next hop.
Label operation	MPLS label and operation occurring at this routing device. The operation can be **pop** (where a label is removed from the top of the stack), **push** (where another label is added to the label stack), or **swap** (where a label is replaced by another label).
Offset	Whether the metric has been increased or decreased by an offset value.
Interface	(Local only) Local interface name.
Protocol next hop	Network layer address of the remote routing device that advertised the prefix. This address is used to recursively derive a forwarding next hop.
label-operation	MPLS label and operation occurring at this routing device. The operation can be **pop** (where a label is removed from the top of the stack), **push** (where another label is added to the label stack), or **swap** (where a label is replaced by another label).
Indirect next hops	When present, a list of nodes that are used to resolve the path to the next-hop destination, in the order that they are resolved.

Table 18: show route extensive Output Fields *(continued)*

Field Name	Field Description
State	State of the route (a route can be in more than one state). See the Output Field table in the show route detail command.
Inactive reason	If the route is inactive, the reason for its current state is indicated. Typical reasons include: • **Active preferred**—Currently active route was selected over this route. • **Always compare MED**—Path with a lower multiple exit discriminator (MED) is available. • **AS path**—Shorter AS path is available. • **Cisco Non-deterministic MED selection**—Cisco nondeterministic MED is enabled and a path with a lower MED is available. • **Cluster list length**—Path with a shorter cluster list length is available. • **Forwarding use only**—Path is only available for forwarding purposes. • **IGP metric**—Path through the next hop with a lower IGP metric is available. • **IGP metric type**—Path with a lower OSPF link-state advertisement type is available. • **Interior > Exterior > Exterior via Interior**—Direct, static, IGP, or EBGP path is available. • **Local preference**—Path with a higher local preference value is available. • **Next hop address**—Path with a lower metric next hop is available. • **No difference**—Path from a neighbor with a lower IP address is available. • **Not Best in its group**—Occurs when multiple peers of the same external AS advertise the same prefix and are grouped together in the selection process. When this reason is displayed, an additional reason is provided (typically one of the other reasons listed). • **Number of gateways**—Path with a higher number of next hops is available. • **Origin**—Path with a lower origin code is available. • **OSPF version**—Path does not support the indicated OSPF version. • **RIB preference**—Route from a higher-numbered routing table is available. • **Route destinguisher**—64-bit prefix added to IP subnets to make them unique. • **Route metric or MED comparison**—Route with a lower metric or MED is available. • **Route preference**—Route with a lower preference value is available. • **Router ID**—Path through a neighbor with a lower ID is available. • **Unusable path**—Path is not usable because of one of the following conditions: the route is damped, the route is rejected by an import policy, or the route is unresolved. • **Update source**—Last tiebreaker is the lowest IP address value.
Local AS	Autonomous system (AS) number of the local routing device.
Age	How long the route has been known.
AIGP	Accumulated interior gateway protocol (AIGP) BGP attribute.
Metric	Cost value of the indicated route. For routes within an AS, the cost is determined by IGP and the individual protocol metrics. For external routes, destinations, or routing domains, the cost is determined by a preference value.
MED-plus-IGP	Metric value for BGP path selection to which the IGP cost to the next-hop destination has been added.

Table 18: show route extensive Output Fields *(continued)*

Field Name	Field Description
TTL-Action	For MPLS LSPs, state of the TTL propagation attribute. Can be enabled or disabled for all RSVP-signalled and LDP-signalled LSPs or for specific VRF routing instances. For sample output, see show route table.
Task	Name of the protocol that has added the route.
Announcement bits	List of protocols that announce this route. ***n*-Resolve inet** indicates that the route is used for route resolution for next hops found in the routing table. ***n*** is an index used by Juniper Networks customer support only.
AS path	AS path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated. When AS path numbers are included in the route, the format is as follows: • **[ ]**—Brackets enclose the local AS number associated with the AS path if more than one AS number is configured on the routing device, or if AS path prepending is configured. • **{ }**—Braces enclose AS sets, which are groups of AS numbers in which the order does not matter. A set commonly results from route aggregation. The numbers in each AS set are displayed in ascending order. • **( )**—Parentheses enclose a confederation. • **([ ])**—Parentheses and brackets enclose a confederation set. NOTE: In Junos OS Release 10.3 and later, the AS path field displays an unrecognized attribute and associated hexadecimal value if BGP receives attribute 128 (attribute set) and you have not configured an independent domain in any routing instance.
AS path: I <Originator>	(For route reflected output only) Originator ID attribute set by the route reflector.
VC Label	MPLS label assigned to the Layer 2 circuit virtual connection.
MTU	Maximum transmission unit (MTU) of the Layer 2 circuit.
VLAN ID	VLAN identifier of the Layer 2 circuit.
Cluster list	(For route reflected output only) Cluster ID sent by the route reflector.
Originator ID	(For route reflected output only) Address of router that originally sent the route to the route reflector.
Prefixes bound to route	Forwarding Equivalent Class (FEC) bound to this route. Applicable only to routes installed by LDP.
Communities	Community path attribute for the route. See the Output Field table in the show route detail command for all possible values for this field.
Layer2-info: encaps	Layer 2 encapsulation (for example, VPLS).

Table 18: show route extensive Output Fields *(continued)*

Field Name	Field Description
control flags	Control flags: **none** or Site Down.
mtu	Maximum transmission unit (MTU) information.
Label-Base, range	First label in a block of labels and label block size. A remote PE routing device uses this first label when sending traffic toward the advertising PE routing device.
status vector	Layer 2 VPN and VPLS network layer reachability information (NLRI).
Localpref	Local preference value included in the route.
Router ID	BGP router ID as advertised by the neighbor in the open message.
Primary Routing Table	In a routing table group, the name of the primary routing table in which the route resides.
Secondary Tables	In a routing table group, the name of one or more secondary tables in which the route resides.
Originating RIB	Name of the routing table whose active route was used to determine the forwarding next-hop entry in the resolution database. For example, in the case of **inet.0** resolving through **inet.0** and **inet.3**, this field indicates which routing table, **inet.0** or **inet.3**, provided the best path for a particular prefix.
Node path count	Number of nodes in the path.
Forwarding nexthops	Number of forwarding next hops. The forwarding next hop is the network layer address of the directly reachable neighboring system (if applicable) and the interface used to reach it.

Sample Output

show route extensive

```
user@host> show route extensive
inet.0: 22 destinations, 23 routes (21 active, 0 holddown, 1 hidden)
10.10.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.10.0.0/16 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 29
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 1:34:06
                Task: RT
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

10.31.1.0/30 (2 entries, 1 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 2
                Next hop: via so-0/3/0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:32:40
```



```
Task: IF
Announcement bits (1): 3-Resolve tree 2
AS path: I
```

```
         OSPF   Preference: 10
                Next-hop reference count: 1
                Next hop: via so-0/3/0.0, selected
                State: <Int>
                Inactive reason: Route Preference
                Local AS:    69
                Age: 1:32:40    Metric: 1
                Area: 0.0.0.0
                Task: OSPF
                AS path: I

10.31.1.1/32 (1 entry, 1 announced)
        *Local  Preference: 0
                Next hop type: Local
                Next-hop reference count: 7
                Interface: so-0/3/0.0
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:32:43
                Task: IF
                Announcement bits (1): 3-Resolve tree 2
                AS path: I

...

10.31.2.0/30 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.31.2.0/30 -> {10.31.1.6}
        *OSPF   Preference: 10
                Next-hop reference count: 9
                Next hop: via so-0/3/0.0
                Next hop: 10.31.1.6 via ge-3/1/0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:32:19    Metric: 2
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

...

224.0.0.2/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 224.0.0.2/32 -> {}
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:08
                Task: PIM Recv
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

...

224.0.0.22/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 224.0.0.22/32 -> {}
        *IGMP   Preference: 0
                Next-hop reference count: 18
```



```
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:06
                Task: IGMP
                Announcement bits (2): 0-KRT 3-Resolve tree 2
                AS path: I

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

10.255.70.103/32 (1 entry, 1 announced)
        State: <FlashAll>
        *RSVP   Preference: 7
                Next-hop reference count: 6
                Next hop: 10.31.1.6 via ge-3/1/0.0 weight 0x1, selected
                Label-switched-path green-r1-r3
                Label operation: Push 100096
                State: <Active Int>
                Local AS:    69
                Age: 1:28:12    Metric: 2
                Task: RSVP
                Announcement bits (2): 1-Resolve tree 1 2-Resolve tree 2
                AS path: I

10.255.71.238/32 (1 entry, 1 announced)
        State: <FlashAll>
        *RSVP   Preference: 7
                Next-hop reference count: 6
                Next hop: via so-0/3/0.0 weight 0x1, selected
                Label-switched-path green-r1-r2
                State: <Active Int>
                Local AS:    69
                Age: 1:28:12    Metric: 1
                Task: RSVP
                Announcement bits (2): 1-Resolve tree 1 2-Resolve tree 2
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

...

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

47.0005.80ff.f800.0000.0108.0001.0102.5507.1052/152 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:34:07
                Task: IF
                AS path: I

mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)

0   (1 entry, 1 announced)
TSI:
KRT in-kernel 0      /36 -> {}
        *MPLS   Preference: 0
                Next hop type: Receive
                Next-hop reference count: 6
```



```
                State: <Active Int>
                Local AS:    69
                Age: 1:34:08    Metric: 1
                Task: MPLS
                Announcement bits (1): 0-KRT
                AS path: I

...

mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
299776 (1 entry, 1 announced)
TSI:
KRT in-kernel 299776 /52 -> {Flood}
        *RSVP   Preference: 7
                Next hop type: Flood
                Next-hop reference count: 130
                Flood nexthop branches exceed maximum
                Address: 0x8ea65d0
...

800010 (1 entry, 1 announced)

TSI:
KRT in-kernel 800010 /36 -> {vt-3/2/0.32769}
        *VPLS   Preference: 7
                Next-hop reference count: 2
                Next hop: via vt-3/2/0.32769, selected
                Label operation: Pop
                State: <Active Int>
                Age: 1:31:53
                Task: Common L2 VC
                Announcement bits (1): 0-KRT
                AS path: I

vt-3/2/0.32769 (1 entry, 1 announced)
TSI:
KRT in-kernel vt-3/2/0.32769.0      /16 -> {indirect(1048574)}
        *VPLS   Preference: 7
                Next-hop reference count: 2
                Next hop: 10.31.1.6 via ge-3/1/0.0 weight 0x1, selected
                Label-switched-path green-r1-r3
                Label operation: Push 800012, Push 100096(top)
                Protocol next hop: 10.255.70.103
                Push 800012
                Indirect next hop: 87272e4 1048574
                State: <Active Int>
                Age: 1:31:53    Metric2: 2
                Task: Common L2 VC
                Announcement bits (2): 0-KRT 1-Common L2 VC
                AS path: I
                Communities: target:11111:1 Layer2-info: encaps:VPLS,
                control flags:, mtu: 0
                Indirect next hops: 1
                        Protocol next hop: 10.255.70.103 Metric: 2
                        Push 800012
                        Indirect next hop: 87272e4 1048574
                        Indirect path forwarding next hops: 1
                                Next hop: 10.31.1.6 via ge-3/1/0.0 weight 0x1
                        10.255.70.103/32 Originating RIB: inet.3
                          Metric: 2                       Node path count: 1
                          Forwarding nexthops: 1
```



```
                                Nexthop: 10.31.1.6 via ge-3/1/0.0

inet6.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)

abcd::10:255:71:52/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active Int>
                Local AS:    69
                Age: 1:34:07
                Task: IF
                AS path: I

fe80::280:42ff:fe10:f179/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:07
                Task: IF
                AS path: I

ff02::2/128 (1 entry, 1 announced)
TSI:
KRT in-kernel ff02::2/128 -> {}
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:08
                Task: PIM Recv6
                Announcement bits (1): 0-KRT
                AS path: I

ff02::d/128 (1 entry, 1 announced)
TSI:
KRT in-kernel ff02::d/128 -> {}
        *PIM    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:08
                Task: PIM Recv6
                Announcement bits (1): 0-KRT
                AS path: I

ff02::16/128 (1 entry, 1 announced)
TSI:
KRT in-kernel ff02::16/128 -> {}
        *MLD    Preference: 0
                Next-hop reference count: 18
                State: <Active NoReadvrt Int>
                Local AS:    69
                Age: 1:34:06
                Task: MLD
                Announcement bits (1): 0-KRT
                AS path: I
```

```
private.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

fe80::280:42ff:fe10:f179/128 (1 entry, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.16385, selected
                State: <Active NoReadvrt Int>
                Age: 1:34:07
                Task: IF
                AS path: I

green.l2vpn.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)

10.255.70.103:1:3:1/96 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Route Distinguisher: 10.255.70.103:1
                Next-hop reference count: 7
                Source: 10.255.70.103
                Protocol next hop: 10.255.70.103
                Indirect next hop: 2 no-forward
                State: <Secondary Active Int Ext>
                Local AS:    69 Peer AS:    69
                Age: 1:28:12    Metric2: 1
                Task: BGP_69.10.255.70.103+179
                Announcement bits (1): 0-green-l2vpn
                AS path: I
                Communities: target:11111:1 Layer2-info: encaps:VPLS,
                control flags:, mtu: 0
                Label-base: 800008, range: 8
                Localpref: 100
                Router ID: 10.255.70.103
                Primary Routing Table bgp.l2vpn.0

10.255.71.52:1:1:1/96 (1 entry, 1 announced)
TSI:
Page 0 idx 0 Type 1 val 8699540
        *L2VPN  Preference: 170/-1
                Next-hop reference count: 5
                Protocol next hop: 10.255.71.52
                Indirect next hop: 0 -
                State: <Active Int Ext>
                Age: 1:34:03    Metric2: 1
                Task: green-l2vpn
                Announcement bits (1): 1-BGP.0.0.0.0+179
                AS path: I
                Communities: Layer2-info: encaps:VPLS, control flags:Site-Down,
                mtu: 0
                Label-base: 800016, range: 8, status-vector: 0x9F

10.255.71.52:1:5:1/96 (1 entry, 1 announced)
TSI:
Page 0 idx 0 Type 1 val 8699528
        *L2VPN  Preference: 170/-101
                Next-hop reference count: 5
                Protocol next hop: 10.255.71.52
                Indirect next hop: 0 -
                State: <Active Int Ext>
                Age: 1:34:03    Metric2: 1
                Task: green-l2vpn
```



```
                Announcement bits (1): 1-BGP.0.0.0.0+179
                AS path: I
                Communities: Layer2-info: encaps:VPLS, control flags:, mtu: 0
                Label-base: 800008, range: 8, status-vector: 0x9F

...

l2circuit.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

TSI:

10.245.255.63:CtrlWord:4:3:Local/96 (1 entry, 1 announced)
        *L2CKT  Preference: 7
                Next hop: via so-1/1/2.0 weight 1, selected
                Label-switched-path my-lsp
                Label operation: Push 100000[0]
                Protocol next hop: 10.245.255.63 Indirect next hop: 86af000 296
                State: <Active Int>
                Local AS:    99
                Age: 10:21
                Task: l2 circuit
                Announcement bits (1): 0-LDP
                AS path: I
                VC Label 100000, MTU 1500, VLAN ID 512


55.0.0.0/24 (1 entry, 1 announced)
TSI:
KRT queued (pending) add
  55.0.0.0/24 -> {Push 300112}
        *BGP    Preference: 170/-101
                Next hop type: Router
                Address: 0x925c208
                Next-hop reference count: 2
                Source: 10.0.0.9
                Next hop: 10.0.0.9 via lt-1/2/0.15, selected
                Label operation: Push 300112
                Label TTL action: prop-ttl
                State: <Active Ext>
                Local AS:  7019 Peer AS: 13979
                Age: 1w0d 23:06:56
                AIGP: 25
                Task: BGP_13979.10.0.0.9+56732
                Announcement bits (1): 0-KRT
                AS path: 13979 7018 I
                Accepted
                Route Label: 300112
                Localpref: 100
                Router ID: 10.9.9.1
```

show route extensive (Access Route)

```
user@host> show route 13.160.0.102 extensive
inet.0: 39256 destinations, 39258 routes (39255 active, 0 holddown, 1 hidden)
13.160.0.102/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 13.160.0.102/32 -> {13.160.0.2}
OSPF area : 0.0.0.0, LSA ID : 13.160.0.102, LSA type : Extern
        *Access Preference: 13
                Next-hop reference count: 78472
                Next hop: 13.160.0.2 via fe-0/0/0.0, selected
                State: <Active Int>
       Age: 12
```

```
                Task: RPD Unix Domain Server./var/run/rpd_serv.local
                Announcement bits (2): 0-KRT 1-OSPFv2
                AS path: I
```

show route extensive (Route Reflector)

```
user@host> show route extensive
1.0.0.0/8 (1 entry, 1 announced)

TSI:
KRT in-kernel 1.0.0.0/8 -> {indirect(40)}
        *BGP    Preference: 170/-101
                Source: 192.168.4.214
                Protocol next hop: 207.17.136.192 Indirect next hop: 84ac908 40
                State: <Active Int Ext>
                Local AS: 10458 Peer AS: 10458
                Age: 3:09       Metric: 0       Metric2: 0
                Task: BGP_10458.192.168.4.214+1033
                Announcement bits (2): 0-KRT 4-Resolve inet.0
                AS path: 3944 7777 I <Originator>
                Cluster list:  1.1.1.1
                Originator ID: 10.255.245.88
                Communities: 7777:7777
                Localpref: 100
                Router ID: 4.4.4.4
                Indirect next hops: 1
                        Protocol next hop: 207.17.136.192 Metric: 0
                        Indirect next hop: 84ac908 40
                        Indirect path forwarding next hops: 0
                                Next hop type: Discard
```


show route forwarding-table

Syntax

show route forwarding-table
<detail | extensive | summary>
<all>
<ccc *interface-name*>
<destination *destination-prefix*>
<family *family* | matching *matching*>
<label *name*>
<multicast>
<table (default | *logical-system-name/routing-instance-name* | *routing-instance-name*)>
<vlan (all | *vlan-name*)>
<vpn *vpn*>

Syntax (MX Series Routers)

show route forwarding-table
<detail | extensive | summary>
<all>
<bridge-domain (all | *domain-name*)>
<ccc *interface-name*>
<destination *destination-prefix*>
<family *family* | matching *matching*>
<label *name*>
<learning-vlan-id *learning-vlan-id*>
<multicast>
<table (default | *logical-system-name/routing-instance-name* | *routing-instance-name*)>
<vlan (all | *vlan-name*)>
<vpn *vpn*>

Syntax (Routing Matrix)

show route forwarding-table
<detail | extensive | summary>
<all>
<ccc *interface-name*>
<destination *destination-prefix*>
<family *family* | matching *matching*>
<label *name*>
<lcc *number*>
<multicast>
<table *routing-instance-name*>
<vpn *vpn*>

Release Information

Command introduced before Junos OS Release 7.4.
bridge-domain option introduced in Junos OS Release 7.5
learning-vlan-id option introduced in Junos OS Release 8.4
all and **vlan** options introduced in Junos OS Release 9.6.
Command introduced in Junos OS Release 11.3 for the QFX Series.

Description

Display the Routing Engine's forwarding table, including the network-layer prefixes and their next hops. This command is used to help verify that the routing protocol process has relayed the correction information to the forwarding table. The Routing Engine constructs and maintains one or more routing tables. From the routing tables, the Routing Engine derives a table of active routes, called the forwarding table.

NOTE: The Routing Engine copies the forwarding table to the Packet Forwarding Engine, the part of the router that is responsible for forwarding packets. To display the entries in the Packet Forwarding Engine's forwarding table, use the **show pfe route** command. For more information, see the *Junos System Basics and Services Command Reference*.

Options

none—Display the routes in the forwarding tables. By default, the **show route forwarding-table** command does not display information about private, or internal, forwarding tables.

detail | extensive | summary—(Optional) Display the specified level of output.

all—(Optional) Display routing table entries for all forwarding tables, including private, or internal, tables.

bridge-domain (all | ***bridge-domain-name*****)**—(MX Series routers only) (Optional) Display route entries for all bridge domains or the specified bridge domain.

ccc ***interface-name***—(Optional) Display route entries for the specified circuit cross-connect interface.

destination ***destination-prefix***—(Optional) Destination prefix.

family ***family***—(Optional) Display routing table entries for the specified family: **fibre-channel**, **fmembers**, **inet**, **inet6**, **iso**, **mpls**, **tnp**, **unix**, **vpls**, or **vlan-classification**.

interface-name ***interface-name***—(Optional) Display routing table entries for the specified interface.

label ***name***—(Optional) Display route entries for the specified label.

lcc ***number***—(Routing matrix only) (Optional) On a routing matrix composed of a TX Matrix Plus router and T640 routers configured in the routing matrix, display information for the specified T640 router (or line-card chassis) connected to the TX Matrix router. On a routing matrix composed of the TX Matrix Plus router and T1600 routers configured in the routing matrix, display information for the specified T1600 router (or line-card chassis) connected to the TX Matrix Plus router. Replace ***number*** with a value from 0 through 3.

learning-vlan-id ***learning-vlan-id***—(MX Series routers only) (Optional) Display learned information for all VLANs or for the specified VLAN.

matching ***matching***—(Optional) Display routing table entries matching the specified prefix or prefix length.

multicast—(Optional) Display routing table entries for multicast routes.

table (default | ***logical-system-name/routing-instance-name*** **|** ***routing-instance-name*****)**—(Optional) Display route entries for all the routing tables in the main routing instance or for the specified routing instance. If your device supports logical systems, you can also display route entries for the specified logical system and routing instance. To view the routing instances on your device, use the show route instance command.

vlan (all | *vlan-name*)—(Optional) Display information for all VLANs or for the specified VLAN.

vpn *vpn*—(Optional) Display routing table entries for a specified VPN.

Required Privilege Level view

List of Sample Output

show route forwarding-table on page 204
show route forwarding-table detail on page 205
show route forwarding-table destination extensive (Weights and Balances) on page 205
show route forwarding-table extensive on page 206
show route forwarding-table extensive (RPF) on page 207
show route forwarding-table family mpls on page 208
show route forwarding-table family vpls on page 208
show route forwarding-table family vpls extensive on page 208
show route forwarding-table table default on page 209
show route forwarding-table table logical-system-name/routing-instance-name on page 210
show route forwarding-table vpn on page 211

Output Fields Table 19 on page 201 lists the output fields for the **show route forwarding-table** command. Output fields are listed in the approximate order in which they appear. Field names may be abbreviated (as shown in parentheses) when no level of output is specified, or when the **detail** keyword is used instead of the **extensive** keyword.

Table 19: show route forwarding-table Output Fields

Field Name	Field Description	Level of Output
Logical system	Name of the logical system. This field is displayed if you specify the **table *logical-system-name/routing-instance-name*** option on a device that is configured for and supports logical systems.	All levels
Routing table	Name of the routing table (for example, **inet**, **inet6**, **mpls**).	All levels
Address family	Address family (for example, **IP**, **IPv6**, **ISO**, **MPLS**, and **VPLS**).	All levels
Destination	Destination of the route.	**detail extensive**

Table 19: show route forwarding-table Output Fields *(continued)*

Field Name	Field Description	Level of Output
Route Type (Type)	How the route was placed into the forwarding table. When the **detail** keyword is used, the route type might be abbreviated (as shown in parentheses): • **cloned** (**clon**)—(TCP or multicast only) Cloned route. • **destination** (**dest**)—Remote addresses directly reachable through an interface. • **destination down** (**iddn**)—Destination route for which the interface is unreachable. • **interface cloned** (**ifcl**)—Cloned route for which the interface is unreachable. • **route down** (**ifdn**)—Interface route for which the interface is unreachable. • **ignore** (**ignr**)—Ignore this route. • **interface** (**intf**)—Installed as a result of configuring an interface. • **permanent** (**perm**)—Routes installed by the kernel when the routing table is initialized. • **user**—Routes installed by the routing protocol process or as a result of the configuration.	All levels
Route Reference (RtRef)	Number of routes to reference.	**detail extensive**
Flags	Route type flags: • **none**—No flags are enabled. • **accounting**—Route has accounting enabled. • **cached**—Cache route. • **incoming-iface*interface-number***—Check against incoming interface. • **prefix load balance**—Load balancing is enabled for this prefix. • **rt nh decoupled**—Route has been decoupled from the next hop to the destination. • **sent to PFE**—Route has been sent to the Packet Forwarding Engine. • **static**—Static route.	**extensive**
Next hop	IP address of the next hop to the destination.	**detail extensive**

Table 19: show route forwarding-table Output Fields *(continued)*

Field Name	Field Description	Level of Output
Next hop Type (Type)	Next-hop type. When the **detail** keyword is used, the next-hop type might be abbreviated (as indicated in parentheses): • **broadcast (bcst)**—Broadcast. • **deny**—Deny. • **discard (dscd)** —Discard. • **hold**—Next hop is waiting to be resolved into a unicast or multicast type. • **indexed (idxd)**—Indexed next hop. • **indirect (indr)**—Indirect next hop. • **local (locl)**—Local address on an interface. • **routed multicast (mcrt)**—Regular multicast next hop • **multicast (mcst)**—Wire multicast next hop (limited to the LAN). • **multicast discard (mdsc)**—Multicast discard. • **multicast group (mgrp)** —Multicast group member. • **receive (recv)**—Receive. • **reject (rjct)** Discard. An ICMP unreachable message was sent. • **resolve (rslv)**—Resolving the next hop. • **unicast (ucst)**—Unicast. • **unilist (ulst)**—List of unicast next hops. A packet sent to this next hop goes to any next hop in the list.	**detail extensive**
Index	Software index of the next hop that is used to route the traffic for a given prefix.	**detail extensive** none
Route interface-index	Logical interface index from which the route is learned. For example, for interface routes, this is the logical interface index of the route itself. For static routes, this field is zero. For routes learned through routing protocols, this is the logical interface index from which the route is learned.	**extensive**
Reference (NhRef)	Number of routes that refer to this next hop.	none **detail extensive**
Next-hop interface (Netif)	Interface used to reach the next hop.	none **detail extensive**
Weight	Value used to distinguish primary, secondary, and fast reroute backup routes. Weight information is available when Multiprotocol Label Switching (MPLS) label-switched path (LSP) link protection, node-link protection, or fast reroute is enabled, or when the standby state is enabled for secondary paths. A lower weight value is preferred. Among routes with the same weight value, load balancing is possible (see the **Balance** field description).	**extensive**
Balance	Balance coefficient indicating how traffic of unequal cost is distributed among next hops when a router is performing unequal-cost load balancing. This information is available when you enable Border Gateway Protocol (BGP) multipath load balancing.	**extensive**
RPF interface	List of interfaces from which the prefix can be accepted. Reverse path forwarding (RPF) information is displayed only when **rpf-check** is configured on the interface.	**extensive**

Sample Output

show route forwarding-table

```
user@host> show route forwarding-table
Routing table: default.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    46     4
0.0.0.0/32         perm     0                    dscd    44     1
1.1.1.0/24         ifdn     0                    rslv   608     1 ge-2/0/1.0
1.1.1.0/32         iddn     0 1.1.1.0            recv   606     1 ge-2/0/1.0
1.1.1.1/32         user     0                    rjct    46     4
1.1.1.1/32         intf     0 1.1.1.1            locl   607     2
1.1.1.1/32         iddn     0 1.1.1.1            locl   607     2
1.1.1.255/32       iddn     0 ff:ff:ff:ff:ff:ff  bcst   605     1 ge-2/0/1.0
10.0.0.0/24        intf     0                    rslv   616     1 ge-2/0/0.0
10.0.0.0/32        dest     0 10.0.0.0           recv   614     1 ge-2/0/0.0
10.0.0.1/32        intf     0 10.0.0.1           locl   615     2
10.0.0.1/32        dest     0 10.0.0.1           locl   615     2
10.0.0.255/32      dest     0 10.0.0.255         bcst   613     1 ge-2/0/0.0
10.1.1.0/24        ifdn     0                    rslv   612     1 ge-2/0/1.0
10.1.1.0/32        iddn     0 10.1.1.0           recv   610     1 ge-2/0/1.0
10.1.1.1/32        user     0                    rjct    46     4
10.1.1.1/32        intf     0 10.1.1.1           locl   611     2
10.1.1.1/32        iddn     0 10.1.1.1           locl   611     2
10.1.1.255/32      iddn     0 ff:ff:ff:ff:ff:ff  bcst   609     1 ge-2/0/1.0
10.206.0.0/16      user     0 10.209.63.254      ucst   419    20 fxp0.0
10.209.0.0/16      user     1 0:12:1e:ca:98:0    ucst   419    20 fxp0.0
10.209.0.0/18      intf     0                    rslv   418     1 fxp0.0
10.209.0.0/32      dest     0 10.209.0.0         recv   416     1 fxp0.0
10.209.2.131/32    intf     0 10.209.2.131       locl   417     2
10.209.2.131/32    dest     0 10.209.2.131       locl   417     2
10.209.17.55/32    dest     0 0:30:48:5b:78:d2   ucst   435     1 fxp0.0
10.209.63.42/32    dest     0 0:23:7d:58:92:ca   ucst   434     1 fxp0.0
10.209.63.254/32   dest     0 0:12:1e:ca:98:0    ucst   419    20 fxp0.0
10.209.63.255/32   dest     0 10.209.63.255      bcst   415     1 fxp0.0
10.227.0.0/16      user     0 10.209.63.254      ucst   419    20 fxp0.0

...

Routing table: iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                   rjct    27     1
47.0005.80ff.f800.0000.0108.0003.0102.5524.5220.00
intf     0                    locl    28     1

Routing table: inet6
Internet6:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                   rjct     6     1
ff00::/8           perm     0                   mdsc     4     1
ff02::1/128        perm     0 ff02::1           mcst     3     1

Routing table: ccc
MPLS:
Interface.Label    Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct 16     1
100004(top)fe-0/0/1.0
```

show route forwarding-table detail

```
user@host> show route forwarding-table detail
Routing table: inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            user     2 0:90:69:8e:b1:1b   ucst   132     4 fxp0.0
default            perm     0                    rjct    14     1
10.1.1.0/24        intf     0 ff.3.0.21          ucst   322     1 so-5/3/0.0
10.1.1.0/32        dest     0 10.1.1.0           recv   324     1 so-5/3/0.0
10.1.1.1/32        intf     0 10.1.1.1           locl   321     1
10.1.1.255/32      dest     0 10.1.1.255         bcst   323     1 so-5/3/0.0
10.21.21.0/24      intf     0 ff.3.0.21          ucst   326     1 so-5/3/0.0
10.21.21.0/32      dest     0 10.21.21.0         recv   328     1 so-5/3/0.0
10.21.21.1/32      intf     0 10.21.21.1         locl   325     1
10.21.21.255/32    dest     0 10.21.21.255       bcst   327     1 so-5/3/0.0
127.0.0.1/32       intf     0 127.0.0.1          locl   320     1
172.17.28.19/32    clon     1 192.168.4.254      ucst   132     4 fxp0.0
172.17.28.44/32    clon     1 192.168.4.254      ucst   132     4 fxp0.0

...

Routing table: private1__.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    46     1
10.0.0.0/8         intf     0                    rslv   136     1 fxp1.0
10.0.0.0/32        dest     0 10.0.0.0           recv   134     1 fxp1.0
10.0.0.4/32        intf     0 10.0.0.4           locl   135     2
10.0.0.4/32        dest     0 10.0.0.4           locl   135     2

...

Routing table: iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    38     1

Routing table: inet6
Internet6:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    22     1
ff00::/8           perm     0                    mdsc    21     1
ff02::1/128        perm     0 ff02::1            mcst    17     1

...

Routing table: mpls
MPLS:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct 28     1
```

show route forwarding-table destination extensive (Weights and Balances)

```
user@host> show route forwarding-table destination 3.4.2.1 extensive
Routing table: inet [Index 0]
Internet:

Destination:  3.4.2.1/32
  Route type: user
  Route reference: 0                   Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: unilist               Index: 262143   Reference: 1
  Nexthop: 4.4.4.4
  Next-hop type: unicast               Index: 335      Reference: 2
```

```
  Next-hop interface: so-1/1/0.0      Weight: 22      Balance: 3
  Nexthop: 145.12.1.2
  Next-hop type: unicast              Index: 337      Reference: 2
  Next-hop interface: so-0/1/2.0      Weight: 33      Balance: 33
```

show route forwarding-table extensive

```
user@host> show route forwarding-table extensive
Routing table: inet [Index 0]
Internet:

Destination:  default
  Route type: user
  Route reference: 2                  Route interface-index: 0
  Flags: sent to PFE
  Nexthop: 0:90:69:8e:b1:1b
  Next-hop type: unicast              Index: 132      Reference: 4
  Next-hop interface: fxp0.0

Destination:  default
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: none
  Next-hop type: reject               Index: 14       Reference: 1

Destination:  127.0.0.1/32
  Route type: interface
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Nexthop: 127.0.0.1
  Next-hop type: local                Index: 320      Reference: 1

...

Routing table: private1__.inet [Index 1]
Internet:

Destination:  default
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: reject               Index: 46       Reference: 1

Destination:  10.0.0.0/8
  Route type: interface
  Route reference: 0                  Route interface-index: 3
  Flags: sent to PFE
  Next-hop type: resolve              Index: 136      Reference: 1
  Next-hop interface: fxp1.0

...

Routing table: iso [Index 0]
ISO:

Destination:  default
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: reject               Index: 38       Reference: 1

Routing table: inet6 [Index 0]
Internet6:
```



```
Destination:  default
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: reject               Index: 22      Reference: 1

Destination:  ff00::/8
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: multicast discard    Index: 21      Reference: 1

...

Routing table: private1__.inet6 [Index 1]
Internet6:

Destination:  default
  Route type: permanent
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Next-hop type: reject               Index: 54      Reference: 1

Destination:  fe80::2a0:a5ff:fe3d:375/128
  Route type: interface
  Route reference: 0                  Route interface-index: 0
  Flags: sent to PFE
  Nexthop: fe80::2a0:a5ff:fe3d:375
  Next-hop type: local                Index: 75      Reference: 1

...
```

show route forwarding-table extensive (RPF)

The next example is based on the following configuration, which enables an RPF check on all routes that are learned from this interface, including the interface route:

```
so-1/1/0 {
    unit 0 {
        family inet {
            rpf-check;
            address 15.95.1.2/30;
        }
    }
}
```

```
user@host> show route forwarding-table extensive
Routing table: inet [Index 0]
Internet:
...
...
Destination:  15.95.1.3/32
  Route type: destination
  Route reference: 0                  Route interface-index: 67
  Flags: sent to PFE
  Nexthop: 15.95.1.3
  Next-hop type: broadcast            Index: 328     Reference: 1
  Next-hop interface: so-1/1/0.0
  RPF interface: so-1/1/0.0
```

show route forwarding-table family mpls

```
user@host> show route forwarding-table family mpls
Routing table: mpls
MPLS:
Destination        Type RtRef Next hop          Type Index NhRef Netif
default            perm     0                   rjct    19     1
0                  user     0                   recv    18     3
1                  user     0                   recv    18     3
2                  user     0                   recv    18     3
100000             user     0 10.31.1.6         swap  100001     fe-1/1/0.0
800002             user     0                  Pop                vt-0/3/0.32770

vt-0/3/0.32770 (VPLS)
                   user     0                   indr   351     4
                                                Push 800000, Push 100002(top)
so-0/0/0.0
```

show route forwarding-table family vpls

```
user@host> show route forwarding-table family vpls
Routing table: green.vpls
VPLS:
Destination        Type RtRef Next hop          Type Index NhRef Netif
default            dynm     0                   flood   353     1
default            perm     0                   rjct    298     1
fe-0/1/0.0         dynm     0                   flood   355     1
00:90:69:0c:20:1f/48              <<<<<Remote CE

                   dynm     0                   indr   351     4
                                                Push 800000, Push 100002(top)
so-0/0/0.0
00:90:69:85:b0:1f/48              <<<<<<Local CE

                   dynm     0                   ucst   354     2 fe-0/1/0.0
```

show route forwarding-table family vpls extensive

```
user@host> show route forwarding-table family vpls extensive
Routing table: green.vpls [Index 2]
VPLS:

Destination:  default
  Route type: dynamic
  Route reference: 0                   Route interface-index: 72
  Flags: sent to PFE
  Next-hop type: flood                 Index: 289      Reference: 1
  Next-hop type: unicast               Index: 291      Reference: 3
  Next-hop interface: fe-0/1/3.0
  Next-hop type: unicast               Index: 290      Reference: 3
  Next-hop interface: fe-0/1/2.0

Destination:  default
  Route type: permanent
  Route reference: 0                   Route interface-index: 0
  Flags: none
  Next-hop type: discard               Index: 341      Reference: 1

Destination:  fe-0/1/2.0
  Route type: dynamic
  Route reference: 0                   Route interface-index: 69
  Flags: sent to PFE
  Next-hop type: flood                 Index: 293      Reference: 1
  Next-hop type: indirect              Index: 363      Reference: 4
  Next-hop type: Push 800016
  Next-hop interface: at-1/0/1.0
```

```
  Next-hop type: indirect             Index: 301     Reference: 5
  Next hop: 10.31.3.2
  Next-hop type: Push 800000
  Next-hop interface: fe-0/1/1.0
  Next-hop type: unicast              Index: 291     Reference: 3
  Next-hop interface: fe-0/1/3.0

Destination:  fe-0/1/3.0
  Route type: dynamic
  Route reference: 0                  Route interface-index: 70
  Flags: sent to PFE
  Next-hop type: flood                Index: 292     Reference: 1
  Next-hop type: indirect             Index: 363     Reference: 4
  Next-hop type: Push 800016
  Next-hop interface: at-1/0/1.0
  Next-hop type: indirect             Index: 301     Reference: 5
  Next hop: 10.31.3.2
  Next-hop type: Push 800000
  Next-hop interface: fe-0/1/1.0
  Next-hop type: unicast              Index: 290     Reference: 3
  Next-hop interface: fe-0/1/2.0

Destination:  10:00:00:01:01:01/48
  Route type: dynamic
  Route reference: 0                  Route interface-index: 70
  Flags: sent to PFE, prefix load balance
  Next-hop type: unicast              Index: 291     Reference: 3
  Next-hop interface: fe-0/1/3.0
  Route used as destination:
    Packet count:         6640    Byte count:      675786
  Route used as source
    Packet count:         6894    Byte count:      696424

Destination:  10:00:00:01:01:04/48
  Route type: dynamic
  Route reference: 0                  Route interface-index: 69
  Flags: sent to PFE, prefix load balance
  Next-hop type: unicast              Index: 290     Reference: 3
  Next-hop interface: fe-0/1/2.0
  Route used as destination:
    Packet count:           96    Byte count:        8079
  Route used as source:
    Packet count:          296    Byte count:       24955

Destination:  10:00:00:01:03:05/48
  Route type: dynamic
  Route reference: 0                  Route interface-index: 74
  Flags: sent to PFE, prefix load balance
  Next-hop type: indirect             Index: 301     Reference: 5
  Next hop: 10.31.3.2
  Next-hop type: Push 800000
  Next-hop interface: fe-0/1/1.0
```

show route forwarding-table table default

```
user@host> show route forwarding-table table default
Routing table: default.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    36     2
0.0.0.0/32         perm     0                    dscd    34     1
10.0.60.0/30       user     0 10.0.60.13         ucst   713     5 fe-0/1/3.0
10.0.60.12/30      intf     0                    rslv   688     1 fe-0/1/3.0
```

```
10.0.60.12/32      dest     0 10.0.60.12         recv   686      1 fe-0/1/3.0
10.0.60.13/32      dest     0 0:5:85:8b:bc:22    ucst   713      5 fe-0/1/3.0
10.0.60.14/32      intf     0 10.0.60.14         locl   687      2
10.0.60.14/32      dest     0 10.0.60.14         locl   687      2
10.0.60.15/32      dest     0 10.0.60.15         bcst   685      1 fe-0/1/3.0
10.0.67.12/30      user     0 10.0.60.13         ucst   713      5 fe-0/1/3.0
10.0.80.0/30       ifdn     0 ff.3.0.21          ucst   676      1 so-0/0/1.0
10.0.80.0/32       dest     0 10.0.80.0          recv   678      1 so-0/0/1.0
10.0.80.2/32       user     0                    rjct    36      2
10.0.80.2/32       intf     0 10.0.80.2          locl   675      1
10.0.80.3/32       dest     0 10.0.80.3          bcst   677      1 so-0/0/1.0
10.0.90.12/30      intf     0                    rslv   684      1 fe-0/1/0.0
10.0.90.12/32      dest     0 10.0.90.12         recv   682      1 fe-0/1/0.0
10.0.90.14/32      intf     0 10.0.90.14         locl   683      2
10.0.90.14/32      dest     0 10.0.90.14         locl   683      2
10.0.90.15/32      dest     0 10.0.90.15         bcst   681      1 fe-0/1/0.0
10.5.0.0/16        user     0 192.168.187.126    ucst   324     15 fxp0.0
10.10.0.0/16       user     0 192.168.187.126    ucst   324     15 fxp0.0
10.13.10.0/23      user     0 192.168.187.126    ucst   324     15 fxp0.0
10.84.0.0/16       user     0 192.168.187.126    ucst   324     15 fxp0.0
10.150.0.0/16      user     0 192.168.187.126    ucst   324     15 fxp0.0
10.157.64.0/19     user     0 192.168.187.126    ucst   324     15 fxp0.0
10.209.0.0/16      user     0 192.168.187.126    ucst   324     15 fxp0.0

...

Routing table: default.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    60     1

Routing table: default.inet6
Internet6:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    44     1
::/128             perm     0                    dscd    42     1
ff00::/8           perm     0                    mdsc    43     1
ff02::1/128        perm     0 ff02::1            mcst    39     1

Routing table: default.mpls
MPLS:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    dscd    50     1
```

show route forwarding-table table logical-system-name/ routing-instance-name

```
user@host> run show route forwarding-table table R4/vpn-red
Logical system: R4
Routing table: vpn-red.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   563     1
0.0.0.0/32         perm     0                    dscd   561     2
1.0.0.1/32         user     0                    dscd   561     2
2.0.2.0/24         intf     0                    rslv   771     1 lt-1/2/0.3
2.0.2.0/32         dest     0 2.0.2.0            recv   769     1 lt-1/2/0.3
2.0.2.1/32         intf     0 2.0.2.1            locl   770     2
2.0.2.1/32         dest     0 2.0.2.1            locl   770     2
2.0.2.2/32         dest     0 0.4.80.3.0.1b.c0.d5.e4.bd.0.1b.c0.d5.e4.bc.8.0
                                                 ucst   789     1 lt-1/2/0.3
2.0.2.255/32       dest     0 2.0.2.255          bcst   768     1 lt-1/2/0.3
224.0.0.0/4        perm     1                    mdsc   562     1
224.0.0.1/32       perm     0 224.0.0.1          mcst   558     1
```



```
255.255.255.255/32 perm     0                    bcst   559     1

Logical system: R4
Routing table: vpn-red.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   608     1

Logical system: R4
Routing table: vpn-red.inet6
Internet6:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   708     1
::/128             perm     0                    dscd   706     1
ff00::/8           perm     0                    mdsc   707     1
ff02::1/128        perm     0 ff02::1            mcst   704     1

Logical system: R4
Routing table: vpn-red.mpls
MPLS:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    dscd   638
```

show route forwarding-table vpn

```
user@host> show route forwarding-table vpn VPN-A
      Routing table:: VPN-A.inet
Internet:
      Destination        Type RtRef Nexthop            Type Index NhRef Netif
      default            perm     0                    rjct     4     4
      10.39.10.20/30     intf     0 ff.3.0.21          ucst    40     1
      so-0/0/0.0
      10.39.10.21/32     intf     0 10.39.10.21        locl    36     1
      10.255.14.172/32   user     0                    ucst    69     2
      so-0/0/0.0
      10.255.14.175/32   user     0                    indr    81     3
                                                       Push 100004, Push
      100004(top) so-1/0/0.0
      224.0.0.0/4        perm     2                    mdsc     5     3
      224.0.0.1/32       perm     0 224.0.0.1          mcst     1     8
      224.0.0.5/32       user     1 224.0.0.5          mcst     1     8
      255.255.255.255/32 perm     0                    bcst     2     3
```

show route hidden

Syntax

show route hidden
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display only hidden route information. A hidden route is unusable, even if it is the best path.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route hidden on page 212
show route hidden detail on page 213
show route hidden extensive on page 213
show route hidden terse on page 213

Output Fields

For information about output fields, see the output field table for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route hidden

```
user@host> show route hidden
inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
127.0.0.1/32        [Direct/0] 04:26:38
                    > via lo0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
10.5.5.5/32         [BGP/170] 03:44:10, localpref 100, from 10.4.4.4
                      AS path: 100 I
                      Unusable
10.12.1.0/24        [BGP/170] 03:44:10, localpref 100, from 10.4.4.4
                      AS path: 100 I
                      Unusable
10.12.80.4/30       [BGP/170] 03:44:10, localpref 100, from 10.4.4.4
                      AS path: I
                      Unusable
...
```

show route hidden detail

```
user@host> show route hidden detail

inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
127.0.0.1/32 (1 entry, 0 announced)
         Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via lo0.0, selected
                State: <Hidden Martian Int>
                Local AS:     1
                Age: 4:27:37
                Task: IF
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete

10.5.5.5/32 (1 entry, 0 announced)
         BGP    Preference: 170/-101
                Route Distinguisher: 10.4.4.4:4
                Next hop type: Unusable
                Next-hop reference count: 6
                State: <Secondary Hidden Int Ext>
                Local AS:     1 Peer AS:     1
                Age: 3:45:09
                Task: BGP_1.10.4.4.4+2493
                AS path: 100 I
                Communities: target:1:999
                VPN Label: 100064
                Localpref: 100
                Router ID: 10.4.4.4
                Primary Routing Table bgp.l3vpn.0

...
```

show route hidden extensive

The output for the **show route hidden extensive** command is identical to that of the **show route hidden detail** command. For sample output, see show route hidden detail on page 213.

show route hidden terse

```
user@host> show route hidden terse

inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  127.0.0.1/32       D   0                       >lo0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  10.5.5.5/32        B 170        100             Unusable        100 I
  10.12.1.0/24       B 170        100             Unusable        100 I
```

```
  10.12.80.4/30      B 170       100            Unusable       I

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

bgp.l3vpn.0: 3 destinations, 3 routes (0 active, 0 holddown, 3 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  10.4.4.4:4:10.5.5.5/32
                     B 170       100            Unusable       100 I
  10.4.4.4:4:10.12.1.0/24
                     B 170       100            Unusable       100 I
  10.4.4.4:4:10.12.80.4/30
                     B 170       100            Unusable       I

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```


show route inactive-path

Syntax

show route inactive-path
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route inactive-path
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display routes for destinations that have no active route. An inactive route is a route that was not selected as the best path.

Options

none—Display all inactive routes.

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route inactive-path on page 215
show route inactive-path detail on page 216
show route inactive-path extensive on page 217
show route inactive-path terse on page 217

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route inactive-path

```
user@host> show route inactive-path

inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

10.12.100.12/30     [OSPF/10] 03:57:28, metric 1
                    > via so-0/3/0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.0/8          [Direct/0] 04:39:56
                    > via fxp1.0

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete
```



```
+ = Active Route, - = Last Active, * = Both

10.12.80.0/30       [BGP/170] 04:38:17, localpref 100
                      AS path: 100 I
                    > to 10.12.80.1 via ge-6/3/2.0

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

bgp.l3vpn.0: 3 destinations, 3 routes (0 active, 0 holddown, 3 hidden)
Restart Complete

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route inactive-path detail

```
user@host> show route inactive-path detail

inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete

10.12.100.12/30 (2 entries, 1 announced)
         OSPF   Preference: 10
                Next-hop reference count: 1
                Next hop: via so-0/3/0.0, selected
                State: <Int>
                Inactive reason: Route Preference
                Local AS:     1
                Age: 3:58:24    Metric: 1
                Area: 0.0.0.0
                Task: OSPF
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

10.0.0.0/8 (2 entries, 0 announced)
         Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via fxp1.0, selected
                State: <NotBest Int>
                Inactive reason: No difference
                Age: 4:40:52
                Task: IF
                AS path: I

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete

10.12.80.0/30 (2 entries, 1 announced)
         BGP    Preference: 170/-101
                Next-hop reference count: 6
                Source: 10.12.80.1
                Next hop: 10.12.80.1 via ge-6/3/2.0, selected
                State: <Ext>
                Inactive reason: Route Preference
                Peer AS:   100
```

```
Age: 4:39:13
Task: BGP_100.10.12.80.1+179
AS path: 100 I
Localpref: 100
Router ID: 10.0.0.0
```

show route inactive-path extensive

The output for the **show route inactive-path extensive** command is identical to that of the **show route inactive-path detail** command. For sample output, see show route inactive-path detail on page 216.

show route inactive-path terse

user@host> **show route inactive-path terse**

```
inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  10.12.100.12/30    O  10          1            >so-0/3/0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  10.0.0.0/8         D   0                       >fxp1.0

red.inet.0: 6 destinations, 8 routes (4 active, 0 holddown, 3 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  10.12.80.0/30      B 170        100            >10.12.80.1      100 I

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

bgp.l3vpn.0: 3 destinations, 3 routes (0 active, 0 holddown, 3 hidden)
Restart Complete

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```


show route instance

Syntax

show route instance
<brief | detail | summary>
<*instance-name*>
<logical-system (all | *logical-system-name*)>
<operational>

Syntax (EX Series Switch and QFX Series)

show route instance
<brief | detail | summary>
<*instance-name*>
<operational>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 11.3 for the QFX Series.

Description

Display routing instance information.

Options

none—(Same as **brief**) Display standard information about all routing instances.

brief | detail | summary—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to **brief**. (These options are not available with the **operational** keyword.)

instance-name—(Optional) Display information for all routing instances whose name begins with this string (for example, **cust1**, **cust11**, and **cust111** are all displayed when you run the **show route instance cust1** command).

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

operational—(Optional) Display operational routing instances.

Required Privilege Level

view

List of Sample Output

show route instance on page 219
show route instance detail (Graceful Restart Complete) on page 220
show route instance detail (Graceful Restart Incomplete) on page 221
show route instance detail (VPLS Routing Instance) on page 223
show route instance operational on page 223
show route instance summary on page 224

Output Fields

Table 20 on page 218 lists the output fields for the **show route instance** command. Output fields are listed in the approximate order in which they appear.

Table 20: show route instance Output Fields

Field Name	Field Description	Level of Output
Instance or ***instance-name***	Name of the routing instance.	All levels

Table 20: show route instance Output Fields *(continued)*

Field Name	Field Description	Level of Output
Operational Routing Instances	(**operational** keyword only) Names of all operational routing instances.	—
Type	Type of routing instance: **forwarding**, **l2vpn**, **no-forwarding**, **vpls**, **virtual-router**, or **vrf**.	All levels
State	State of the routing instance: **active** or **inactive**.	**brief detail** none
Interfaces	Name of interfaces belonging to this routing instance.	**brief detail** none
Restart State	Status of graceful restart for this instance: **Pending** or **Complete**.	**detail**
Path selection timeout	Maximum amount of time, in seconds, remaining until graceful restart is declared complete. The default is **300**.	**detail**
Tables	Tables (and number of routes) associated with this routing instance.	**brief detail** none
Route-distinguisher	Unique route distinguisher associated with this routing instance.	**detail**
Vrf-import	VPN routing and forwarding instance import policy name.	**detail**
Vrf-export	VPN routing and forwarding instance export policy name.	**detail**
Vrf-import-target	VPN routing and forwarding instance import target community name.	**detail**
Vrf-export-target	VPN routing and forwarding instance export target community name.	**detail**
Fast-reroute-priority	Fast reroute priority setting for a VPLS routing instance: **high**, **medium**, or **low**. The default is **low**.	**detail**
Restart State	Restart state: • **Pending:***protocol-name*—List of protocols that have not yet completed graceful restart for this routing table. • **Complete**—All protocols have restarted for this routing table.	**detail**
Primary rib	Primary table for this routing instance.	**brief** none **summary**
Active/holddown/hidden	Number of active, hold-down, and hidden routes.	All levels

Sample Output

show route instance

```
user@host> show route instance
Instance             Type
         Primary RIB                                     Active/holddown/hidden
master               forwarding
         inet.0                                          16/0/1
         iso.0                                           1/0/0
         mpls.0                                          0/0/0
         inet6.0                                         2/0/0
```

```
        l2circuit.0                                 0/0/0
__juniper_private1__ forwarding
        __juniper_private1__.inet.0                 12/0/0
        __juniper_private1__.inet6.0                1/0/0
```

show route instance detail (Graceful Restart Complete)

```
user@host> show route instance detail
master:
  Router ID: 10.255.14.176
  Type: forwarding        State: Active
  Restart State: Complete Path selection timeout: 300
  Tables:
    inet.0                : 17 routes (15 active, 0 holddown, 1 hidden)
    Restart Complete
    inet.3                : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Complete
    iso.0                 : 1 routes (1 active, 0 holddown, 0 hidden)
    Restart Complete
    mpls.0                : 19 routes (19 active, 0 holddown, 0 hidden)
    Restart Complete
    bgp.l3vpn.0           : 10 routes (10 active, 0 holddown, 0 hidden)
    Restart Complete
    inet6.0               : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Complete
    bgp.l2vpn.0           : 1 routes (1 active, 0 holddown, 0 hidden)
    Restart Complete
BGP-INET:
  Router ID: 10.69.103.1
  Type: vrf               State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.103
  Route-distinguisher: 10.255.14.176:103
  Vrf-import: [ BGP-INET-import ]
  Vrf-export: [ BGP-INET-export ]
  Tables:
    BGP-INET.inet.0       : 4 routes (4 active, 0 holddown, 0 hidden)
    Restart Complete
BGP-L:
  Router ID: 10.69.104.1
  Type: vrf               State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.104
  Route-distinguisher: 10.255.14.176:104
  Vrf-import: [ BGP-L-import ]
  Vrf-export: [ BGP-L-export ]
  Tables:
    BGP-L.inet.0          : 4 routes (4 active, 0 holddown, 0 hidden)
    Restart Complete
    BGP-L.mpls.0          : 3 routes (3 active, 0 holddown, 0 hidden)
    Restart Complete
L2VPN:
  Router ID: 0.0.0.0
  Type: l2vpn             State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.512
  Route-distinguisher: 10.255.14.176:512
  Vrf-import: [ L2VPN-import ]
  Vrf-export: [ L2VPN-export ]
  Tables:
```



```
    L2VPN.l2vpn.0          : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Complete
LDP:
  Router ID: 10.69.105.1
  Type: vrf              State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.105
  Route-distinguisher: 10.255.14.176:105
  Vrf-import: [ LDP-import ]
  Vrf-export: [ LDP-export ]
  Tables:
    LDP.inet.0             : 5 routes (4 active, 0 holddown, 0 hidden)
    Restart Complete
OSPF:
  Router ID: 10.69.101.1
  Type: vrf              State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.101
  Route-distinguisher: 10.255.14.176:101
  Vrf-import: [ OSPF-import ]
  Vrf-export: [ OSPF-export ]
  Vrf-import-target: [ target:11111
  Tables:
    OSPF.inet.0            : 8 routes (7 active, 0 holddown, 0 hidden)
    Restart Complete
RIP:
  Router ID: 10.69.102.1
  Type: vrf              State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.102
  Route-distinguisher: 10.255.14.176:102
  Vrf-import: [ RIP-import ]
  Vrf-export: [ RIP-export ]
  Tables:
    RIP.inet.0             : 6 routes (6 active, 0 holddown, 0 hidden)
    Restart Complete
STATIC:
  Router ID: 10.69.100.1
  Type: vrf              State: Active
  Restart State: Complete Path selection timeout: 300
  Interfaces:
    t3-0/0/0.100
  Route-distinguisher: 10.255.14.176:100
  Vrf-import: [ STATIC-import ]
  Vrf-export: [ STATIC-export ]
  Tables:
    STATIC.inet.0          : 4 routes (4 active, 0 holddown, 0 hidden)
    Restart Complete
```

show route instance detail (Graceful Restart Incomplete)

```
user@host> show route instance detail
master:
  Router ID: 10.255.14.176
  Type: forwarding       State: Active
  Restart State: Pending  Path selection timeout: 300
  Tables:
    inet.0                 : 17 routes (15 active, 1 holddown, 1 hidden)
    Restart Pending: OSPF LDP
    inet.3                 : 2 routes (2 active, 0 holddown, 0 hidden)
```



```
    Restart Pending: OSPF LDP
    iso.0                 : 1 routes (1 active, 0 holddown, 0 hidden)
    Restart Complete
    mpls.0                : 23 routes (23 active, 0 holddown, 0 hidden)
    Restart Pending: LDP VPN
    bgp.l3vpn.0           : 10 routes (10 active, 0 holddown, 0 hidden)
    Restart Pending: BGP VPN
    inet6.0               : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Complete
    bgp.l2vpn.0           : 1 routes (1 active, 0 holddown, 0 hidden)
    Restart Pending: BGP VPN
BGP-INET:
  Router ID: 10.69.103.1
  Type: vrf              State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.103
  Route-distinguisher: 10.255.14.176:103
  Vrf-import: [ BGP-INET-import ]
  Vrf-export: [ BGP-INET-export ]
  Tables:
    BGP-INET.inet.0       : 6 routes (5 active, 0 holddown, 0 hidden)
    Restart Pending: VPN
BGP-L:
  Router ID: 10.69.104.1
  Type: vrf              State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.104
  Route-distinguisher: 10.255.14.176:104
  Vrf-import: [ BGP-L-import ]
  Vrf-export: [ BGP-L-export ]
  Tables:
    BGP-L.inet.0          : 6 routes (5 active, 0 holddown, 0 hidden)
    Restart Pending: VPN
    BGP-L.mpls.0          : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Pending: VPN
L2VPN:
  Router ID: 0.0.0.0
  Type: l2vpn            State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.512
  Route-distinguisher: 10.255.14.176:512
  Vrf-import: [ L2VPN-import ]
  Vrf-export: [ L2VPN-export ]
  Tables:
    L2VPN.l2vpn.0         : 2 routes (2 active, 0 holddown, 0 hidden)
    Restart Pending: VPN L2VPN
LDP:
  Router ID: 10.69.105.1
  Type: vrf              State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.105
  Route-distinguisher: 10.255.14.176:105
  Vrf-import: [ LDP-import ]
  Vrf-export: [ LDP-export ]
  Tables:
    LDP.inet.0            : 5 routes (4 active, 1 holddown, 0 hidden)
    Restart Pending: OSPF LDP VPN
```



```
OSPF:
  Router ID: 10.69.101.1
  Type: vrf               State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.101
  Route-distinguisher: 10.255.14.176:101
  Vrf-import: [ OSPF-import ]
  Vrf-export: [ OSPF-export ]
  Tables:
    OSPF.inet.0           : 8 routes (7 active, 1 holddown, 0 hidden)
    Restart Pending: OSPF VPN
RIP:
  Router ID: 10.69.102.1
  Type: vrf               State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.102
  Route-distinguisher: 10.255.14.176:102
  Vrf-import: [ RIP-import ]
  Vrf-export: [ RIP-export ]
  Tables:
    RIP.inet.0            : 8 routes (6 active, 2 holddown, 0 hidden)
    Restart Pending: RIP VPN
STATIC:
  Router ID: 10.69.100.1
  Type: vrf               State: Active
  Restart State: Pending  Path selection timeout: 300
  Interfaces:
    t3-0/0/0.100
  Route-distinguisher: 10.255.14.176:100
  Vrf-import: [ STATIC-import ]
  Vrf-export: [ STATIC-export ]
  Tables:
    STATIC.inet.0         : 4 routes (4 active, 0 holddown, 0 hidden)
    Restart Pending: VPN
```

show route instance detail (VPLS Routing Instance)

```
user@host> show route instance detail test-vpls
test-vpls:
  Router ID: 0.0.0.0
  Type: vpls              State: Active
  Interfaces:
    lsi.1048833
    lsi.1048832
    fe-0/1/0.513
  Route-distinguisher: 10.255.37.65:1
  Vrf-import: [ __vrf-import-test-vpls-internal__ ]
  Vrf-export: [ __vrf-export-test-vpls-internal__ ]
  Vrf-import-target: [ target:300:1 ]
  Vrf-export-target: [ target:300:1 ]
  Fast-reroute-priority: high
  Tables:
    test-vpls.l2vpn.0         : 3 routes (3 active, 0 holddown, 0 hidden)
```

show route instance operational

```
user@host> show route instance operational
Operational Routing Instances:

master
default
```


show route instance summary

```
user@host> show route instance summary
Instance             Type              Primary rib           Active/holddown/hidden
master               forwarding
                                       inet.0                15/0/1
                                       iso.0                 1/0/0
                                       mpls.0                35/0/0
                                       l3vpn.0               0/0/0
                                       inet6.0               2/0/0
                                       l2vpn.0               0/0/0
                                       l2circuit.0           0/0/0
BGP-INET             vrf
                                       BGP-INET.inet.0       5/0/0
                                       BGP-INET.iso.0        0/0/0
                                       BGP-INET.inet6.0      0/0/0
BGP-L                vrf
                                       BGP-L.inet.0          5/0/0
                                       BGP-L.iso.0           0/0/0
                                       BGP-L.mpls.0          4/0/0
                                       BGP-L.inet6.0         0/0/0
L2VPN                l2vpn
                                       L2VPN.inet.0          0/0/0
                                       L2VPN.iso.0           0/0/0
                                       L2VPN.inet6.0         0/0/0
                                       L2VPN.l2vpn.0         2/0/0
LDP                  vrf
                                       LDP.inet.0            4/0/0
                                       LDP.iso.0             0/0/0
                                       LDP.mpls.0            0/0/0
                                       LDP.inet6.0           0/0/0
                                       LDP.l2circuit.0       0/0/0
OSPF                 vrf
                                       OSPF.inet.0           7/0/0
                                       OSPF.iso.0            0/0/0
                                       OSPF.inet6.0          0/0/0
RIP                  vrf
                                       RIP.inet.0            6/0/0
                                       RIP.iso.0             0/0/0
                                       RIP.inet6.0           0/0/0
STATIC               vrf
                                       STATIC.inet.0         4/0/0
                                       STATIC.iso.0          0/0/0
                                       STATIC.inet6.0        0/0/0
```


show route next-hop

Syntax

show route next-hop *next-hop*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route next-hop *next-hop*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display the entries in the routing table that are being sent to the specified next-hop address.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of ouput.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

next-hop—Next-hop address.

Required Privilege Level

view

List of Sample Output

show route next-hop on page 225
show route next-hop detail on page 226
show route next-hop extensive on page 227
show route next-hop terse on page 229

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route next-hop

```
user@host> show route next-hop 192.168.71.254

inet.0: 18 destinations, 18 routes (17 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

10.10.0.0/16       *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
10.209.0.0/16      *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
172.16.0.0/12      *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
192.168.0.0/16     *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
192.168.102.0/23   *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
207.17.136.0/24    *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0
```

```
207.17.136.192/32  *[Static/5] 06:26:25
                    > to 192.168.71.254 via fxp0.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 4 destinations, 5 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route next-hop detail

user@host> **show route next-hop 192.168.71.254 detail**

```
inet.0: 18 destinations, 18 routes (17 active, 0 holddown, 1 hidden)
Restart Complete
10.10.0.0/16 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

10.209.0.0/16 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

172.16.0.0/12 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

192.168.0.0/16 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
```

```
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

192.168.102.0/23 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

207.17.136.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

207.17.136.192/32 (1 entry, 1 announced)
        *Static Preference: 5
                Next-hop reference count: 36
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:     1
                Age: 6:27:41
                Task: RT
                Announcement bits (3): 0-KRT 3-Resolve tree 1 5-Resolve tree 2
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 4 destinations, 5 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route next-hop extensive

```
user@host> show route next-hop 192.168.71.254 extensive

inet.0: 18 destinations, 18 routes (17 active, 0 holddown, 1 hidden)
10.10.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.10.0.0/16 -> {192.168.71.254}
```

```
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

10.209.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.209.0.0/16 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

172.16.0.0/12 (1 entry, 1 announced)
TSI:
KRT in-kernel 172.16.0.0/12 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

192.168.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 192.168.0.0/16 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

192.168.102.0/23 (1 entry, 1 announced)
TSI:
KRT in-kernel 192.168.102.0/23 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I
```

```
207.17.136.0/24 (1 entry, 1 announced)
TSI:
KRT in-kernel 207.17.136.0/24 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

207.17.136.192/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 207.17.136.192/32 -> {192.168.71.254}
        *Static Preference: 5
                Next-hop reference count: 22
                Next hop: 192.168.71.254 via fxp0.0, selected
                State: <Active NoReadvrt Int Ext>
                Local AS:    69
                Age: 2:02:28
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

green.l2vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

red.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route next-hop terse

```
user@host> show route next-hop 192.168.71.254 terse

inet.0: 25 destinations, 26 routes (24 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.10.0.0/16       S   5                       >192.168.71.254
* 10.209.0.0/16      S   5                       >192.168.71.254
* 172.16.0.0/12      S   5                       >192.168.71.254
* 192.168.0.0/16     S   5                       >192.168.71.254
* 192.168.102.0/23   S   5                       >192.168.71.254
* 207.17.136.0/24    S   5                       >192.168.71.254
* 207.17.136.192/32  S   5                       >192.168.71.254

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

red.inet.0: 4 destinations, 5 routes (4 active, 0 holddown, 0 hidden)
Restart Complete
```



```
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Restart Complete

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Restart Complete
private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```


show route output

Syntax

show route output (address *ip-address* | interface *interface-name*)
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route output (address *ip-address* | interface *interface-name*)
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display the entries in the routing table learned through static routes and interior gateway protocols that are to be sent out the interface with either the specified IP address or specified name.

To view routes advertised to a neighbor or received from a neighbor for the BGP protocol, use the **show route advertising-protocol bgp** and **show route receive-protocol bgp** commands instead.

Options

address *ip-address*—Display entries in the routing table that are to be sent out the interface with the specified IP address.

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

interface *interface-name*—Display entries in the routing table that are to be sent out the interface with the specified name.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

List of Sample Output

show route output address on page 232
show route output address detail on page 232
show route output address extensive on page 232
show route output address terse on page 233
show route output interface on page 233
show route output interface detail on page 233
show route output interface extensive on page 234
show route output interface terse on page 234

Output Fields

For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route output address

```
user@host> show route output address 36.1.1.1/24

inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

36.1.1.0/24        *[Direct/0] 00:19:56
                    > via so-0/1/2.0
                    [OSPF/10] 00:19:55, metric 1
                    > via so-0/1/2.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route output address detail

```
user@host> show route output address 36.1.1.1 detail

inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
36.1.1.0/24 (2 entries, 0 announced)
        *Direct Preference: 0
                Next hop type: Interface
                Next-hop reference count: 1
                Next hop: via so-0/1/2.0, selected
                State: <Active Int>
                Age: 23:00
                Task: IF
                AS path: I
         OSPF   Preference: 10
                Next-hop reference count: 1
                Next hop: via so-0/1/2.0, selected
                State: <Int>
                Inactive reason: Route Preference
                Age: 22:59      Metric: 1
                Area: 0.0.0.0
                Task: OSPF
                AS path: I

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route output address extensive

The output for the **show route output address extensive** command is identical to that of the **show route output address detail** command. For sample output, see show route output address detail on page 232.

show route output address terse

```
user@host> show route output address 36.1.1.1 terse

inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 36.1.1.0/24        D   0                       >so-0/1/2.0
                     O  10          1            >so-0/1/2.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route output interface

```
user@host> show route output interface so-0/1/2.0

inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

10.255.71.240/32   *[OSPF/10] 00:13:00, metric 2
                      via so-0/1/2.0
                    > via so-0/3/2.0
10.255.71.241/32   *[OSPF/10] 00:13:10, metric 1
                    > via so-0/1/2.0
14.1.1.0/24        *[OSPF/10] 00:05:11, metric 3
                      to 35.1.1.2 via ge-3/1/0.0
                    > via so-0/1/2.0
                      via so-0/3/2.0
16.1.1.0/24        *[OSPF/10] 00:13:10, metric 2
                    > via so-0/1/2.0
36.1.1.0/24        *[Direct/0] 00:13:21
                    > via so-0/1/2.0
                    [OSPF/10] 00:13:20, metric 1
                    > via so-0/1/2.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route output interface detail

```
user@host> show route output interface so-0/1/2.0 detail

inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
10.255.71.240/32 (1 entry, 1 announced)
        *OSPF   Preference: 10
                Next-hop reference count: 2
                Next hop: via so-0/1/2.0
                Next hop: via so-0/3/2.0, selected
                State: <Active Int>
                Age: 14:52      Metric: 2
```

```
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (1): 0-KRT
                AS path: I

10.255.71.241/32 (1 entry, 1 announced)
        *OSPF   Preference: 10
                Next-hop reference count: 4
                Next hop: via so-0/1/2.0, selected
                State: <Active Int>
                Age: 15:02      Metric: 1
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (1): 0-KRT
                AS path: I
...
```

show route output interface extensive

The output for the **show route output interface extensive** command is identical to that of the **show route output interface detail** command. For sample output, see show route output interface detail on page 233.

show route output interface terse

user@host> **show route output interface so-0/1/2.0 terse**

```
inet.0: 28 destinations, 30 routes (27 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* 10.255.71.240/32   O  10          2              so-0/1/2.0
                                                  >so-0/3/2.0
* 10.255.71.241/32   O  10          1             >so-0/1/2.0
* 14.1.1.0/24        O  10          3              35.1.1.2
                                                  >so-0/1/2.0
                                                   so-0/3/2.0
* 16.1.1.0/24        O  10          2             >so-0/1/2.0
* 36.1.1.0/24        D   0                        >so-0/1/2.0
                     O  10          1             >so-0/1/2.0

private1__.inet.0: 2 destinations, 3 routes (2 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

private1__.inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
```

show route protocol

Syntax

show route protocol *protocol*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route protocol *protocol*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Options **opsf2** and **ospf3** introduced in Junos OS Release 9.2.
Options **opsf2** and **ospf3** introduced in Junos OS Release 9.2 for EX Series switches.
Option **flow** introduced in Junos OS Release 10.0.
Option **flow** introduced in Junos OS Release 10.0 for EX Series switches.

Description

Display the route entries in the routing table that were learned from a particular protocol.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output. If you do not specify a level of output, the system defaults to brief.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

protocol—Protocol from which the route was learned:

- **access**—Access route for use by DHCP application
- **access-internal**—Access-internal route for use by DHCP application
- **aggregate**—Locally generated aggregate route
- **atmvpn**—Asynchronous Transfer Mode virtual private network
- **bgp**—Border Gateway Protocol
- **ccc**—Circuit cross-connect
- **direct**—Directly connected route
- **dvmrp**—Distance Vector Multicast Routing Protocol
- **esis**—End System-to-Intermediate System
- **flow**—Locally defined flow-specification route.
- **isis**—Intermediate System-to-Intermediate System
- **ldp**—Label Distribution Protocol
- **l2circuit**—Layer 2 circuit
- **l2vpn**—Layer 2 virtual private network
- **local**—Local address
- **mpls**—Multiprotocol Label Switching

- **msdp**—Multicast Source Discovery Protocol
- **ospf**—Open Shortest Path First versions 2 and 3
- **ospf2**—Open Shortest Path First version 2 only
- **ospf3**—Open Shortest Path First version 3 only
- **pim**—Protocol Independent Multicast
- **rip**—Routing Information Protocol
- **ripng**—Routing Information Protocol next generation
- **rsvp**—Resource Reservation Protocol
- **rtarget**—Local route target virtual private network
- **static**—Statically defined route
- **tunnel**—Dynamic tunnel
- **vpn**—Virtual private network

NOTE: EX Series switches run a subset of these protocols. See the switch CLI for details.

Required Privilege Level view

List of Sample Output

show route protocol access on page 237
show route protocol access-internal extensive on page 237
show route protocol bgp on page 237
show route protocol bgp detail on page 237
show route protocol bgp extensive on page 238
show route protocol bgp terse on page 238
show route protocol direct on page 238
show route protocol l2circuit detail on page 239
show route protocol l2vpn extensive on page 240
show route protocol ldp on page 240
show route protocol ldp extensive on page 241
show route protocol ospf (Layer 3 VPN) on page 242
show route protocol ospf detail on page 242
show route protocol rip on page 242
show route protocol rip detail on page 243
show route protocol ripng table inet6 on page 243

Output Fields For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route protocol access

user@host> **show route protocol access**

```
inet.0: 30380 destinations, 30382 routes (30379 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

13.160.0.3/32      *[Access/13] 00:00:09
                    > to 13.160.0.2 via fe-0/0/0.0
13.160.0.4/32      *[Access/13] 00:00:09
                    > to 13.160.0.2 via fe-0/0/0.0
13.160.0.5/32      *[Access/13] 00:00:09
                    > to 13.160.0.2 via fe-0/0/0.0
```

show route protocol access-internal extensive

user@host> **show route protocol access-internal 13.160.0.19 extensive**

```
inet.0: 100020 destinations, 100022 routes (100019 active, 0 holddown, 1 hidden)
13.160.0.19/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 13.160.0.19/32 -> {13.160.0.2}
        *Access-internal Preference: 12
                Next-hop reference count: 200000
                Next hop: 13.160.0.2 via fe-0/0/0.0, selected
                State: <Active Int>
       Age: 36
                Task: RPD Unix Domain Server./var/run/rpd_serv.local
                Announcement bits (1): 0-KRT
                AS path: I
```

show route protocol bgp

user@host> **show route protocol bgp 192.168.64.0/21**

```
inet.0: 335832 destinations, 335833 routes (335383 active, 0 holddown, 450 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.64.0/21       *[BGP/170] 6d 10:41:16, localpref 100, from 192.168.69.71
                      AS path: 10458 14203 2914 4788 4788 I
                    > to 192.168.167.254 via fxp0.0
```

show route protocol bgp detail

show route protocol bgp 66.117.63.0/24 exact detail

```
inet.0: 335805 destinations, 335806 routes (335356 active, 0 holddown, 450 hidden)
66.117.63.0/24  (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 1006436
                Source: 192.168.69.71
                Next hop type: Router, Next hop index: 324
                Next hop: 192.168.167.254 via fxp0.0, selected
                Protocol next hop: 192.168.69.71
                Indirect next hop: 8e166c0 342
                State: <Active Ext>
                Local AS:    69 Peer AS: 10458
                Age: 6d 10:42:42        Metric2: 0
                Task: BGP_10458.192.168.69.71+179
                Announcement bits (3): 0-KRT 2-BGP RT Background 3-Resolve tree
1
                AS path: 10458 14203 2914 4788 4788 I
                Communities: 2914:410 2914:2403 2914:3400
                Accepted
                Localpref: 100
                Router ID: 207.17.136.192
```

show route protocol bgp extensive

user@host> **show route protocol bgp 192.168.64.0/21 extensive**

```
inet.0: 335827 destinations, 335828 routes (335378 active, 0 holddown, 450 hidden)
192.168.64.0/21 (1 entry, 1 announced)
TSI:
KRT in-kernel 1.9.0.0/16 -> {indirect(342)}
Page 0 idx 1 Type 1 val db31a80
    Nexthop: Self
    AS path: [69] 10458 14203 2914 4788 4788 I
    Communities: 2914:410 2914:2403 2914:3400
Path 1.9.0.0 from 192.168.69.71 Vector len 4.  Val: 1
        *BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 1006502
                Source: 192.168.69.71
                Next hop type: Router, Next hop index: 324
                Next hop: 192.168.167.254 via fxp0.0, selected
                Protocol next hop: 192.168.69.71
                Indirect next hop: 8e166c0 342
                State: <Active Ext>
                Local AS:    69 Peer AS: 10458
                Age: 6d 10:44:45        Metric2: 0
                Task: BGP_10458.192.168.69.71+179
                Announcement bits (3): 0-KRT 2-BGP RT Background 3-Resolve tree
1
                AS path: 10458 14203 2914 4788 4788 I
                Communities: 2914:410 2914:2403 2914:3400
                Accepted
                Localpref: 100
                Router ID: 207.17.136.192
                Indirect next hops: 1
                        Protocol next hop: 192.168.69.71
                        Indirect next hop: 8e166c0 342
                        Indirect path forwarding next hops: 1
                                Next hop type: Router
                                Next hop: 192.168.167.254 via fxp0.0
                        192.168.0.0/16 Originating RIB: inet.0
                          Node path count: 1
                          Forwarding nexthops: 1
                                Nexthop: 192.168.167.254 via fxp0.0
```

show route protocol bgp terse

user@host> **show route protocol bgp 192.168.64.0/21 terse**

```
inet.0: 24 destinations, 32 routes (23 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
  192.168.64.0/21    B 170        100            >100.1.3.2      10023 21 I
```

show route protocol direct

user@host> **show route protocol direct**

```
inet.0: 335843 destinations, 335844 routes (335394 active, 0 holddown, 450 hidden)
+ = Active Route, - = Last Active, * = Both

8.8.8.0/24         *[Direct/0] 17w0d 10:31:49
                    > via fe-1/3/1.0
10.255.165.1/32    *[Direct/0] 25w4d 04:13:18
                    > via lo0.0
30.30.30.0/24      *[Direct/0] 17w0d 23:06:26
                    > via fe-1/3/2.0
```

```
192.168.164.0/22   *[Direct/0] 25w4d 04:13:20
                    > via fxp0.0

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

47.0005.80ff.f800.0000.0108.0001.0102.5516.5001/152
                   *[Direct/0] 25w4d 04:13:21
                    > via lo0.0

inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

abcd::10:255:165:1/128
                   *[Direct/0] 25w4d 04:13:21
                    > via lo0.0
fe80::2a0:a5ff:fe12:ad7/128
                   *[Direct/0] 25w4d 04:13:21
                    > via lo0.0
```

show route protocol l2circuit detail

user@host> **show route protocol l2circuit detail**

```
mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
100000 (1 entry, 1 announced)
        *L2CKT  Preference: 7
                Next hop: via ge-2/0/0.0, selected
                Label operation: Pop       Offset: 4
                State: <Active Int>
                Local AS:    99
                Age: 9:52
                Task: Common L2 VC
                Announcement bits (1): 0-KRT
                AS path: I

ge-2/0/0.0 (1 entry, 1 announced)
        *L2CKT  Preference: 7
                Next hop: via so-1/1/2.0 weight 1, selected
                Label-switched-path my-lsp
                Label operation: Push 100000, Push 100000(top)[0] Offset: -4
                Protocol next hop: 10.245.255.63
                Push 100000 Offset: -4
                 Indirect next hop: 86af0c0 298
                State: <Active Int>
                Local AS:    99
                Age: 9:52
                Task: Common L2 VC
                Announcement bits (2): 0-KRT 1-Common L2 VC
                AS path: I

l2circuit.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

10.245.255.63:CtrlWord:4:3:Local/96 (1 entry, 1 announced)
        *L2CKT  Preference: 7
                Next hop: via so-1/1/2.0 weight 1, selected
                Label-switched-path my-lsp
                Label operation: Push 100000[0]
                Protocol next hop: 10.245.255.63 Indirect next hop: 86af000 296
                State: <Active Int>
                Local AS:    99
                Age: 10:21
                Task: l2 circuit
```



```
                Announcement bits (1): 0-LDP
                AS path: I
                VC Label 100000, MTU 1500, VLAN ID 512
```

show route protocol l2vpn extensive

```
user@host> show route protocol l2vpn extensive

inet.0: 14 destinations, 15 routes (13 active, 0 holddown, 1 hidden)

inet.3: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

mpls.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
800001 (1 entry, 1 announced)
TSI:
KRT in-kernel 800001 /36 -> {so-0/0/0.0}
        *L2VPN  Preference: 7
                Next hop: via so-0/0/0.0 weight 49087 balance 97%, selected
                Label operation: Pop       Offset: 4
                State: <Active Int>
                Local AS:    69
                Age: 7:48
                Task: Common L2 VC
                Announcement bits (1): 0-KRT
                AS path: I

so-0/0/0.0 (1 entry, 1 announced)
TSI:
KRT in-kernel so-0/0/0.0.0      /16 -> {indirect(288)}
        *L2VPN  Preference: 7
                Next hop: via so-0/0/1.0, selected
                Label operation: Push 800000 Offset: -4
                Protocol next hop: 10.255.14.220
                Push 800000 Offset: -4
                 Indirect next hop: 85142a0 288
                State: <Active Int>
                Local AS:    69
                Age: 7:48
                Task: Common L2 VC
                Announcement bits (2): 0-KRT 1-Common L2 VC
                AS path: I
                Communities: target:69:1 Layer2-info: encaps:PPP,
                control flags:2, mtu: 0
```

show route protocol ldp

```
user@host> show route protocol ldp
inet.0: 12 destinations, 13 routes (12 active, 0 holddown, 0 hidden)

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.16.1/32    *[LDP/9] 1d 23:03:35, metric 1
                    > via t1-4/0/0.0, Push 100000
192.168.17.1/32    *[LDP/9] 1d 23:03:35, metric 1
                    > via t1-4/0/0.0

private1__.inet.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

mpls.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

100064             *[LDP/9] 1d 23:03:35, metric 1
```



```
                   > via t1-4/0/0.0, Pop
100064(S=0)       *[LDP/9] 1d 23:03:35, metric 1
                   > via t1-4/0/0.0, Pop
100080            *[LDP/9] 1d 23:03:35, metric 1
                   > via t1-4/0/0.0, Swap 100000
```

show route protocol ldp extensive

```
user@host> show route protocol ldp extensive
192.168.16.1/32 (1 entry, 1 announced)
        State: <FlashAll>
        *LDP    Preference: 9
                Next-hop reference count: 3
                Next hop: via t1-4/0/0.0, selected
                Label operation: Push 100000
                State: <Active Int>
                Local AS: 65500
                Age: 1d 23:03:58        Metric: 1
                Task: LDP
                Announcement bits (2): 0-Resolve tree 1 2-Resolve tree 2
                AS path: I

192.168.17.1/32 (1 entry, 1 announced)
        State: <FlashAll>
        *LDP    Preference: 9
                Next-hop reference count: 3
                Next hop: via t1-4/0/0.0, selected
                State: <Active Int>
                Local AS: 65500
                Age: 1d 23:03:58        Metric: 1
                Task: LDP
                Announcement bits (2): 0-Resolve tree 1 2-Resolve tree 2
                AS path: I

private1__.inet.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

mpls.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)

100064 (1 entry, 1 announced)
TSI:
KRT in-kernel 100064 /36 -> {t1-4/0/0.0}
        *LDP    Preference: 9
                Next-hop reference count: 2
                Next hop: via t1-4/0/0.0, selected
                State: <Active Int>
                Local AS: 65500
                Age: 1d 23:03:58        Metric: 1
                Task: LDP
                Announcement bits (1): 0-KRT
                AS path: I
                Prefixes bound to route: 192.168.17.1/32

100064(S=0) (1 entry, 1 announced)
TSI:
KRT in-kernel 100064 /40 -> {t1-4/0/0.0}
        *LDP    Preference: 9
                Next-hop reference count: 2
                Next hop: via t1-4/0/0.0, selected
                Label operation: Pop
                State: <Active Int>
                Local AS: 65500
                Age: 1d 23:03:58        Metric: 1
                Task: LDP
```



```
                Announcement bits (1): 0-KRT
                AS path: I

100080 (1 entry, 1 announced)
TSI:
KRT in-kernel 100080 /36 -> {t1-4/0/0.0}
        *LDP    Preference: 9
                Next-hop reference count: 2
                Next hop: via t1-4/0/0.0, selected
                Label operation: Swap 100000
                State: <Active Int>
                Local AS: 65500
                Age: 1d 23:03:58        Metric: 1
                Task: LDP
                Announcement bits (1): 0-KRT
                AS path: I
                Prefixes bound to route: 192.168.16.1/32
```

show route protocol ospf (Layer 3 VPN)

```
user@host> show route protocol ospf
inet.0: 40 destinations, 40 routes (39 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

10.39.1.4/30       *[OSPF/10] 00:05:18, metric 4
                    > via t3-3/2/0.0
10.39.1.8/30        [OSPF/10] 00:05:18, metric 2
                    > via t3-3/2/0.0
10.255.14.171/32   *[OSPF/10] 00:05:18, metric 4
                    > via t3-3/2/0.0
10.255.14.179/32   *[OSPF/10] 00:05:18, metric 2
                    > via t3-3/2/0.0
224.0.0.5/32       *[OSPF/10] 20:25:55, metric 1

VPN-AB.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.39.1.16/30       [OSPF/10] 00:05:43, metric 1
                    > via so-0/2/2.0
10.255.14.173/32   *[OSPF/10] 00:05:43, metric 1
                    > via so-0/2/2.0
224.0.0.5/32       *[OSPF/10] 20:26:20, metric 1
```

show route protocol ospf detail

```
user@host> show route protocol ospf detail
VPN-AB.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.39.1.16/30 (2 entries, 0 announced)
         OSPF   Preference:  10
                Nexthop: via so-0/2/2.0, selected
                State: <Int>
                Inactive reason: Route Preference
                Age: 6:25       Metric: 1
                Area: 0.0.0.0
                Task: VPN-AB-OSPF
                AS path: I
                Communities: Route-Type:0.0.0.0:1:0

...
```

show route protocol rip

```
user@host> show route protocol rip
```



```
inet.0: 26 destinations, 27 routes (25 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

VPN-AB.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
10.255.14.177/32   *[RIP/100] 20:24:34, metric 2
                    > to 10.39.1.22 via t3-0/2/2.0
224.0.0.9/32       *[RIP/100] 00:03:59, metric 1
```

show route protocol rip detail

```
user@host> show route protocol rip detail
inet.0: 26 destinations, 27 routes (25 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

VPN-AB.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
10.255.14.177/32 (1 entry, 1 announced)
        *RIP    Preference: 100
                Nexthop: 10.39.1.22 via t3-0/2/2.0, selected
                State: <Active Int>
                Age: 20:25:02   Metric: 2
                Task: VPN-AB-RIPv2
                Announcement bits (2): 0-KRT 2-BGP.0.0.0.0+179
                AS path: I
                Route learned from 10.39.1.22 expires in 96 seconds
```

show route protocol ripng table inet6

```
user@host> show route protocol ripng table inet6
inet6.0: 4215 destinations, 4215 routes (4214 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

1111::1/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
1111::2/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
1111::3/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
1111::4/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
1111::5/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
1111::6/128        *[RIPng/100] 02:13:33, metric 2
                    > to fe80::2a0:a5ff:fe3d:56 via t3-0/2/0.0
```

show route receive-protocol

Syntax

show route receive-protocol *protocol neighbor-address*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)

Syntax (EX Series Switches)

show route receive-protocol *protocol neighbor-address*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display the routing information as it was received through a particular neighbor using a particular dynamic routing protocol.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output.

logical-system (all | ***logical-system-name*****)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

protocol neighbor-address—Protocol transmitting the route (**bgp**, **dvmrp**, **msdp**, **pim**, **rip**, or **ripng**) and address of the neighboring router from which the route entry was received.

Additional Information

The output displays the selected routes and the attributes with which they were received, but does not show the effects of import policy on the routing attributes.

Required Privilege Level

view

List of Sample Output

show route receive-protocol bgp on page 247
show route receive-protocol bgp extensive on page 247
show route receive-protocol bgp extensive on page 247
show route receive-protocol bgp detail (Layer 2 VPN) on page 248
show route receive-protocol bgp extensive (Layer 2 VPN) on page 249
show route receive-protocol bgp (Layer 3 VPN) on page 249
show route receive-protocol bgp detail (Layer 3 VPN) on page 250
show route receive-protocol bgp extensive (Layer 3 VPN) on page 251

Output Fields

Table 21 on page 244 describes the output fields for the **show route receive-protocol** command. Output fields are listed in the approximate order in which they appear.

Table 21: show route receive-protocol Output Fields

Field Name	Field Description	Level of Output
routing-table-name	Name of the routing table—for example, **inet.0**.	All levels
number destinations	Number of destinations for which there are routes in the routing table.	All levels

Table 21: show route receive-protocol Output Fields *(continued)*

Field Name	Field Description	Level of Output
number routes	Number of routes in the routing table and total number of routes in the following states: • **active** • **holddown** (routes in that are pending state before being declared inactive) • **hidden** (the routes are not used because of a routing policy)	All levels
Prefix	Destination prefix.	none **brief**
MED	Multiple exit discriminator value included in the route.	none **brief**
destination-prefix **(entry, announced)**	Destination prefix. The **entry** value is the number of routes for this destination, and the **announced** value is the number of routes being announced for this destination.	**detail extensive**
Route Distinguisher	64-bit prefix added to IP subnets to make them unique.	**detail extensive**
Label-Base, range	First label in a block of labels and label block size. A remote PE routing device uses this first label when sending traffic toward the advertising PE routing device.	**detail extensive**
VPN Label	Virtual private network (VPN) label. Packets are sent between CE and PE routing devices by advertising VPN labels. VPN labels transit over either a Resource Reservation Protocol (RSVP) or a Label Distribution Protocol (LDP) label-switched path (LSP) tunnel.	**detail extensive**
Next hop	Next hop to the destination. An angle bracket (>) indicates that the route is the selected route.	All levels
Localpref or **Lclpref**	Local preference value included in the route.	All levels

Table 21: show route receive-protocol Output Fields *(continued)*

Field Name	Field Description	Level of Output
AS path	Autonomous system (AS) path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated. When AS path numbers are included in the route, the format is as follows: • **[ ]**—Brackets enclose the number that precedes the AS path. This number represents the number of ASs present in the AS path, when calculated as defined in RFC 4271. This value is used the AS-path merge process, as defined in RFC 4893. • **[ ]**—If more than one AS number is configured on the router, or if AS path prepending is configured, brackets enclose the local AS number associated with the AS path. • **{ }**—Braces enclose AS sets, which are groups of AS numbers in which the order does not matter. A set commonly results from route aggregation. The numbers in each AS set are displayed in ascending order. • **( )**—Parentheses enclose a confederation. • **([ ])**—Parentheses and brackets enclose a confederation set. NOTE: In Junos OS Release 10.3 and later, the AS path field displays an unrecognized attribute and associated hexadecimal value if BGP receives attribute 128 (attribute set) and you have not configured an independent domain in any routing instance.	All levels
Cluster list	(For route reflected output only) Cluster ID sent by the route reflector.	**detail extensive**
Originator ID	(For route reflected output only) Address of routing device that originally sent the route to the route reflector.	**detail extensive**
Communities	Community path attribute for the route. See the Output Field table in the show route detail command for all possible values for this field.	**detail extensive**
AIGP	Accumulated interior gateway protocol (AIGP) BGP attribute.	**detail extensive**
Attrset AS	Number, local preference, and path of the AS that originated the route. These values are stored in the **Attrset** attribute at the originating routing device.	**detail extensive**
Layer2-info: encaps	Layer 2 encapsulation (for example, VPLS).	**detail extensive**
control flags	Control flags: **none** or **Site Down**.	**detail extensive**
mtu	Maximum transmission unit (MTU) of the Layer 2 circuit.	**detail extensive**

Sample Output

show route receive-protocol bgp

```
user@host> show route receive-protocol bgp 10.255.245.215

inet.0: 28 destinations, 33 routes (27 active, 0 holddown, 1 hidden)
Prefix                   Next hop              MED     Lclpref    AS path
10.22.1.0/24             10.255.245.215       0       100        I
10.22.2.0/24             10.255.245.215       0       100        I
```

show route receive-protocol bgp extensive

```
user@host> show route receive-protocol bgp 10.255.245.63 extensive
inet.0: 244 destinations, 244 routes (243 active, 0 holddown, 1 hidden)
Prefix             Next hop                MED    Lclpref AS path
1.1.1.0/24 (1 entry, 1 announced)
     Next hop: 10.0.50.3
     Localpref: 100
     AS path: I <Orginator>
     Cluster list:  10.2.3.1
     Originator ID: 10.255.245.45
165.3.0.0/16 (1 entry, 1 announced)
     Next hop: 111.222.5.254
     Localpref: 100
     AS path: I <Originator>
     Cluster list:  10.2.3.1
     Originator ID: 10.255.245.68
165.4.0.0/16 (1 entry, 1 announced)
     Next hop: 111.222.5.254
     Localpref: 100
     AS path: I <Originator>
     Cluster list:  10.2.3.1
     Originator ID: 10.255.245.45
195.1.2.0/24 (1 entry, 1 announced)
     Next hop: 111.222.5.254
     Localpref: 100
     AS path: I <Originator>
     Cluster list:  10.2.3.1
     Originator ID: 10.255.245.68
inet.2: 63 destinations, 63 routes (63 active, 0 holddown, 0 hidden)
Prefix             Next hop                MED    Lclpref AS path
inet.3: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
Prefix             Next hop                MED    Lclpref AS path
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix             Next hop                MED    Lclpref AS path
mpls.0: 48 destinations, 48 routes (48 active, 0 holddown, 0 hidden)
```

show route receive-protocol bgp extensive

```
user@host> show route receive–protocol bgp 207.17.136.192 table inet.0 66.117.68.0/24 extensive
inet.0: 227315 destinations, 227316 routes (227302 active, 0 holddown, 13 hidden)
* 66.117.63.0/24 (1 entry, 1 announced)
     Nexthop: 207.17.136.29
     Localpref: 100
     AS path: AS2 PA[6]: 14203 2914 3356 29748 33437 AS_TRANS
     AS path: AS4 PA[2]: 33437 393219
     AS path: Merged[6]: 14203 2914 3356 29748 33437 393219 I
     Communities: 2914:420

user@host> show route receive-protocol bgp 10.0.0.9 logical-system PE4 extensive
inet.0: 12 destinations, 13 routes (12 active, 0 holddown, 0 hidden)
* 10.0.0.0/30 (1 entry, 1 announced)
     Accepted
     Route Label: 3
```



```
     Nexthop: 10.0.0.9
     AS path: 13979 I

* 10.0.0.4/30 (1 entry, 1 announced)
     Accepted
     Route Label: 3
     Nexthop: 10.0.0.9
     AS path: 13979 I

  10.0.0.8/30 (2 entries, 1 announced)
     Accepted
     Route Label: 3
     Nexthop: 10.0.0.9
     AS path: 13979 I

* 10.9.9.1/32 (1 entry, 1 announced)
     Accepted
     Route Label: 3
     Nexthop: 10.0.0.9
     AS path: 13979 I

* 10.100.1.1/32 (1 entry, 1 announced)
     Accepted
     Route Label: 3
     Nexthop: 10.0.0.9
     AS path: 13979 I

* 44.0.0.0/24 (1 entry, 1 announced)
     Accepted
     Route Label: 300096
     Nexthop: 10.0.0.9
     AS path: 13979 I
     AIGP: 203

* 55.0.0.0/24 (1 entry, 1 announced)
     Accepted
     Route Label: 300112
     Nexthop: 10.0.0.9
     AS path: 13979 7018 I
     AIGP: 25

* 66.0.0.0/24 (1 entry, 1 announced)
     Accepted
     Route Label: 300144
     Nexthop: 10.0.0.9
     AS path: 13979 7018 I

* 99.0.0.0/24 (1 entry, 1 announced)
     Accepted
     Route Label: 300160
     Nexthop: 10.0.0.9
     AS path: 13979 7018 I
```

show route receive-protocol bgp detail (Layer 2 VPN)

user@host> **show route receive-protocol bgp 10.255.14.171 detail**

```
inet.0: 68 destinations, 68 routes (67 active, 0 holddown, 1 hidden)
Prefix            Nexthop              MED    Lclpref AS path
inet.3: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Prefix            Nexthop              MED    Lclpref AS path
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix            Nexthop              MED    Lclpref AS path
mpls.0: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
```



```
Prefix             Nexthop               MED    Lclpref AS path
frame-vpn.l2vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0
hidden)
Prefix             Nexthop               MED    Lclpref AS path
10.255.245.35:1:5:1/96 (1 entry, 1 announced)
     Route Distinguisher: 10.255.245.35:1
     Label-base : 800000, range : 4, status-vector : 0x0
     Nexthop: 10.255.245.35
     Localpref: 100
     AS path: I
     Communities: target:65299:100 Layer2-info: encaps:FRAME RELAY,
     control flags: 0, mtu: 0
bgp.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
10.255.245.35:1:5:1/96 (1 entry, 0 announced)
     Route Distinguisher: 10.255.245.35:1
     Label-base : 800000, range : 4, status-vector : 0x0
     Nexthop: 10.255.245.35
     Localpref: 100
     AS path: I
     Communities: target:65299:100 Layer2-info: encaps:FRAME RELAY,
     control flags:0, mtu: 0
```

show route receive-protocol bgp extensive (Layer 2 VPN)

```
user@host> show route receive-protocol bgp 10.255.14.171 extensive
inet.0: 68 destinations, 68 routes (67 active, 0 holddown, 1 hidden)
Prefix             Nexthop               MED    Lclpref AS path
inet.3: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
mpls.0: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
frame-vpn.l2vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
10.255.245.35:1:5:1/96 (1 entry, 1 announced)
     Route Distinguisher: 10.255.245.35:1
     Label-base : 800000, range : 4, status-vector : 0x0
     Nexthop: 10.255.245.35
     Localpref: 100
     AS path: I
     Communities: target:65299:100 Layer2-info: encaps:FRAME RELAY,
     control flags:0, mtu: 0
bgp.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix             Nexthop               MED    Lclpref AS path
10.255.245.35:1:5:1/96 (1 entry, 0 announced)
     Route Distinguisher: 10.255.245.35:1
     Label-base : 800000, range : 4, status-vector : 0x0
     Nexthop: 10.255.245.35
     Localpref: 100
     AS path: I
     Communities: target:65299:100 Layer2-info: encaps:FRAME RELAY,
     control flags:0, mtu: 0
```

show route receive-protocol bgp (Layer 3 VPN)

```
user@host> show route receive-protocol bgp 10.255.14.171
      inet.0: 33 destinations, 33 routes (32 active, 0 holddown, 1 hidden)
      Prefix             Nexthop               MED    Lclpref AS path
      inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
      Prefix             Nexthop               MED    Lclpref AS path
      VPN-A.inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
      Prefix             Nexthop               MED    Lclpref AS path
      10.255.14.175/32   10.255.14.171                     100 2 I
```

```
10.255.14.179/32   10.255.14.171           2       100 I
VPN-B.inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
Prefix             Nexthop                MED    Lclpref AS path
10.255.14.175/32   10.255.14.171                   100 2 I
10.255.14.177/32   10.255.14.171                   100 I
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Prefix             Nexthop                MED    Lclpref AS path
mpls.0: 9 destinations, 9 routes (9 active, 0 holddown, 0 hidden)
Prefix             Nexthop                MED    Lclpref AS path
bgp.l3vpn.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
Prefix             Nexthop                MED    Lclpref AS path
10.255.14.171:300:10.255.14.177/32
                   10.255.14.171                   100 I
10.255.14.171:100:10.255.14.179/32
                   10.255.14.171           2       100 I
10.255.14.171:200:10.255.14.175/32
                   10.255.14.171                   100 2 I
```

show route receive-protocol bgp detail (Layer 3 VPN)

```
user@host> show route receive-protocol bgp 10.255.14.174 detail
inet.0: 16 destinations, 17 routes (15 active, 0 holddown, 1 hidden)
inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
vpna.inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
* 10.49.0.0/30 (1 entry, 1 announced)
     Route Distinguisher: 10.255.14.176:2
     VPN Label: 101264
     Nexthop: 10.255.14.174
     Localpref: 100
     AS path: I
     Communities: target:200:100
     AttrSet AS: 100
         Localpref: 100
         AS path: I
* 10.255.14.172/32 (1 entry, 1 announced)
     Route Distinguisher: 10.255.14.176:2
     VPN Label: 101280
     Nexthop: 10.255.14.174
     Localpref: 100
     AS path: I
     Communities: target:200:100
     AttrSet AS: 100
         Localpref: 100
         AS path: I
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
mpls.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
bgp.l3vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
* 10.255.14.174:2:10.49.0.0/30 (1 entry, 0 announced)
     Route Distinguisher: 10.255.14.174:2
     VPN Label: 101264
     Nexthop: 10.255.14.174
     Localpref: 100
     AS path: I
     Communities: target:200:100
     AttrSet AS: 100
         Localpref: 100
         AS path: I
* 10.255.14.174:2:10.255.14.172/32 (1 entry, 0 announced)
     Route Distinguisher: 10.255.14.174:2
     VPN Label: 101280
     Nexthop: 10.255.14.174
     Localpref: 100
     AS path: I
```



```
     Communities: target:200:100
     AttrSet AS: 100
         Localpref: 100
         AS path: I
inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
```

show route receive-protocol bgp extensive (Layer 3 VPN)

```
user@host> show route receive-protocol bgp 10.255.245.63 extensive
inet.0: 244 destinations, 244 routes (243 active, 0 holddown, 1 hidden)
     Prefix             Nexthop                MED    Lclpref AS path
     1.1.1.0/24 (1 entry, 1 announced)
          Nexthop: 10.0.50.3
          Localpref: 100
          AS path: I <Originator>
          Cluster list:  10.2.3.1
          Originator ID: 10.255.245.45
     165.3.0.0/16 (1 entry, 1 announced)
          Nexthop: 111.222.5.254
          Localpref: 100
          AS path: I <Originator>
          Cluster list:  10.2.3.1
          Originator ID: 10.255.245.68
     165.4.0.0/16 (1 entry, 1 announced)
          Nexthop: 111.222.5.254
          Localpref: 100
          AS path: I <Originator>
          Cluster list:  10.2.3.1
          Originator ID: 10.255.245.45
     195.1.2.0/24 (1 entry, 1 announced)
          Nexthop: 111.222.5.254
          Localpref: 100
          AS path: I <Originator>
          Cluster list:  10.2.3.1
          Originator ID: 10.255.245.68
     inet.2: 63 destinations, 63 routes (63 active, 0 holddown, 0 hidden)
     Prefix             Nexthop                MED    Lclpref AS path
     inet.3: 10 destinations, 10 routes (10 active, 0 holddown, 0 hidden)
     Prefix             Nexthop                MED    Lclpref AS path
     iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
     Prefix             Nexthop                MED    Lclpref AS path
     mpls.0: 48 destinations, 48 routes (48 active, 0 holddown, 0 hidden)
```

show route table

Syntax

show route table *routing-table-name*
<brief | detail | extensive | terse>
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches)

show route table *routing-table-name*
<brief | detail | extensive | terse>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display the route entries in a particular routing table.

Options

brief | detail | extensive | terse—(Optional) Display the specified level of output.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

routing-table-name—Display route entries for all routing tables whose name begins with this string (for example, **inet.0** and **inet6.0** are both displayed when you run the **show route table inet** command).

Required Privilege Level

view

Related Documentation

- show route summary

List of Sample Output

Output Fields For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

show route table bgp.l2.vpn

```
user@host> show route table bgp.l2.vpn
bgp.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.24.1:1:4:1/96
                   *[BGP/170] 01:08:58, localpref 100, from 192.168.24.1
                      AS path: I
                    > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am
```

show route table bgp.l3vpn.0

```
user@host> show route table bgp.l3vpn.0
      bgp.l3vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
      + = Active Route, - = Last Active, * = Both

      10.255.71.15:100:10.255.71.17/32
                         *[BGP/170] 00:03:59, MED 1, localpref 100, from
      10.255.71.15
                            AS path: I
                          > via so-2/1/0.0, Push 100020, Push 100011(top)
      10.255.71.15:200:10.255.71.18/32
                         *[BGP/170] 00:03:59, MED 1, localpref 100, from
      10.255.71.15
                            AS path: I
                          > via so-2/1/0.0, Push 100021, Push 100011(top)
```

show route table bgp.l3vpn.0 detail

```
user@host> show route table bgp.l3vpn.0 detail
bgp.l3vpn.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)

10.255.245.12:1:4.0.0.0/8 (1 entry, 1 announced)
  *BGP    Preference: 170/-101
          Route Distinguisher: 10.255.245.12:1
          Source: 10.255.245.12
          Next hop: 192.168.208.66 via fe-0/0/0.0, selected
          Label operation: Push 182449
          Protocol next hop: 10.255.245.12
          Push 182449
          Indirect next hop: 863a630 297
          State: <Active Int Ext>
          Local AS:    35 Peer AS:    35
          Age: 12:19      Metric2: 1
          Task: BGP_35.10.255.245.12+179
          Announcement bits (1): 0-BGP.0.0.0.0+179
          AS path: 30 10458 14203 2914 3356 I (Atomic) Aggregator: 3356 4.68.0.11

          Communities: 2914:420 target:11111:1 origin:56:78
          VPN Label: 182449
          Localpref: 100
           Router ID: 10.255.245.12

10.255.245.12:1:4.17.225.0/24 (1 entry, 1 announced)
  *BGP    Preference: 170/-101
          Route Distinguisher: 10.255.245.12:1
          Source: 10.255.245.12
          Next hop: 192.168.208.66 via fe-0/0/0.0, selected
```

```
        Label operation: Push 182465
        Protocol next hop: 10.255.245.12
        Push 182465
        Indirect next hop: 863a8f0 305
        State: <Active Int Ext>
        Local AS:    35 Peer AS:    35
        Age: 12:19      Metric2: 1
        Task: BGP_35.10.255.245.12+179
        Announcement bits (1): 0-BGP.0.0.0.0+179
AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496 6496 I
               Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
               VPN Label: 182465
               Localpref: 100
               Router ID: 10.255.245.12

10.255.245.12:1:4.17.226.0/23 (1 entry, 1 announced)
  *BGP   Preference: 170/-101
        Route Distinguisher: 10.255.245.12:1
        Source: 10.255.245.12
        Next hop: 192.168.208.66 via fe-0/0/0.0, selected
        Label operation: Push 182465
        Protocol next hop: 10.255.245.12
        Push 182465
        Indirect next hop: 86bd210 330
        State: <Active Int Ext>
        Local AS:    35 Peer AS:    35
        Age: 12:19      Metric2: 1
        Task: BGP_35.10.255.245.12+179
        Announcement bits (1): 0-BGP.0.0.0.0+179
        AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496

        6496 I
        Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
        VPN Label: 182465
        Localpref: 100
        Router ID: 10.255.245.12

10.255.245.12:1:4.17.251.0/24 (1 entry, 1 announced)
  *BGP   Preference: 170/-101
        Route Distinguisher: 10.255.245.12:1
        Source: 10.255.245.12
        Next hop: 192.168.208.66 via fe-0/0/0.0, selected
        Label operation: Push 182465
        Protocol next hop: 10.255.245.12
        Push 182465
        Indirect next hop: 86bd210 330
        State: <Active Int Ext>
        Local AS:    35 Peer AS:    35
        Age: 12:19      Metric2: 1
        Task: BGP_35.10.255.245.12+179
        Announcement bits (1): 0-BGP.0.0.0.0+179
        AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496

        6496 I
        Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
        VPN Label: 182465
        Localpref: 100
```

show route table inet.0

```
user@host> show route table inet.0
inet.0: 12 destinations, 12 routes (11 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
```



```
0.0.0.0/0          *[Static/5] 00:51:57
                    > to 111.222.5.254 via fxp0.0
1.0.0.1/32         *[Direct/0] 00:51:58
                    > via at-5/3/0.0
1.0.0.2/32         *[Local/0] 00:51:58
                      Local
12.12.12.21/32     *[Local/0] 00:51:57
                      Reject
13.13.13.13/32     *[Direct/0] 00:51:58
                    > via t3-5/2/1.0
13.13.13.14/32     *[Local/0] 00:51:58
                      Local
13.13.13.21/32     *[Local/0] 00:51:58
                      Local
13.13.13.22/32     *[Direct/0] 00:33:59
                    > via t3-5/2/0.0
127.0.0.1/32        [Direct/0] 00:51:58
                    > via lo0.0
111.222.5.0/24     *[Direct/0] 00:51:58
                    > via fxp0.0
111.222.5.81/32    *[Local/0] 00:51:58
                      Local
```

show route table inet6.0

```
user@host> show route table inet6.0
inet6.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Route, * = Both

fec0:0:0:3::/64 *[Direct/0] 00:01:34
>via fe-0/1/0.0

fec0:0:0:3::/128 *[Local/0] 00:01:34
>Local

fec0:0:0:4::/64 *[Static/5] 00:01:34
>to fec0:0:0:3::ffff via fe-0/1/0.0
```

show route table inet6.3

```
user@router> show route table inet6.3
inet6.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

::10.255.245.195/128
                   *[LDP/9] 00:00:22, metric 1
                    > via so-1/0/0.0
::10.255.245.196/128
                   *[LDP/9] 00:00:08, metric 1
                    > via so-1/0/0.0, Push 100008
```

show route table l2circuit.0

```
user@host> show route table l2circuit.0
l2circuit.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.1.1.195:NoCtrlWord:1:1:Local/96
                   *[L2CKT/7] 00:50:47
                    > via so-0/1/2.0, Push 100049
                      via so-0/1/3.0, Push 100049
10.1.1.195:NoCtrlWord:1:1:Remote/96
                   *[LDP/9] 00:50:14
                      Discard
10.1.1.195:CtrlWord:1:2:Local/96
```

```
                   *[L2CKT/7] 00:50:47
                    > via so-0/1/2.0, Push 100049
                      via so-0/1/3.0, Push 100049
10.1.1.195:CtrlWord:1:2:Remote/96
                   *[LDP/9] 00:50:14
                      Discard
```

show route table mpls

```
user@host> show route table mpls
mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 00:13:55, metric 1
                      Receive
1                  *[MPLS/0] 00:13:55, metric 1
                      Receive
2                  *[MPLS/0] 00:13:55, metric 1
                      Receive
1024               *[VPN/0] 00:04:18
                      to table red.inet.0, Pop
```

show route table mpls extensive

```
user@host> show route table mpls extensive
100000 (1 entry, 1 announced)
TSI:
KRT in-kernel 100000 /36 -> {so-1/0/0.0}
        *LDP    Preference:   9
                Next hop:  via so-1/0/0.0, selected
                Pop
                State: <Active Int>
                Age: 29:50      Metric: 1
                Task: LDP
                Announcement bits (1): 0-KRT
                AS path: I
                Prefixes bound to route: 10.0.0.194/32
```

show route table mpls.0

```
user@host> show route table mpls.0
mpls.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 00:45:09, metric 1
                      Receive
1                  *[MPLS/0] 00:45:09, metric 1
                      Receive
2                  *[MPLS/0] 00:45:09, metric 1
                      Receive
100000             *[L2VPN/7] 00:43:04
                    > via so-0/1/0.1, Pop
100001             *[L2VPN/7] 00:43:03
                    > via so-0/1/0.2, Pop       Offset: 4
100002             *[LDP/9] 00:43:22, metric 1
                      via so-0/1/2.0, Pop
                    > via so-0/1/3.0, Pop
100002(S=0)        *[LDP/9] 00:43:22, metric 1
                      via so-0/1/2.0, Pop
                    > via so-0/1/3.0, Pop
100003             *[LDP/9] 00:43:22, metric 1
                    > via so-0/1/2.0, Swap 100002
                      via so-0/1/3.0, Swap 100002
100004             *[LDP/9] 00:43:16, metric 1
                      via so-0/1/2.0, Swap 100049
                    > via so-0/1/3.0, Swap 100049
```



```
so-0/1/0.1          *[L2VPN/7] 00:43:04
                     > via so-0/1/2.0, Push 100001, Push 100049(top)
                       via so-0/1/3.0, Push 100001, Push 100049(top)
so-0/1/0.2          *[L2VPN/7] 00:43:03
                       via so-0/1/2.0, Push 100000, Push 100049(top) Offset: -4
                     > via so-0/1/3.0, Push 100000, Push 100049(top) Offset: -4
```

show route table mpls.0 (RSVP Route—Transit LSP)

```
user@host> show route table mpls.0

mpls.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                   *[MPLS/0] 00:37:31, metric 1
                       Receive
1                   *[MPLS/0] 00:37:31, metric 1
                       Receive
2                   *[MPLS/0] 00:37:31, metric 1
                       Receive
13                  *[MPLS/0] 00:37:31, metric 1
                       Receive
300352              *[RSVP/7/1] 00:08:00, metric 1
                     > to 8.64.0.106 via ge-1/0/1.0, label-switched-path lsp1_p2p
300352(S=0)         *[RSVP/7/1] 00:08:00, metric 1
                     > to 8.64.0.106 via ge-1/0/1.0, label-switched-path lsp1_p2p
300384              *[RSVP/7/2] 00:05:20, metric 1
                     > to 8.64.1.106 via ge-1/0/0.0, Pop
300384(S=0)         *[RSVP/7/2] 00:05:20, metric 1
                     > to 8.64.1.106 via ge-1/0/0.0, Pop
```

show route table vpls_1 detail

```
user@host> show route table vpls_1 detail
vpls_1.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

1.1.1.11:1000:1:1/96 (1 entry, 1 announced)
*L2VPN Preference: 170/-1
Receive table: vpls_1.l2vpn.0
Next-hop reference count: 2
State: <Active Int Ext>
Age: 4:29:47 Metric2: 1
Task: vpls_1-l2vpn
Announcement bits (1): 1-BGP.0.0.0.0+179
AS path: I
Communities: Layer2-info: encaps:VPLS, control flags:Site-Down
Label-base: 800000, range: 8, status-vector: 0xFF
```

show route table vpn-a

```
user@host> show route table vpn-a
vpn-a.l2vpn.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both
192.168.16.1:1:1:1/96
                    *[VPN/7] 05:48:27
                      Discard
192.168.24.1:1:2:1/96
                    *[BGP/170] 00:02:53, localpref 100, from 192.168.24.1
                       AS path: I
                     > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am
192.168.24.1:1:3:1/96
                    *[BGP/170] 00:02:53, localpref 100, from 192.168.24.1
```

```
                              AS path: I
                            > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am
```

show route table vpn-a.mdt.0

```
user@host> show route table vpn-a.mdt.0
vpn-a.mdt.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

1:1:0:10.255.14.216:232.1.1.1/144
                   *[MVPN/70] 01:23:05, metric2 1
                      Indirect
1:1:1:10.255.14.218:232.1.1.1/144
                   *[BGP/170] 00:57:49, localpref 100, from 10.255.14.218
                      AS path: I
                    > via so-0/0/0.0, label-switched-path r0e-to-r1
1:1:2:10.255.14.217:232.1.1.1/144
                   *[BGP/170] 00:57:49, localpref 100, from 10.255.14.217
                      AS path: I
> via so-0/0/1.0, label-switched-path r0-to-r2
```

show route table VPN-AB.inet.0

```
user@host>  show route table VPN-AB.inet.0
      VPN-AB.inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
      + = Active Route, - = Last Active, * = Both

      10.39.1.0/30       *[OSPF/10] 00:07:24, metric 1
                          > via so-7/3/1.0
      10.39.1.4/30       *[Direct/0] 00:08:42
                          > via so-5/1/0.0
      10.39.1.6/32       *[Local/0] 00:08:46
                           Local
      10.255.71.16/32    *[Static/5] 00:07:24
                          > via so-2/0/0.0
      10.255.71.17/32    *[BGP/170] 00:07:24, MED 1, localpref 100, from
      10.255.71.15
                            AS path: I
                          > via so-2/1/0.0, Push 100020, Push 100011(top)
      10.255.71.18/32    *[BGP/170] 00:07:24, MED 1, localpref 100, from
      10.255.71.15
                            AS path: I
                          > via so-2/1/0.0, Push 100021, Push 100011(top)
      10.255.245.245/32  *[BGP/170] 00:08:35, localpref 100
                            AS path: 2 I
                          > to 10.39.1.5 via so-5/1/0.0
      10.255.245.246/32  *[OSPF/10] 00:07:24, metric 1
                          > via so-7/3/1.0
```

show route table VPN_blue.mvpn-inet6.0

```
user@host>  show route table VPN_blue.mvpn-inet6.0
vpn_blue.mvpn-inet6.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

1:10.255.2.202:65535:10.255.2.202/432
                   *[BGP/170] 00:02:37, localpref 100, from 10.255.2.202
                      AS path: I
                    > via so-0/1/3.0
1:10.255.2.203:65535:10.255.2.203/432
                   *[BGP/170] 00:02:37, localpref 100, from 10.255.2.203
                      AS path: I
                    > via so-0/1/0.0
1:10.255.2.204:65535:10.255.2.204/432
                   *[MVPN/70] 00:57:23, metric2 1
                      Indirect
```



```
5:10.255.2.202:65535:128:::192.168.90.2:128:ffff::1/432
                   *[BGP/170] 00:02:37, localpref 100, from 10.255.2.202
                      AS path: I
                    > via so-0/1/3.0
6:10.255.2.203:65535:65000:128:::10.12.53.12:128:ffff::1/432
                   *[PIM/105] 00:02:37
                      Multicast (IPv6)
7:10.255.2.202:65535:65000:128:::192.168.90.2:128:ffff::1/432
                   *[MVPN/70] 00:02:37, metric2 1
                      Indirect
```

show route table VPN-A detail

```
user@host> show route table VPN-A detail
VPN-AB.inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
10.255.179.9/32 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Route Distinguisher: 10.255.179.13:200
                Next hop type: Indirect
                Next-hop reference count: 5
                Source: 10.255.179.13
                Next hop type: Router, Next hop index: 732
                Next hop: 10.39.1.14 via fe-0/3/0.0, selected
                Label operation: Push 299824, Push 299824(top)
                Protocol next hop: 10.255.179.13
                Push 299824
                Indirect next hop: 8f275a0 1048574
                State: (Secondary Active Int Ext)
                Local AS: 1 Peer AS: 1
                Age: 3:41:06 Metric: 1 Metric2: 1
                Task: BGP_1.10.255.179.13+64309
                Announcement bits (2): 0-KRT 1-BGP RT Background
                AS path: I
                Communities: target:1:200 rte-type:0.0.0.0:1:0
                Import Accepted
                VPN Label: 299824 TTL Action: vrf-ttl-propagate
                Localpref: 100
                Router ID: 10.255.179.13
                Primary Routing Table bgp.l3vpn.0
```

show route table inetflow detail

```
user@host> show route table inetflow detail
inetflow.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
10.12.44.1,*/48 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next-hop reference count: 2
                State: **Active Ext>
                Local AS: 65002 Peer AS: 65000
                Age: 4
                Task: BGP_65000.10.12.99.5+3792
                Announcement bits (1): 0-Flow
                AS path: 65000 I
                Communities: traffic-rate:0:0
                Validation state: Accept, Originator: 10.12.99.5
                Via: 10.12.44.0/24, Active
                Localpref: 100
                Router ID: 10.255.71.161

10.12.56.1,*/48 (1 entry, 1 announced)
        *Flow   Preference: 5
                Next-hop reference count: 2
                State: **Active>
                Local AS: 65002
                Age: 6:30
```

```
Task: RT Flow
Announcement bits (2): 0-Flow 1-BGP.0.0.0.0+179
AS path: I
Communities: 1:1
```

show route terse

Syntax show route terse
<logical-system (all | *logical-system-name*)>

Syntax (EX Series Switches) show route terse

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display a high-level summary of the routes in the routing table.

NOTE: For BGP routes, the **show route terse** command displays the local preference attribute and MED instead of metric1 and metric2 values. This is mostly due to historical reasons.
To display the metric1 and metric2 value of a BGP route, use the show route extensive command.

Options **none**—Display a high-level summary of the routes in the routing table.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level view

List of Sample Output show route terse on page 263

Output Fields Table 22 on page 261 describes the output fields for the **show route terse** command. Output fields are listed in the approximate order in which they appear.

Table 22: show route terse Output Fields

Field Name	Field Description
routing-table-name	Name of the routing table (for example, **inet.0**).
number **destinations**	Number of destinations for which there are routes in the routing table.
number **routes**	Number of routes in the routing table and total number of routes in the following states: • **active** (routes that are active) • **holddown** (routes that are in the pending state before being declared inactive) • **hidden** (routes that are not used because of a routing policy)

Table 22: show route terse Output Fields *(continued)*

Field Name	Field Description
route key	Key for the state of the route: • **+**—A plus sign indicates the active route, which is the route installed from the routing table into the forwarding table. • **-** —A hyphen indicates the last active route. • *****—An asterisk indicates that the route is both the active and the last active route. An asterisk before a **to** line indicates the best subpath to the route.
A	Active route. An asterisk (*) indicates this is the active route.
Destination	Destination of the route.
P	Protocol through which the route was learned: • **A**—Aggregate • **B**—BGP • **C**—CCC • **D**—Direct • **G**—GMPLS • **I**—IS-IS • **L**—L2CKT, L2VPN, LDP, Local • **K**—Kernel • **M**—MPLS, MSDP • **O**—OSPF • **P**—PIM • **R**—RIP, RIPng • **S**—Static • **T**—Tunnel
Prf	Preference value of the route. In every routing metric except for the BGP **LocalPref** attribute, a lesser value is preferred. In order to use common comparison routines, Junos OS stores the 1's complement of the **LocalPref** value in the **Preference2** field. For example, if the **LocalPref** value for Route 1 is 100, the **Preference2** value is -101. If the **LocalPref** value for Route 2 is 155, the **Preference2** value is -156. Route 2 is preferred because it has a higher **LocalPref** value and a lower **Preference2** value.
Metric 1	First metric value in the route. For routes learned from BGP, this is the MED metric.
Metric 2	Second metric value in the route. For routes learned from BGP, this is the IGP metric.
Next hop	Next hop to the destination. An angle bracket (>) indicates that the route is the selected route.
AS path	AS path through which the route was learned. The letters at the end of the AS path indicate the path origin, providing an indication of the state of the route at the point at which the AS path originated: • **I**—IGP. • **E**—EGP. • **?**—Incomplete; typically, the AS path was aggregated.

Sample Output

show route terse

```
user@host> show route terse
inet.0: 12 destinations, 12 routes (11 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination        P Prf Metric 1   Metric 2    Next hop        AS path
* 0.0.0.0/0          S   5                       >111.222.5.254
* 1.0.0.1/32         D   0                       >at-5/3/0.0
* 1.0.0.2/32         L   0                        Local
* 12.12.12.21/32     L   0                        Reject
* 13.13.13.13/32     D   0                       >t3-5/2/1.0
* 13.13.13.14/32     L   0                        Local
* 13.13.13.21/32     L   0                        Local
* 13.13.13.22/32     D   0                       >t3-5/2/0.0
  127.0.0.1/32       D   0                       >lo0.0
* 111.222.5.0/24     D   0                       >fxp0.0
* 111.222.5.81/32    L   0                        Local
* 224.0.0.5/32       O  10          1             MultiRecv
```

test policy

Syntax test policy *policy-name prefix*

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Test a policy configuration to determine which prefixes match routes in the routing table.

Options *policy-name*—Name of a policy.

prefix—Destination prefix to match.

Additional Information All prefixes in the default unicast routing table (**inet.0**) that match prefixes that are the same as or longer than the specific prefix are processed by the **from** clause in the specified policy. All prefixes accepted by the policy are displayed. The **test policy** command evaluates a policy differently from the Border Gateway Protocol (BGP) import process. When testing a policy that contains an **interface** match condition in the **from** clause, the **test policy** command uses the match condition. In contrast, BGP does not use the **interface** match condition when evaluating the policy against routes learned from internal BGP (IBGP) or external BGP (EGBP) multihop peers.

Required Privilege Level view

Related Documentation

- show policy damping

List of Sample Output test policy on page 264

Output Fields For information about output fields, see the output field tables for the show route command, the show route detail command, the show route extensive command, or the show route terse command.

Sample Output

test policy

```
user@host> test policy test-statics 3.0.0.1/8
inet.0: 44 destinations, 44 routes (44 active, 0 holddown, 0 hidden)
Prefixes passing policy:

3.0.0.0/8          *[BGP/170] 16:22:46, localpref 100, from 10.255.255.41
                   AS Path: 50888 I
                    > to 10.11.4.32 via en0.2, label-switched-path l2
3.3.3.1/32         *[IS-IS/18] 2d 00:21:46, metric 0, tag 2
                    > to 10.0.4.7 via fxp0.0
3.3.3.2/32         *[IS-IS/18] 2d 00:21:46, metric 0, tag 2
                    > to 10.0.4.7 via fxp0.0
3.3.3.3/32         *[IS-IS/18] 2d 00:21:46, metric 0, tag 2
                    > to 10.0.4.7 via fxp0.0
3.3.3.4/32         *[IS-IS/18] 2d 00:21:46, metric 0, tag 2
```

```
                    > to 10.0.4.7 via fxp0.0
Policy test-statics: 5 prefixes accepted, 0 prefixes rejected
```

PART 4

Troubleshooting

CHAPTER 6

Routing Protocol Process Memory FAQ

Routing Protocol Process Memory FAQ Overview

The Juniper Networks Junos operating system (Junos OS) is based on the FreeBSD Unix operating system. The open source software is modified and hardened to operate in the device's specialized environment. For example, some executables have been deleted while other utilities have been de-emphasized. Additionally, certain software processes have been added to enhance the routing functionality. The result of this transformation is the kernel, the heart of the Junos OS software.

The kernel is responsible for generating multiple processes that perform the actual functions of the device. Each process operates in its own protected memory space, providing isolation between the processes and resiliency in the event of a process failure. This is important in a core routing platform because a single process failure does not cause the entire device to cease functioning.

Some of the common software processes include the routing protocol process (rpd) that controls the device's protocols, the device control process (dcd) that controls the device's interfaces, the management process (mgd) that controls user access to the device, the chassis process (chassisd) that controls the device's properties itself, and the Packet Forwarding Engine process (pfed) that controls the communication between the device's Packet Forwarding Engine and the Routing Engine. Besides the above processes, there are other specialized processes that support additional functionality, such as the Simple Network Management Protocol (SNMP), Virtual Router Redundancy Protocol (VRRP), and Class of Service (CoS).

The routing protocol process is a software process within the Routing Engine software that controls the routing protocols that run on the device. Its functionality includes all protocol messages, routing table updates, and implementation of routing policies.

The routing protocol process starts all configured routing protocols and handles all routing messages. It maintains one or more routing tables, which consolidate the routing information learned from all routing protocols. From this routing information, the routing protocol process determines the active routes to network destinations and installs these routes into the Routing Engine's forwarding table. Finally, it implements the routing policy, which allows you to control the routing information that is transferred between the routing protocols and the routing table. Using the routing policy, you can filter and limit the transfer of information as well as set properties associated with specific routes.

Related Documentation

- Routing Protocol Process Memory FAQs on page 270

Routing Protocol Process Memory FAQs

The following sections present the most frequently asked questions and answers related to the routing protocol process memory utilization, operation, interpretation of related command outputs, and troubleshooting the software process.

Routing Protocol Process Memory Utilization FAQs

This section presents frequently asked questions and answers related to the memory usage of the routing protocol process.

Why does the routing protocol process use excessive memory?

The routing protocol process uses hundreds of megabytes of RAM in the Routing Engine to store information needed for the operation of routing and related protocols, such as BGP, OSPF, ISIS, RSVP, LDP, and MPLS. Such huge consumption of memory is common for the process, as the information it stores includes routes, next hops, interfaces, routing policies, labels, and label-switched paths (LSPs). Because access to the RAM memory is much faster than access to the hard disk, most of the routing protocol process information is stored in the RAM memory instead of using the hard disk space. This ensures that the performance of the routing protocol process is maximized.

How can I check the amount of memory the routing protocol process is using?

You can check the routing protocol process memory usage by entering the **show system processes** and the **show task memory** Junos OS command-line interface (CLI) operational mode commands.

The **show system processes** command displays information about software processes that are running on the device. You can check the routing protocol process memory usage by using the **show system processes** command with the **extensive** option.

The **show task memory** command displays a report generated by the routing protocol process on the memory utilization for routing protocol tasks on the Routing Engine. Although the report generated by the routing protocol process is on its own memory usage, it does not display all the memory used by the process. The value reported by the routing protocol process does not account for the memory used for the **TEXT** and **STACK** segments, or the memory used by the process's internal memory manager. The **show task memory** command also does not include the memory which has been deactivated by the routing protocol process, although some or all of that deactivated memory has not actually been freed by the kernel.

For more information about checking the routing protocol process memory usage, see Check Routing Protocol Process (rpd) Memory Usage in the *Junos OS Baseline Network Operations Guide*.

For more information about the show system processes command and the show task memory command, see the *Junos OS System Basics and Services Command Reference*.

I just deleted many routes from the routing protocol process. Why is the routing protocol process still using so much memory?

The **show system processes extensive** command displays a **RES** value measured in kilobytes. This value represents the amount of process memory resident in the physical memory. This is also known as RSS or Resident Set Size. Any amount of memory deactivated by the process might still be considered part of the **RES** value. Generally, the kernel defers the actual freeing of deactivated memory until there is a memory shortage. This can lead to large discrepancies between the values reported by the routing protocol process and the kernel, even after the routing protocol process has deactivated a large amount of memory.

Interpreting Routing Protocol Process-Related Command Outputs FAQs

This section presents frequently asked questions and answers about the routing protocol process-related Junos OS CLI command outputs that are used to display the memory usage of the routing protocol process.

How do I interpret memory numbers displayed in the show system processes extensive command output?

The **show system processes extensive** command displays exhaustive system process information about software processes that are running on the device. This command is equivalent to the UNIX **top** command. However, the UNIX **top** command shows real-time memory usage, with the memory values constantly changing, while the **show system processes extensive** command provides a snapshot of memory usage in a given moment.

To check overall CPU and memory usage, enter the **show system processes extensive** command. Refer to Table 23 on page 273 for information about the **show system processes extensive** command output fields.

```
user@host> show system processes extensive
last pid:   544;  load averages:  0.00,  0.00,  0.00    18:30:33
37 processes:  1 running, 36 sleeping

Mem: 25M Active, 3968K Inact, 19M Wired, 184K Cache, 8346K Buf, 202M Free
Swap: 528M Total, 64K Used, 528M Free
  PID USERNAME PRI NICE SIZE    RES STATE    TIME   WCPU    CPU COMMAND
  544 root      30   0  604K   768K RUN      0:00  0.00%  0.00% top
    3 root      28   0    0K    12K psleep   0:00  0.00%  0.00% vmdaemon
    4 root      28   0    0K    12K update   0:03  0.00%  0.00% update
  528 aviva     18   0  660K   948K pause    0:00  0.00%  0.00% tcsh
  204 root      18   0  300K   544K pause    0:00  0.00%  0.00% csh
  131 root      18   0  332K   532K pause    0:00  0.00%  0.00% cron
  186 root      18   0  196K    68K pause    0:00  0.00%  0.00% watchdog
   27 root      10   0  512M 16288K mfsidl   0:00  0.00%  0.00% mount_mfs
    1 root      10   0  620K   344K wait     0:00  0.00%  0.00% init
  304 root       3   0  884K   900K ttyin    0:00  0.00%  0.00% bash
  200 root       3   0  180K   540K ttyin    0:00  0.00%  0.00% getty
  203 root       3   0  180K   540K ttyin    0:00  0.00%  0.00% getty
  202 root       3   0  180K   540K ttyin    0:00  0.00%  0.00% getty
  201 root       3   0  180K   540K ttyin    0:00  0.00%  0.00% getty
  194 root       2   0 2248K  1640K select   0:11  0.00%  0.00% rpd
  205 root       2   0  964K   800K select   0:12  0.00%  0.00% tnp.chassisd
  189 root       2 -12  352K   740K select   0:03  0.00%  0.00% xntpd
  114 root       2   0  296K   612K select   0:00  0.00%  0.00% amd
```



```
188 root       2   0   780K   600K select   0:00  0.00%  0.00% dcd
527 root       2   0   176K   580K select   0:00  0.00%  0.00% rlogind
195 root       2   0   212K   552K select   0:00  0.00%  0.00% inetd
187 root       2   0   192K   532K select   0:00  0.00%  0.00% tnetd
 83 root       2   0   188K   520K select   0:00  0.00%  0.00% syslogd
538 root       2   0  1324K   516K select   0:00  0.00%  0.00% mgd
 99 daemon     2   0   176K   492K select   0:00  0.00%  0.00% portmap
163 root       2   0   572K   420K select   0:00  0.00%  0.00% nsrexecd
192 root       2   0   560K   400K select   0:10  0.00%  0.00% snmpd
191 root       2   0  1284K   376K select   0:00  0.00%  0.00% mgd
537 aviva      2   0   636K   364K select   0:00  0.00%  0.00% cli
193 root       2   0   312K   204K select   0:07  0.00%  0.00% mib2d
  5 root       2   0     0K    12K pfesel   0:00  0.00%  0.00% if_pfe
  2 root     -18   0     0K    12K psleep   0:00  0.00%  0.00% pagedaemon
  0 root     -18   0     0K     0K sched    0:00  0.00%  0.00% swapper
```

Table 23 on page 273 describes the output fields that represent the memory values for the **show system processes extensive** command. Output fields are listed in the approximate order in which they appear.

Table 23: show system processes extensive Output Fields

Field Name	Field Description
Mem	Information about physical and virtual memory allocation.
Active	Memory allocated and actively used by the process.
Inact	Memory allocated but not recently used, or memory deactivated by the processes. Inactive memory remains mapped in the address space of one or more processes and, therefore, counts toward the RSS value of those processes.
Wired	Memory that is not eligible to be swapped, usually used for in-kernel memory structure, memory physically locked by a process, or both.
Cache	Freed memory that is no longer associated with any process but still has valid contents that correspond to some file system blocks. Cache pages can be reclaimed as is when the corresponding file system blocks are accessed again. However, when the system is under memory pressure, the contents of Cache pages could be erased by the kernel and the pages reused to service any memory allocation requests.
Buf	Size of the virtual memory buffer used to hold data recently called from the disk.
Free	Free memory that is neither associated with any process nor contains any valid contents.
Swap	Information about swap memory. • Total—Total space on the swap device. • Used—Memory swapped to disk. • Free—Unused space available on the swap device.

The rest of the command output displays information about the memory usage of each process. The **SIZE** field indicates the size of the virtual address space, and the **RES** field indicates the amount of the process in physical memory, which is also known as RSS or Resident Set Size. For more information, see the show system processes command in the *Junos OS System Basics and Services Command Reference*.

What is the difference between Active and Inact memory that is displayed by the show system processes extensive command?

When the system is under memory pressure, the pageout process can free up memory from the **Inact** and, if necessary, **Active** pools after first preserving the contents of those pages on the swap device or backing file systems if necessary. When the pageout process runs, it scans memory to see which pages are good candidates to be unmapped and freed up. Thus, the distinction between **Active** and **Inact** memory is only used by the pageout process to determine which pool of pages to free first at the time of a memory shortage.

The pageout process first scans the **Inact** list and checks whether the pages on this list have been accessed since the time they have been listed here. The pages that have been accessed are moved from the **Inact** list to the **Active** list. On the other hand, pages that have not been accessed become prime candidates to be freed by the pageout process. If the pageout process cannot produce enough free pages from the **Inact** list, pages from the **Active** list are freed up.

Because the pageout process runs only when the system is under memory pressure, the pages on the **Inact** list remain untouched – even if they have not been accessed recently – when the amount of **Free** memory is adequate.

How do I interpret memory numbers displayed in the show task memory command output?

The **show task memory** command provides a comprehensive picture of the memory utilization for routing protocol tasks on the Routing Engine. The routing protocol process is the main task that uses Routing Engine memory.

To check routing process memory usage, enter the **show task memory** command.

```
user@host> show task memory
Memory                 Size (kB)  %Available  When
  Currently In Use:        29417          3%  now
  Maximum Ever Used:       33882          4%  00/02/11 22:07:03
  Available:              756281        100%  now
```

Table 24 on page 274 describes the output fields for the **show task memory** command. Output fields are listed in the approximate order in which they appear.

Table 24: show task memory Output Fields

Field Name	Field Description
Memory Currently In Use	Memory currently in use. Dynamically allocated memory plus the **DATA** segment memory in kilobytes.
Memory Maximum Ever Used	Maximum memory ever used.
Memory Available	Memory currently available.

The **show task memory** command does not display all the memory used by the routing protocol process. This value does not account for the memory used for the **TEXT** and

STACK segments, or the memory used by the routing protocol process's internal memory manager. The **show task memory** command also does not include the memory which has been deactivated by the routing protocol process, although some or all of that deactivated memory has not actually been freed by the kernel.

Why is the Memory Currently In Use value less than the RES value?

The **show task memory** command displays a **Memory Currently In Use** value measured in kilobytes. This value is the dynamically allocated memory plus the **DATA** segment memory. The **show system processes extensive** command displays a **RES** value measured in kilobytes. This value represents the amount of process memory resident in the physical memory. This is also known as RSS or Resident Set Size.

The **Memory Currently In Use** value does not account for all of the memory that the routing protocol process uses. This value does not include the memory used for the **TEXT** and the **STACK** segments, and a small percentage of memory used by the routing protocol process's internal memory manager. The **show task memory** command also does not include the memory which has been deactivated by the routing protocol process, although some or all of that deactivated memory has not actually been freed by the kernel.

Any amount of memory deactivated by the routing protocol process might still be considered part of the **RES** value. Generally, the kernel defers the actual freeing of deactivated memory until there is a memory shortage This can lead to large discrepancies between the **Memory Currently In Use** value and the **RES** value.

Routing Protocol Process Memory Swapping FAQs

This section presents frequently asked questions and answers related to the memory swapping of the routing protocol process from the Routing Engine memory to the hard disk memory.

Why does the system start swapping when I try to perform a core dump using the request system core-dumps command?

The **request system core-dumps** command displays a list of system core files created when the device has failed. This command can be useful for diagnostic purposes. Each list item includes the file permissions, number of links, owner, group, size, modification date, path, and filename. You can use the **core-filename** option and the **core-file-info**, **brief**, and **detail** options to display more information about the specified core dump files.

You can use the **request system core-dumps** command to perform a non-fatal core dump without aborting the routing protocol process. To do this, the routing protocol process is forked, generating a second copy, and then aborted. This process can double the memory consumed by the two copies of the routing protocol process, pushing the system into swap.

Why does the show system processes extensive command show that memory is swapped to disk even though there is plenty of free memory?

Memory can remain swapped out indefinitely if it is not accessed again. Therefore, the **show system processes extensive** command shows that memory is swapped to disk even though there is plenty of free memory. Such a situation is not unusual.

Troubleshooting the Routing Protocol Process FAQs

This section presents frequently asked questions and answers related to a shortage of memory and memory leakage by the routing protocol process.

What does the RPD_OS_MEMHIGH message mean?

The **RPD_OS_MEMHIGH** message is written into the system message file if the routing protocol process is running out of memory. This message alerts you that the routing protocol process is using the indicated amount and percentage of Routing Engine memory, which is considered excessive. This message is generated either because the routing protocol process is leaking memory or the use of system resources is excessive, perhaps because routing filters are not configured properly or the configured network topology is very complex.

When the memory utilization for the routing protocol process is using all available Routing Engine DRAM memory or reaches the maximum memory limit, a message of the following form is written every minute in the syslog message file:

```
RPD_OS_MEMHIGH: Using 188830 KB of memory, 100 percent of available
```

This message includes the amount (in kilobytes), the percentage, or both of the available memory in use.

This message should not appear under normal conditions, as any further memory allocations usually require a portion of existing memory to be written to swap. As a recommended solution, increase the amount of RAM in the Routing Engine. For more information, see http://kb.juniper.net/InfoCenter/index?page=content&id=KB14186 .

What can I do when there is a memory shortage even after a swap?

We do not recommend that the system operate in this state, notwithstanding the existence of swap. The protocols that run in the routing protocol process usually have a real-time requirement that cannot reliably withstand the latency of being swapped to hard disk. If the memory shortage has not resulted from a memory leak, then either a reduction in the memory usage or an upgrade to a higher memory-capacity Routing Engine is required.

What is the task_timer?

The source of a routing protocol process memory leak can usually be identified by dumping the timers for each task. You can use the **show task *task-name*** command to display routing protocol tasks on the Routing Engine. Tasks can be baseline tasks performed regardless of the device's configuration, and other tasks that depend on the device configuration.

For more information, see the show task command in the *Junos OS System Basics and Services Command Reference*.

Related Documentation

- Routing Protocol Process Memory FAQ Overview on page 269

CHAPTER 7

RIP Monitoring

Monitoring RIP Routing Information

Purpose Use the monitoring functionality to monitor RIP routing on routing devices.

Action To view RIP routing information in the J-Web interface, select **Monitor** > **Routing** > **RIP Information**.

To view RIP routing information in the CLI, enter the following CLI commands:

- **show rip statistics**
- **show rip neighbor**

Meaning Table 25 on page 277 summarizes key output fields in the RIP routing display in the J-Web interface.

Table 25: Summary of Key RIP Routing Output Fields

Field	Values	Additional Information
RIP Statistics		
Protocol Name	The RIP protocol name.	
Port number	The port on which RIP is enabled.	
Hold down time	The interval during which routes are neither advertised nor updated.	
Global routes learned	Number of RIP routes learned on the logical interface.	
Global routes held down	Number of RIP routes that are not advertised or updated during the hold-down interval.	
Global request dropped	Number of requests dropped.	

Table 25: Summary of Key RIP Routing Output Fields *(continued)*

Field	Values	Additional Information
Global responses dropped	Number of responses dropped.	
RIP Neighbors		
Neighbor	Name of the RIP neighbor.	This value is the name of the interface on which RIP is enabled. Click the name to see the details for this neighbor.
State	State of the RIP connection: **Up** or **Dn** (Down).	
Source Address	Local source address.	This value is the configured address of the interface on which RIP is enabled.
Destination Address	Destination address.	This value is the configured address of the immediate RIP adjacency.
Send Mode	The mode of sending RIP messages.	
Receive Mode	The mode in which messages are received.	
In Metric	Value of the incoming metric configured for the RIP neighbor.	

Related Documentation

- Configuring a RIP Network (J-Web Procedure)
- Layer 3 Protocols Supported on EX Series Switches

PART 5

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