Tunnel Properties

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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:

- M Series
- T Series
- MX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

   ```
   system {
     scripts {
       commit {
         file ex-script.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 ix 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 ix 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 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; interface names; 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**.

Documentation Feedback

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

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- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf .
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- Search for known bugs: http://www2.juniper.net/kb/
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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/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

CHAPTER 1

Tunnel Services

Tunnel Services Overview

By encapsulating arbitrary packets inside a transport protocol, tunneling provides a private, secure path through an otherwise public network. Tunnels connect discontinuous subnetworks and enable encryption interfaces, virtual private networks (VPNs), and MPLS. If you have a Tunnel Physical Interface Card (PIC) installed in your M Series or T Series router, you can configure unicast, multicast, and logical tunnels.

You can configure two types of tunnels for VPNs: one to facilitate routing table lookups and another to facilitate VPN routing and forwarding instance (VRF) table lookups.

For information about encryption interfaces, see Configuring Encryption Interfaces and the *Junos OS System Basics Configuration Guide*. For information about VPNs, see the *Junos OS VPNs Configuration Guide*. For information about MPLS, see the *Junos OS MPLS Applications Configuration Guide*.

On SRX Series and J Series devices, Generic Routing Encapsulation (GRE) and IP-IP tunnels use internal interfaces, gr-0/0/0 and ip-0/0/0, respectively. The Junos OS creates these interfaces at system bootup; they are not associated with physical interfaces.

The Juniper Networks Junos OS supports the tunnel types shown in Table 3 on page 3.

Table 3: Tunnel Interface Types

Interface	Description
gr-0/0/0	Configurable generic routing encapsulation (GRE) interface. GRE allows the encapsulation of one routing protocol over another routing protocol. Within a router, packets are routed to this internal interface, where they are first encapsulated with a GRE packet and then re-encapsulated with another protocol packet to complete the GRE. The GRE interface is an internal interface only and is not associated with a physical interface. You must configure the interface for it to perform GRE.
gre	Internally generated GRE interface. This interface is generated by the Junos OS to handle GRE. You cannot configure this interface.

Table 3: Tunnel Interface Types *(continued)*

Interface	Description
ip-0/0/0	Configurable IP-over-IP encapsulation (also called IP tunneling) interface. IP tunneling allows the encapsulation of one IP packet over another IP packet. Packets are routed to an internal interface where they are encapsulated with an IP packet and then forwarded to the encapsulating packet's destination address. The IP-IP interface is an internal interface only and is not associated with a physical interface. You must configure the interface for it to perform IP tunneling.
ipip	Internally generated IP-over-IP interface. This interface is generated by the Junos OS to handle IP-over-IP encapsulation. It is not a configurable interface.
lt-0/0/0	The **lt** interface on M Series and T Series routers supports configuration of logical systems—the capability to partition a single physical router into multiple logical devices that perform independent routing tasks. On SRX Series devices, the **lt** interface is a configurable logical tunnel interface that interconnects logical systems. See the *Junos OS Logical Systems Configuration Guide for Security Devices*. On J Series devices, the **lt** interface is used to provide class-of-service (CoS) support for real-time performance monitoring (RPM) probe packets. Packets are routed to this internal interface for services. The **lt** interface is an internal interface only; it is not associated with a physical interface. You must configure the interface for it to perform CoS for RPM services. See the *Junos OS Class of Service Configuration Guide for Security Devices*.
mt-0/0/0	Internally generated multicast tunnel interface. Multicast tunnels filter all unicast packets; if an incoming packet is not destined for a **224/8**-or-greater prefix, the packet is dropped and a counter is incremented. Within a router, packets are routed to this internal interface for multicast filtering. The multicast tunnel interface is an internal interface only and is not associated with a physical interface. If your router has a Tunnel Services PIC, the Junos OS automatically configures one multicast tunnel interface (**mt-**) for each virtual private network (VPN) you configure. You do not need to configure multicast tunnel interfaces. However, you can configure properties on **mt-** interfaces, such as the **multicast-only** statement.
mtun	Internally generated multicast tunnel interface. This interface is generated by the Junos OS to handle multicast tunnel services. It is not a configurable interface.
pd-0/0/0	Configurable Protocol Independent Multicast (PIM) de-encapsulation interface. In PIM sparse mode, the first-hop router encapsulates packets destined for the rendezvous point router. The packets are encapsulated with a unicast header and are forwarded through a unicast tunnel to the rendezvous point. The rendezvous point then de-encapsulates the packets and transmits them through its multicast tree. Within a router, packets are routed to this internal interface for de-encapsulation. The PIM de-encapsulation interface is an internal interface only and is not associated with a physical interface. You must configure the interface for it to perform PIM de-encapsulation. NOTE: On SRX Series devices, this interface type is **ppd0**.

Table 3: Tunnel Interface Types *(continued)*

Interface	Description
pe-0/0/0	Configurable PIM encapsulation interface. In PIM sparse mode, the first-hop router encapsulates packets destined for the rendezvous point router. The packets are encapsulated with a unicast header and are forwarded through a unicast tunnel to the rendezvous point. The rendezvous point then de-encapsulates the packets and transmits them through its multicast tree. Within a router, packets are routed to this internal interface for encapsulation. The PIM encapsulation interface is an internal interface only and is not associated with a physical interface. You must configure the interface for it to perform PIM encapsulation. NOTE: On SRX Series devices, this interface type is **ppe0**.
pimd	Internally generated PIM de-encapsulation interface. This interface is generated by the Junos OS to handle PIM de-encapsulation. It is not a configurable interface.
pime	Internally generated PIM encapsulation interface. This interface is generated by the Junos OS to handle PIM encapsulation. It is not a configurable interface.
vt-0/0/0	Configurable virtual loopback tunnel interface. Facilitates VRF table lookup based on MPLS labels. This interface type is supported on M Series and T Series routers, but not on SRX Series or J Series devices. To configure a virtual loopback tunnel to facilitate VRF table lookup based on MPLS labels, you specify a virtual loopback tunnel interface name and associate it with a routing instance that belongs to a particular routing table. The packet loops back through the virtual loopback tunnel for route lookup.

GRE Keepalive Time Overview

Generic routing encapsulation (GRE) tunnel interfaces do not have a built-in mechanism for detecting when a tunnel is down. You can enable keepalive messages to serve as the detection mechanism.

Keepalives can be configured on the physical or on the logical interface. If configured on the physical interface, keepalives are sent on all logical interfaces that are part of the physical interface. If configured on a individual logical interface, keepalives are only sent to that logical interface. In addition to configuring a keepalive, you must configure the hold time.

Related Documentation

- Configuring GRE Keepalive Time on page 14
- Example: Configuring Keepalive for a GRE Interface on page 26
- **keepalive-time on page 35**
- **hold-time on page 34**

PART 2

Configuration

CHAPTER 2

Configuration Tasks

Configuring Unicast Tunnels

To configure a unicast tunnel, you configure a **gr-** interface (to use GRE encapsulation) or an **ip-** interface (to use IP-IP encapsulation) and include the **tunnel** and **family** statements:

```
gr-fpc/pic/port or ip-fpc/pic/port {
  unit logical-unit-number {
    copy-tos-to-outer-ip-header;
    reassemble-packets;
    tunnel {
      allow-fragmentation;
      backup-destination address;
      destination destination-address;
      do-not-fragment;
      key number;
      routing-instance {
        destination routing-instance-name;
      }
      source address;
      ttl number;
    }
    family family {
      address address {
        destination address;
      }
```

```
    }
  }
}
```

You can configure these statements at the following hierarchy levels:

- **[edit interfaces]**
- **[edit logical-systems** *logical-system-name* **interfaces]**

You can configure multiple logical units for each GRE or IP-IP interface, and you can configure only one tunnel per unit.

Each tunnel interface must be a point-to-point interface. Point to point is the default interface connection type, so you do not need to include the **point-to-point** statement in the logical interface configuration.

You must specify the tunnel's destination and source addresses. The remaining statements are optional.

NOTE: For transit packets exiting the tunnel, forwarding path features, such as reverse path forwarding (RPF), forwarding table filtering, source class usage, destination class usage, and stateless firewall filtering, are not supported on the interfaces you configure as tunnel sources, but are supported on tunnel-pic interfaces.

However, class-of-service (CoS) information obtained from the GRE or IP-IP header is carried over the tunnel and is used by the re-entering packets. For more information, see the *Junos OS Class of Service Configuration Guide*.

To prevent an invalid configuration, the Junos OS disallows setting the address specified by the **source** or **destination** statement at the **[edit interfaces gr-***fpc/pic/port* **unit** *logical-unit-number* **tunnel]** hierarchy level to be the same as the interface's own subnet address, specified by the **address** statement at the **[edit interfaces gr-***fpc/pic/port* **unit** *logical-unit-number* **family** *family-name***]** hierarchy level.

To set the time-to-live (TTL) field that is included in the encapsulating header, include the **ttl** statement. If you explicitly configure a TTL value for the tunnel, you must configure it to be one larger than the number of hops in the tunnel. For example, if the tunnel has seven hops, you must configure a TTL value of 8.

You must configure at least one family on the logical interface. To enable MPLS over GRE tunnel interfaces, you must include the **family mpls** statement in the GRE interface configuration. In addition, you must include the appropriate statements at the **[edit protocols]** hierarchy level to enable Resource Reservation Protocol (RSVP), MPLS, and label-switched paths (LSPs) over GRE tunnels. Unicast tunnels are bidirectional.

A configured tunnel cannot go through Network Address Translation (NAT) at any point along the way to the destination. For more information, see "Examples: Configuring Unicast Tunnels" on page 23 and the *Junos OS MPLS Applications Configuration Guide*.

For a GRE tunnel, the default is to set the ToS bits in the outer IP header to all zeros. To have the Routing Engine copy the ToS bits from the inner IP header to the outer, include the **copy-tos-bits-to-outer-ip-header** statement. (This inner-to-outer ToS bits copying is already the default behavior for IP-IP tunnels.)

For GRE tunnel interfaces on Adaptive Services or Multiservices interfaces, you can configure additional tunnel attributes, as described in the following sections:

Configuring a Key Number on GRE Tunnels

For Adaptive Services and Multiservices interfaces on M Series and T Series routers, you can assign a key value to identify an individual traffic flow within a GRE tunnel, as defined in RFC 2890, *Key and Sequence Number Extensions to GRE*. However, only one key is allowed for each tunnel source and destination pair.

Each IP version 4 (IPv4) packet entering the tunnel is encapsulated with the GRE tunnel key value. Each IPv4 packet exiting the tunnel is verified by the GRE tunnel key value and de-encapsulated. The Adaptive Services or Multiservices PIC drops packets that do not match the configured key value.

To assign a key value to a GRE tunnel interface, include the **key** statement:

```
key number;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* tunnel]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]**

The key number can be 0 through 4,294,967,295. You must configure the same GRE tunnel key value on tunnel endpoints.

The following example illustrates the use of the key statement in a GRE tunnel configuration:

```
interfaces {
   gr-1/2/0 {
      unit 0 {
         tunnel {
            source 10.58.255.193;
            destination 10.58.255.195;
            key 1234;
         }
         ...
         family inet {
```

```
            mtu 1500;
            address 10.200.0.1/30;
            ...
          }
        }
      }
    }
```

Enabling Fragmentation on GRE Tunnels

For GRE tunnel interfaces on Adaptive Services and Multiservices interfaces only, you can enable fragmentation of IPv4 packets in GRE tunnels.

By default, IPv4 traffic transmitted over GRE tunnels is not fragmented. To enable fragmentation of IPv4 packets in GRE tunnels, include the **clear-dont-fragment-bit** statement:

```
clear-dont-fragment-bit;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces** *interface-name* **unit** *logical-unit-number***]**
- **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number***]**

When you include the **clear-dont-fragment-bit** statement in the configuration, the don't-fragment (DF) bit is cleared on all packets, even packets that do not exceed the tunnel maximum transmission unit (MTU). If the packet's size exceeds the tunnel's MTU value, the packet is fragmented before encapsulation. If the packet's size does not exceed the tunnel's MTU value, the packet is not fragmented.

NOTE: The Packet Forwarding Engine updates the IP identification field in the outer IP header of GRE-encapsulated packets, so that reassembly of the packets is possible after fragmentation. The previous CLI constraint check that required you to configure either the **clear-dont-fragment-bit** statement or a tunnel key with the **allow-fragmentation** statement is no longer enforced.

You can also clear the DF bit in packets transmitted over IP Security (IPsec) tunnels. For more information, see Enabling IPsec Packet Fragmentation.

Specifying an MTU Setting for the Tunnel

To enable key numbers and fragmentation on GRE tunnels (as described in "Configuring a Key Number on GRE Tunnels" on page 11 and "Enabling Fragmentation on GRE Tunnels" on page 12), you must also specify an MTU setting for the tunnel.

To specify an MTU setting for the tunnel, include the **mtu** statement:

```
mtu bytes;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces gr-*fpc/pic/port* unit *logical-unit-number* family inet]**
- **[edit logical-system *logical-system-name* interfaces gr-*fpc/pic/port* unit *logical-unit-number* family inet]**

For more information about MTU settings, see the *Junos OS Network Interfaces Configuration Guide*.

Configuring a GRE Tunnel to Copy ToS Bits to the Outer IP Header

Unlike IP-IP tunnels, GRE tunnels do not copy the ToS bits to the outer IP header by default. To have the Routing Engine copy the inner ToS bits to the outer IP header (which is required for some tunneled routing protocols) on packets sent by the Routing Engine, include the **copy-tos-to-outer-ip-header** statement at the logical unit hierarchy level of a GRE interface. This example copies the inner ToS bits to the outer IP header on a GRE tunnel:

```
[edit interfaces]
gr-0/0/0 {
  unit 0 {
    copy-tos-to-outer-ip-header;
    family inet;
  }
}
```

Configuring Packet Reassembly

On GRE tunnel interfaces only, you can enable reassembly of fragmented tunnel packets. To activate this capability, include the **reassemble-packets** statement:

```
reassemble-packets;
```

You can configure this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

For each tunnel you configure on the interface, you can enable or disable fragmentation of GRE packets by including the **allow-fragmentation** or **do-not-fragment** statement:

```
allow-fragmentation;
do-not-fragment;
```

You can configure these statements at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* tunnel]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]**

If you configure **allow-fragmentation** on a tunnel, it clears the DF bit in the outer IP header, enabling post fragmentation of GRE-encapsulated packets if the packet size exceeds the maximum transmission unit (MTU) value for the egress interface. By default, packets that exceed the MTU size are dropped and post fragmentation of GRE packets is disabled.

NOTE: Whenever you configure **allow-fragmentation** on a tunnel, you must also include either the **tunnel key** or the **clear-dont-fragment-bit** statement. This configuration enables the router to send affected packets to the PIC so that the correct IP header can be placed in the fragments. Otherwise, on the reassembly side some packets might be lost when fragments arrive in the PIC out of sequence at high speeds.

Configuring GRE Keepalive Time

You can configure the keepalives on a GRE tunnel interface by including both the **keepalive-time** statement and the **hold-time** statement at the **[edit protocols oam gre-tunnel interface *interface-name*]** hierarchy level.

NOTE: For proper operation of keepalives on a GRE interface, you must also include the **family inet** statement at the **[edit interfaces *interface-name* unit *unit*]** hierarchy level. If you do not include this statement, the interface is marked as down.

To configure keepalive time for a GRE tunnel interface:

1. At the **[edit interfaces *interface-name* unit *unit-number*]** hierarchy level, set the **family** as **inet**.

   user@host# **set interfaces *interface-name* unit *unit-number* family *family-name***

2. Configure the Operation, Administration, and Maintenance (OAM) protocol:

   [edit]
   user@host# **edit protocols oam**

3. Configure the GRE tunnel interface:

   [edit protocols oam]
   user@host# **edit gre-tunnel interface *interface-name***

4. Configure the keepalive time:

   [edit protocols oam gre-tunnel interface *interface-name*]
   user@host# **set** keepalive-time ***seconds***

5. Configure the hold time, which must be at least twice the keepalive time.

   [edit protocols oam gre-tunnel interface *interface-name*]
   user@host# **set** hold-time ***seconds***

When the keepalive hold time expires, the GRE tunnel will stay up even though the interface cannot send or receive traffic. To verify the GRE tunnel state, check the output for the following commands:

```
user@host> show interfaces gr-3/3/0.3 terse

Interface               Admin Link Proto    Local                 Remote
```

```
gr-3/3/0.3             up    up   inet     200.1.3.1/24
                                  mpls

user@host> show interfaces gr-3/3/0.3 extensive
Logical interface gr-3/3/0.3 (Index 73) (SNMP ifIndex 594) (Generation 900)
    Flags: Point-To-Point SNMP-Traps 0x4000 IP-Header
10.1.19.11:10.1.19.12:47:df:64:0000000000000000 Encapsulation: GRE-NULL
    Gre keepalives configured: On, Gre keepalives adjacency state: down
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
    Traffic statistics:
     Input  bytes  :             15629992
     Output bytes  :             15912273
     Input  packets:               243813
     Output packets:               179476
    Local statistics:
     Input  bytes  :             15322586
     Output bytes  :             15621359
     Input  packets:               238890
     Output packets:               174767
    Transit statistics:
     Input  bytes  :               307406                    0 bps
     Output bytes  :               290914                    0 bps
     Input  packets:                 4923                    0 pps
     Output packets:                 4709                    0 pps
    Protocol inet, MTU: 1476, Generation: 1564, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
        Destination: 200.1.3/24, Local: 200.1.3.1, Broadcast: 200.1.3.255,
Generation: 1366
    Protocol mpls, MTU: 1464, Maximum labels: 3, Generation: 1565, Route table:
0
```

NOTE: When the keepalive hold time has expired, the **Link status** will be **Up** and the **Gre keepalives adjacency state** will be **Down**.

Related Documentation

- GRE Keepalive Time Overview on page 5
- Example: Configuring Keepalive for a GRE Interface on page 26
- keepalive-time on page 35
- hold-time on page 34

Restricting Tunnels to Multicast Traffic

For interfaces that carry IPv4 or IP version 6 (IPv6) traffic, you can configure a tunnel interface to allow multicast traffic only. To configure a multicast-only tunnel, include the **multicast-only** statement:

```
multicast-only;
```

You can configure this statement at the following hierarchy levels:

- **[edit interfaces** *interface-name* **unit** *logical-unit-number* **family** *family***]**

- **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family***]**

Multicast tunnels filter all unicast packets; if an incoming packet is not destined for a 224/8 or greater prefix, the packet is dropped and a counter is incremented.

You can configure this property on GRE, IP-IP, PIM, and multicast tunnel (**mt**) interfaces only.

NOTE: If your router has a Tunnel Services PIC, the Junos OS automatically configures one multicast tunnel interface (**mt**) for each virtual private network (VPN) you configure. You do not need to configure multicast tunnel interfaces.

Configuring Logical Tunnel Interfaces

Logical tunnel (**lt-**) interfaces provide quite different services depending on the host router:

- On M Series, MX Series, and T Series routers, logical tunnel interfaces allow you to connect logical systems, virtual routers, or VPN instances. M Series and T Series routers must be equipped with a Tunnel Services PIC or an Adaptive Services Module (only available on M7i routers). MX Series routers must be equipped with a Trio MPC/MIC module. For more information about connecting these applications, see the *Junos OS VPNs Configuration Guide*.
- On SRX Series Services Gateways, the logical tunnel interface is used to interconnect logical systems. See the *Junos OS Logical Systems Configuration Guide for Security Devices*.
- On J Series Services Routers, the logical tunnel interface is used to provide class-of-service (CoS) support for real-time performance monitoring (RPM) probe packets. Packets are routed to this internal interface for services. See the *Junos OS Class of Service Configuration Guide for Security Devices*.

For M Series, MX Series, and T Series routers, see the following section:

- Connecting Logical Systems on page 16

Connecting Logical Systems

To connect two logical systems, you configure a logical tunnel interface on both logical systems. Then you configure a peer relationship between the logical tunnel interfaces, thus creating a point-to-point connection.

To configure a point-to-point connection between two logical systems, configure the logical tunnel interface by including the **lt-*fpc/pic/port*** statement:

```
lt-fpc/pic/port {
  unit logical-unit-number {
    encapsulation encapsulation;
    peer-unit unit-number; # peering logical system unit number
    dlci dlci-number;
```

```
        family (inet | inet6 | iso | mpls);
    }
}
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces]**
- **[edit logical-systems *logical-system-name* interfaces]**

When configuring logical tunnel interfaces, note the following:

- You can configure each logical tunnel interface with one of the following encapsulation types: Ethernet, Ethernet circuit cross-connect (CCC), Ethernet VPLS, Frame Relay, Frame Relay CCC, VLAN, VLAN CCC, or VLAN VPLS.
- You can configure the IP, IPv6, International Organization for Standardization (ISO), or MPLS protocol family.
- The peering logical interfaces must belong to the same logical tunnel interface derived from the Tunnel Services PIC or Adaptive Services Module.
- You can configure only one peer unit for each logical interface. For example, unit 0 cannot peer with both unit 1 and unit 2.
- To enable the logical tunnel interface, you must configure at least one physical interface statement.
- Logical tunnels are not supported with Adaptive Services, Multiservices, or Link Services PICs (but they are supported on the Adaptive Services Module on M7i routers, as noted above).
- On M Series routers other than the M40e router, logical tunnel interfaces require an Enhanced Flexible PIC Concentrator (FPC).
- On MX Series routers, logical tunnel interfaces require Trio MPC/MIC modules. They do not require a Tunnel Services PIC in the same system.

For more information about configuring logical systems, see the *Junos OS Routing Protocols Configuration Guide*.

Configuring Tunnel Interfaces for Routing Table Lookup

To configure tunnel interfaces to facilitate routing table lookups for VPNs, you specify a tunnel's endpoint IP addresses and associate them with a routing instance that belongs to a particular routing table. This enables the Junos OS to search in the appropriate routing table for the route prefix, because the same prefix can appear in multiple routing tables. To configure the destination VPN, include the **routing-instance** statement:

```
routing-instance {
    destination routing-instance-name;
}
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel]**

- **[edit logical-systems *logical-system-name* interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel]**

This configuration indicates that the tunnel's destination address is in routing instance ***routing-instance-name***. By default, the tunnel route prefixes are assumed to be in the default Internet routing table **inet.0**.

NOTE: If you configure a virtual loopback tunnel interface and the **vrf-table-label** statement on the same routing instance, the **vrf-table-label** statement takes precedence over the virtual loopback tunnel interface. For more information, see "Configuring Virtual Loopback Tunnels for VRF Table Lookup" on page 18.

For more information about VPNs, see the *Junos OS VPNs Configuration Guide*.

Configuring Virtual Loopback Tunnels for VRF Table Lookup

To enable egress filtering, you can either configure filtering based on the IP header, or you can configure a virtual loopback tunnel on routers equipped with a Tunnel PIC. Table 4 on page 18 describes each method.

Table 4: Methods for Configuring Egress Filtering

Method	Interface Type	Configuration Guidelines	Comments
Filter traffic based on the IP header	Nonchannelized Point-to-Point Protocol / High Level Data Link Control (PPP/HDLC) core-facing SONET/SDH interfaces	Include the **vrf-table-label** statement at the **[edit routing-instances *instance-name*]** hierarchy level. For more information, see the *Junos OS VPNs Configuration Guide*.	There is no restriction on customer-edge (CE) router-to-provider edge (PE) router interfaces.
Configure a virtual loopback tunnel on routers equipped with a Tunnel PIC	All interfaces	See the guidelines in this section.	Router must be equipped with a Tunnel PIC. There is no restriction on the type of core-facing interface used or CE router-to-PE router interface used. You cannot configure a virtual loopback tunnel and the **vrf-table-label** statement at the same time.

You can configure a virtual loopback tunnel to facilitate VRF table lookup based on MPLS labels. You might want to enable this functionality so you can do either of the following:

- Forward traffic on a PE router to CE device interface, in a shared medium, where the CE device is a Layer 2 switch without IP capabilities (for example, a metro Ethernet switch).

  The first lookup is done based on the VPN label to determine which VRF table to refer to, and the second lookup is done on the IP header to determine how to forward packets to the correct end hosts on the shared medium.

- Perform egress filtering at the egress PE router.

  The first lookup on the VPN label is done to determine which VRF table to refer to, and the second lookup is done on the IP header to determine how to filter and forward packets. You can enable this functionality by configuring output filters on the VRF interfaces.

To configure a virtual loopback tunnel to facilitate VRF table lookup based on MPLS labels, you specify a virtual loopback tunnel interface name and associate it with a routing instance that belongs to a particular routing table. The packet loops back through the virtual loopback tunnel for route lookup. To specify a virtual loopback tunnel interface name, you configure the virtual loopback tunnel interface at the **[edit interfaces]** hierarchy level and include the **family inet** and **family mpls** statements:

```
vt-fpc/pic/port {
    unit 0 {
        family inet;
        family mpls;
    }
    unit 1 {
        family inet;
    }
}
```

To associate the virtual loopback tunnel with a routing instance, include the virtual loopback tunnel interface name at the **[edit routing-instances]** hierarchy level:

```
interface vt-fpc/pic/port;
```

NOTE: For the virtual loopback tunnel interface, none of the logical interface statements are valid, except for the family statement; in particular, you cannot configure IPv4 or IPv6 addresses on these interfaces. Also, virtual loopback tunnels do not support class-of-service (CoS) configurations.

Configuring PIM Tunnels

PIM tunnels are enabled automatically on routers that have a tunnel PIC and on which you enable PIM sparse mode. You do not need to configure the tunnel interface.

PIM tunnels are unidirectional.

In PIM sparse mode, the first-hop router encapsulates packets destined for the rendezvous point (RP) router. The packets are encapsulated with a unicast header and are forwarded through a unicast tunnel to the RP. The RP then de-encapsulates the packets and transmits them through its multicast tree. To perform the encapsulation and de-encapsulation, the first-hop and RP routers must be equipped with Tunnel PICs.

The Junos OS creates two interfaces to handle PIM tunnels:

- **pe**—Encapsulates packets destined for the RP. This interface is present on the first-hop router.
- **pd**—De-encapsulates packets at the RP. This interface is present on the RP.

NOTE: **The pe and pd interfaces do not support class-of-service (CoS) configurations.**

Configuring IPv6-over-IPv4 Tunnels

If you have a Tunnel PIC installed in your M Series or T Series router, you can configure IPv6-over-IPv4 tunnels. To define a tunnel, you configure a unicast tunnel across an existing IPv4 network infrastructure. IPv6/IPv4 packets are encapsulated in IPv4 headers and sent across the IPv4 infrastructure through the configured tunnel. You manually configure configured tunnels on each end point.

On SRX Series and J Series devices, Generic Routing Encapsulation (GRE) and IP-IP tunnels use internal interfaces, gr-0/0/0 and ip-0/0/0, respectively. The Junos OS creates these interfaces at system bootup; they are not associated with a physical interface.

IPv6-over-IPv4 tunnels are defined in RFC 2893, *Transition Mechanisms for IPv6 Hosts and Routers*. For information about configuring a unicast tunnel, see "Configuring Unicast Tunnels" on page 9. For an IPv6-over-IPv4 tunnel configuration example, see "Example: Configuring an IPv6-over-IPv4 Tunnel" on page 25.

Configuring Dynamic Tunnels

A VPN that travels through a non-MPLS network requires a GRE tunnel. This tunnel can be either a static tunnel or a dynamic tunnel. A static tunnel is configured manually between two PE routers. A dynamic tunnel is configured using BGP route resolution.

When a router receives a VPN route that resolves over a BGP next hop that does not have an MPLS path, a GRE tunnel can be created dynamically, allowing the VPN traffic to be forwarded to that route. Only GRE IPv4 tunnels are supported.

To configure a dynamic tunnel between two PE routers, include the **dynamic-tunnels** statement:

```
dynamic-tunnels tunnel-name {
    destination-networks prefix;
    source-address address;
    tunnel-type type-of-tunnel;
```

```
}
```

You can configure this statement at the following hierarchy levels:

- **[edit routing-options]**
- **[edit routing-instances *routing-instance-name* routing-options]**
- **[edit logical-systems *logical-system-name* routing-options]**
- **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options]**

For more information about configuring routing options or BGP, see the *Junos OS Routing Protocols Configuration Guide*. For more information about VPNs, see the *Junos OS VPNs Configuration Guide*.

Configuring Tunnel Interfaces on MX Series Routers

Because the MX Series routers do not support Tunnel Services PICs, you create tunnel interfaces on MX Series routers by including the following statements at the **[edit chassis]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic number {
    tunnel-services {
      bandwidth (1g | 10g | 20g | 40g);
    }
  }
}
```

fpc *slot-number* is the slot number of the DPC, MPC, or MIC. On the MX80 router, the range is 0 through 1. On other MX series routers, if two SCBs are installed, the range is 0 through 11. If three SCBs are installed, the range is 0 through 5 and 7 through 11.

The **pic *number*** On MX80 routers, if the FPC is 0, the PIC number can only be 0. If the FPC is 1, the PIC range is 0 through 3. For all other MX series routers, the range is 0 through 3.

bandwidth (**1g** | **10g** | **20g** | **40g**) is the amount of bandwidth to reserve for tunnel traffic on each Packet Forwarding Engine.

NOTE: When you use MPCs and MICs, tunnel interfaces are soft interfaces and allow as much traffic as the forwarding-path allows, so it is advantageous to setup tunnel services without artificially limiting traffic by use of the **bandwidth** option. However, you *must* specify **bandwidth** when configuring tunnel services for MX Series routers with DPCs or FPCs. The GRE key option is not supported on the tunnel interfaces for DPCs on MX960 routers.

Bandwidth rates of 20 gigabits per second and 40 gigabits per second require use of an MX Series router with the 100-Gigabit Ethernet Modular Port Concentrator (MPC) and the 100-Gigabit CFP MIC.

1g indicates that 1 gigabit per second of bandwidth is reserved for tunnel traffic.

10g indicates that 10 gigabits per second of bandwidth is reserved for tunnel traffic.

20g indicates that 20 gigabits per second of bandwidth is reserved for tunnel traffic.

40g indicates that 40 gigabits per second of bandwidth is reserved for tunnel traffic.

If you specify a bandwidth that is not compatible, tunnel services are not activated. For example, you cannot specify a bandwidth of 1 Gbps for a Packet Forwarding Engine on a 10-Gigabit Ethernet 4-port DPC.

To verify that the tunnel interfaces have been created, issue the **show interfaces terse** operational mode command. For more information, see the *Junos Interfaces Command Reference*.

Related Documentation

- Example: Configuring Tunnel Interfaces on a Gigabit Ethernet 40-Port DPC
- Example: Configuring Tunnel Interfaces on a 10-Gigabit Ethernet 4-Port DPC
- Example: Configuring Tunnel Interfaces on a 100-Gigabit Ethernet MPC
- bandwidth
- tunnel-services
- [edit chassis] Hierarchy Level

CHAPTER 3

Examples

Examples: Configuring Unicast Tunnels

Configure two unnumbered IP-IP tunnels:

```
[edit interfaces]
ip-0/3/0 {
   unit 0 {
      tunnel {
         source 192.168.4.18;
         destination 192.168.4.253;
      }
      family inet;
   }
   unit 1 {
      tunnel {
         source 192.168.4.18;
         destination 192.168.4.254;
      }
      family inet;
   }
}
```

Configure numbered tunnel interfaces by including an address at the **[edit interfaces ip-0/3/0 unit (0 | 1) family inet]** hierarchy level:

```
[edit interfaces]
ip-0/3/0 {
   unit 0 {
      tunnel {
         source 192.168.4.18;
         destination 192.168.4.253;
      }
      family inet {
         address 10.5.5.1/30;
```

```
    }
  }
  unit 1 {
    tunnel {
      source 192.168.4.18;
      destination 192.168.4.254;
    }
    family inet {
      address 10.6.6.100/30;
    }
  }
}
```

Configure an MPLS over GRE tunnel by including the **family mpls** statement at the **[edit interfaces gr-1/2/0 unit 0]** hierarchy level:

```
[edit interfaces]
gr-1/2/0 {
  unit 0 {
    tunnel {
      source 192.168.1.1;
      destination 192.168.1.2;
    }
    family inet {
      address 10.1.1.1/30;
    }
    family mpls;
  }
}
```

Example: Configuring a Virtual Loopback Tunnel for VRF Table Lookup

Configure a virtual loopback tunnel for VRF table lookup:

```
[edit routing-instances]
routing-instance-1 {
  instance-type vrf;
  interface vt-1/0/0.0;
  interface so-0/2/2.0;
  route-distinguisher 2:3;
  vrf-import VPN-A-import;
  vrf-export VPN-A-export;
  routing-options {
    static {
      route 10.0.0.0/8 next-hop so-0/2/2.0;
    }
  }
}
routing-instance-2 {
  instance-type vrf;
  interface vt-1/0/0.1;
  interface so-0/3/2.0;
  route-distinguisher 4:5;
  vrf-import VPN-B-import;
  vrf-export VPN-B-export;
  routing-options {
```

```
    static {
      route 10.0.0.0/8 next-hop so-0/3/2.0;
    }
  }
}
[edit interfaces]
vt-1/0/0 {
  unit 0 {
    family inet;
    family mpls;
  }
  unit 1 {
    family inet;
  }
}
```

Example: Configuring an IPv6-over-IPv4 Tunnel

Configure a tunnel on both sides of the connection.

Configuration on Router 1

```
[edit]
interfaces {
  gr-1/0/0 {
    unit 0 {
      tunnel {
        source 10.19.2.1;
        destination 10.19.3.1;
      }
      family inet6 {
        address 2001:DB8:1:1/126;
      }
    }
  }
}
```

Configuration on Router 2

```
[edit]
interfaces {
  gr-1/0/0 {
    unit 0 {
      tunnel {
        source 10.19.3.1;
        destination 10.19.2.1;
      }
      family inet6 {
        address 2001:DB8:2:1/126;
      }
    }
  }
}
```

Example: Configuring Logical Tunnels

Configure three logical tunnels:

```
[edit interfaces]
```

```
lt-4/2/0 {
   description “Logical tunnel interface connects three logical systems”;
}
[edit logical-systems]
lr1 {
   interfaces lt-4/2/0 {
      unit 12 {
         peer-unit 21; #Peering with lr2
         encapsulation frame-relay;
         dlci 612;
         family inet;
      }
      unit 13 {
         peer-unit 31; #Peering with lr3
         encapsulation frame-relay-ccc;
         dlci 613;
      }
   }
}
lr2 {
   interfaces lt-4/2/0 {
      unit 21 {
         peer-unit 12; #Peering with lr1
         encapsulation frame-relay-ccc;
         dlci 612;
      }
      unit 23 {
         peer-unit 32; #Peering with lr3
         encapsulation frame-relay;
         dlci 623;
      }
   }
}
lr3 {
   interfaces lt-4/2/0 {
      unit 31 {
         peer-unit 13; #Peering with lr1
         encapsulation frame-relay;
         dlci 613;
         family inet;
      }
      unit 32 {
         peer-unit 23; #Peering with lr2
         encapsulation frame-relay-ccc;
         dlci 623;
      }
   }
}
```

Example: Configuring Keepalive for a GRE Interface

The following example illustrates the minimum configuration of a GRE tunnel interface:

```
[edit]
user@host# show interfaces gr-3/2/0 unit 0
```

```
    {
      family inet;
    }
[edit]
user@host# show
protocols {
  oam {
    gre-tunnel {
      interface gr-1/1/10.1 {
        keepalive-time 10;
          hold-time 30;
        }
      }
    }
  }
```

Related Documentation

- GRE Keepalive Time Overview on page 5
- Configuring GRE Keepalive Time on page 14
- keepalive-time on page 35

CHAPTER 4

Configuration Statements

allow-fragmentation

Syntax allow-fragmentation;

Hierarchy Level [edit interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel]

Release Information Statement introduced in Junos OS Release 9.2.

Description Enable fragmentation of generic routing encapsulation (GRE) encapsulated packets regardless of maximum transmission unit (MTU) value.

Default By default, the GRE-encapsulated packets are dropped if the packet size exceeds the MTU setting of the egress interface.

Usage Guidelines See "Configuring Packet Reassembly" on page 13.

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

Related Documentation

- reassemble-packets on page 37

backup-destination

Syntax backup-destination *destination-address*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel],[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]

Release Information Statement introduced before Junos OS Release 7.4.

Description For tunnel interfaces, specify the remote address of the backup tunnel.

Options ***destination-address***—Address of the remote side of the connection.

Usage Guidelines See Configuring IPsec Tunnel Redundancy.

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

Related Documentation
- destination
- destination (Tunnel Remote End) on page 31

copy-tos-to-outer-ip-header

Syntax copy-tos-to-outer-ip-header;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 8.2.

Description For GRE tunnel interfaces only, enable the inner IP header's ToS bits to be copied to the outer IP packet header.

Default If you omit this statement, the ToS bits in the outer IP header are set to 0.

Usage Guidelines See "Configuring a GRE Tunnel to Copy ToS Bits to the Outer IP Header" on page 13.

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

destination (Tunnel Remote End)

Syntax destination *address*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]

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

Description For tunnel interfaces, specify the remote address of the tunnel.

Options ***destination-address***—Address of the remote side of the connection.

Usage Guidelines See "Configuring Unicast Tunnels" on page 9, Configuring Traffic Sampling, and Configuring Flow Monitoring.

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

destination (Routing Instance)

Syntax destination *routing-instance-name*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel routing-instance]

Release Information Statement introduced before Junos OS Release 7.4.

Description Specify the destination routing instance that points to the routing table containing the tunnel destination address.

Default The default Internet routing table **inet.0**.

Usage Guidelines See "Configuring Tunnel Interfaces for Routing Table Lookup" on page 17.

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

destination-networks

Syntax destination-networks *prefix*;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit logical-systems *logical-system-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-options dynamic-tunnels *tunnel-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Create a tunnel for routes in these destination networks.

Options ***prefix***—Destination prefix of network.

Usage Guidelines See "Configuring Dynamic Tunnels" on page 20.

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

do-not-fragment

Syntax do-not-fragment;

Hierarchy Level [edit interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces gr-*fpc/pic/port* unit *logical-unit-number* tunnel]

Release Information Statement introduced in Junos OS Release 9.2.

Description Set the do-not-fragment (DF) bit on the packets entering the GRE tunnel so that they do not get fragmented anywhere in the path.

Default By default, fragmentation is disabled.

Usage Guidelines See "Configuring Packet Reassembly" on page 13.

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

Related Documentation

- reassemble-packets on page 37

dynamic-tunnels

Syntax

```
dynamic-tunnels tunnel-name {
  destination-networks prefix;
  source-address address;
  tunnel-type type-of-tunnel;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options],
[edit logical-systems *logical-system-name* routing-options],
[edit routing-instances *routing-instance-name* routing-options],
[edit routing-options]

Release Information

Statement introduced before Junos OS Release 7.4.

Description

Configure a dynamic tunnel between two provider edge (PE) routers.

Options

tunnel-name—Name of the dynamic tunnel.

The statements are explained separately in this chapter.

Usage Guidelines

See "Configuring Dynamic Tunnels" on page 20.

Required Privilege Level

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

hold-time (OAM)

Syntax hold-time *seconds*;

Hierarchy Level [edit protocols oam],
[edit protocols oam gre-tunnel interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Length of time the originating end of a GRE tunnel waits for keepalive packets from the other end of the tunnel before marking the tunnel as operationally down.

Options *seconds*—Hold-time value.

Default: 5 seconds

Range: 5 through 250 seconds

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

Related Documentation

- GRE Keepalive Time Overview on page 5
- Configuring GRE Keepalive Time on page 14
- Example: Configuring Keepalive for a GRE Interface on page 26
- **keepalive-time on page 35**

interfaces

Syntax interfaces { ... }

Hierarchy Level [edit]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure interfaces on the router.

Default The management and internal Ethernet interfaces are automatically configured. You must configure all other interfaces.

Usage Guidelines See the *Junos OS Network Interfaces Configuration Guide*.

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

keepalive-time

Syntax keepalive-time *seconds*;

Hierarchy Level [edit protocols oam],
[edit protocols oam gre-tunnel interface *interface-name*],
[edit protocols oam gre-tunnel interface *interface-name.unit-number*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Time difference between consecutive keepalive packets in a GRE tunnel.

Options *seconds*—Keepalive time value.

Default: 1 second

Range: 1 through 50 seconds

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

Related Documentation

- GRE Keepalive Time Overview on page 5
- Configuring GRE Keepalive Time on page 14
- Example: Configuring Keepalive for a GRE Interface on page 26
- **hold-time on page 34**

key

Syntax key *number*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Adaptive Services and Multiservices interfaces on M Series and T Series routers, identify an individual traffic flow within a tunnel, as defined in RFC 2890, *Key and Sequence Number Extensions to GRE*.

Options *number*—Value of the key.

Range: 0 through 4,294,967,295

Usage Guidelines See "Configuring a Key Number on GRE Tunnels" on page 11.

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

multicast-only

Syntax multicast-only;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family inet],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the unit and family so that the interface can transmit and receive multicast traffic only. You can configure this property on the IP family only.

Usage Guidelines See "Restricting Tunnels to Multicast Traffic" on page 15.

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

Related Documentation
- tunnel on page 41

peer-unit

Syntax peer-unit *unit-number*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a peer relationship between two logical systems.

Options ***unit-number***—Peering logical system unit number.

Usage Guidelines See "Configuring Logical Tunnel Interfaces" on page 16.

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

reassemble-packets

Syntax reassemble-packets;

Hierarchy Level [edit interfaces gr-*fpc/pic/port* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces gr-*fpc/pic/port* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Enable reassembly of fragmented tunnel packets on generic routing encapsulation (GRE) tunnel interfaces.

Usage Guidelines See "Configuring Packet Reassembly" on page 13.

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

routing-instance

Syntax
```
routing-instance {
  destination routing-instance-name;
}
```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]

Release Information Statement introduced before Junos OS Release 7.4.

Description Specify the destination routing instance that points to the routing table containing the tunnel destination address.

Default The default Internet routing table **inet.0**.

Usage Guidelines See "Configuring Tunnel Interfaces for Routing Table Lookup" on page 17.

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

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, OSPF version 3 (OSPFv3), and RIP for a router.

Default Routing instances are disabled for the router.

Options ***routing-instance-name***—Name of the routing instance, a maximum of 31 characters. The remaining statements are explained separately.

Usage Guidelines See the *Junos OS Routing Protocols Configuration Guide* and the *Junos OS Policy Framework Configuration Guide*.

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

routing-options

Syntax routing-options { ... }

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure protocol-independent routing properties.

Usage Guidelines See the *Junos OS Routing Protocols Configuration Guide*.

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

source

Syntax source *source-address*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* tunnel]

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

Description Specify the source address of the tunnel.

Default If you do not specify a source address, the tunnel uses the unit's primary address as the source address of the tunnel.

Options ***source-address***—Address of the local side of the tunnel. This is the address that is placed in the outer IP header's source field.

Usage Guidelines See Tunnel Properties.

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

source-address

Syntax source-address *address*;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit logical-systems *logical-system-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-options dynamic-tunnels *tunnel-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the tunnel source address.

Options ***address***—Name of the source address.

Usage Guidelines See "Configuring Dynamic Tunnels" on page 20.

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

ttl

Syntax ttl *value*;

Hierarchy Level [edit interfaces *interface-name* unit *number* tunnel]

Release Information Statement introduced before Junos OS Release 7.4.

Description Set the time-to-live value bit in the header of the outer IP packet.

Options *value*—Time-to-live value.
Range: 0 through 255
Default: 64

Usage Guidelines See Tunnel Properties.

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

tunnel

Syntax

```
tunnel {
  allow-fragmentation;
  backup-destination address;
  destination destination-address;
  do-not-fragment;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
```

Hierarchy Level

[edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1 for EX Series switches.

Description

Configure a tunnel. You can use the tunnel for unicast and multicast traffic or just for multicast traffic. You can also use tunnels for encrypted traffic or virtual private networks (VPNs).

The remaining statements are explained separately.

Usage Guidelines

See Configuring Encryption Interfaces and Tunnel Properties.

Required Privilege Level

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

Related Documentation

- *Junos OS VPNs Configuration Guide*

tunnel-type

Syntax tunnel-type *type*;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit logical-systems *logical-system-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-instances *routing-instance-name* routing-options dynamic-tunnels *tunnel-name*],
[edit routing-options dynamic-tunnels *tunnel-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Select the dynamic tunnel type.

Options ***type***—Tunnel type. Generic routing encapsulation (GRE) is supported.

Usage Guidelines See "Configuring Dynamic Tunnels" on page 20.

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

unit

Syntax

```
unit logical-unit-number {
  peer-unit unit-number;
  reassemble-packets;
  tunnel {
    allow-fragmentation;
    backup-destination address;
    destination destination-address;
    do-not-fragment;
    key number;
    routing-instance {
      destination routing-instance-name;
    }
    source source-address;
    ttl number;
  }
}
```

Hierarchy Level

[edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*]

Release Information

Statement introduced before Junos OS Release 7.4.

Description

Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options

logical-unit-number—Number of the logical unit.

Range: 0 through 16,384

The remaining statements are explained separately.

Usage Guidelines

See Tunnel Properties.

Required Privilege Level

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

Related Documentation

- *Junos OS Network Interfaces Configuration Guide* for other statements that do not affect services interfaces.

PART 3

Administration

CHAPTER 5

Tunnel Services Interface Operational Mode Commands

show interfaces (GRE)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 12.1 for EX Series switches.

Description

Display status information about the specified generic routing encapsulation (GRE) interface.

Options

interface-type—On M Series and T Series routers, the interface type is **gr-*fpc/pic/port***. On J Series routers, the interface type is **gr-*pim/0/port***. On EX Series switches, the interface type is **gr-*fpc/pic/port***

brief | detail | extensive | terse—(Optional) Display brief interface information.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (GRE) on page 52
show interfaces brief (GRE) on page 52
show interfaces detail (GRE) on page 52
show interfaces extensive (GRE) on page 53

Output Fields

Table 5 on page 48 lists the output fields for the **show interfaces** (GRE) command. Output fields are listed in the approximate order in which they appear.

Table 5: GRE show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none

Table 5: GRE show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Device Flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface Flags	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support.	**detail extensive**

Table 5: GRE show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Flags	Information about the logical interface. Possible values listed in the "Logical Interface Flags" section under Common Output Fields Description. describe general information about the logical interface. GRE-specific information about the logical interface is indicated by the presence or absence of the following value in this field: • **Reassemble-Pkts**—If the **Flags** field includes this string, the GRE tunnel is configured to reassemble tunnel packets that were fragmented after tunnel encapsulation.	All levels
IP-Header	IP header of the logical interface. If the **tunnel key** statement is configured, this information is included in the **IP Header** entry. GRE-specific information about the logical interface is indicated by the presence or absence of the following value in this field: • **df**—If the **IP-Header** field includes this string immediately following the 16 bits of identification information (that is, if **:df:** displays after the twelfth byte), the GRE tunnel is configured to allow fragmentation of GRE packets after encapsulation.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input rate**—Rate of bits and packets received on the interface. • **Output rate**—Rate of bits and packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive** none
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive none**
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed.	**brief**
MTU	MTU size on the logical interface.	**detail extensive none**

Table 5: GRE show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under Common Output Fields Description.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Sample Output

show interfaces (GRE)

```
user@host> show interfaces gr-1/2/0
Physical interface: gr-0/0/0, Enabled, Physical link is Up
  Interface index: 132, SNMP ifIndex: 26
  Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface gr-0/0/0.0 (Index 68) (SNMP ifIndex 47)
    Flags: Point-To-Point SNMP-Traps 16384
    IP-Header 1.1.1.2:1.1.1.1:47:df:64:0000000000000000 Encapsulation: GRE-NULL
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1476
      Flags: None
      Addresses, Flags: Is-Primary
        Local: 1.10.1.1
```

show interfaces brief (GRE)

```
user@host> show interfaces gr-1/2/0 brief
Physical interface: gr-1/2/0, Enabled, Physical link is Up
  Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps

  Logical interface gr-1/2/0.0
    Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000
    IP-Header 10.10.0.2:10.10.0.1:47:df:64:0000000000000000
    Encapsulation: GRE-NULL
    inet  10.100.0.1/30
    mpls
```

show interfaces detail (GRE)

```
user@host> show interfaces gr-1/2/0 detail
Physical interface: gr-0/0/0, Enabled, Physical link is Up
  Interface index: 132, SNMP ifIndex: 26, Generation: 13
  Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps

  Logical interface gr-0/0/0.0 (Index 68) (SNMP ifIndex 47) (Generation 8)
    Flags: Point-To-Point SNMP-Traps 16384
    IP-Header 1.1.1.2:1.1.1.1:47:df:64:0000000000000000 Encapsulation: GRE-NULL
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
```

```
 Output packets:                  0
Transit statistics:
 Input  bytes  :                  0                    0 bps
 Output bytes  :                  0                    0 bps
 Input  packets:                  0                    0 pps
 Output packets:                  0                    0 pps
Protocol inet, MTU: 1476, Generation: 12, Route table: 0
  Flags: None
  Addresses, Flags: Is-Primary
    Destination: Unspecified, Local: 1.10.1.1, Broadcast: Unspecified,
    Generation: 15
```

show interfaces extensive (GRE)

The output for the **show interfaces extensive** command is identical to that for the **show interfaces detail** command. For sample output, see show interfaces detail (GRE) on page 52.

show interfaces (IP-over-IP)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified IP-over-IP interface.

Options

interface-type—On M Series and T Series routers, the interface type is **ip-*fpc/pic/port***. On J Series routers, the interface type is **ip-*pim/0/port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (IP-over-IP) on page 56
show interfaces brief (IP-over-IP) on page 57
show interfaces detail (IP-over-iP) on page 57
show interfaces extensive (IP-over-IP) on page 57

Output Fields

Table 6 on page 54 lists the output fields for the **show interfaces** (IP-over-IP) command. Output fields are listed in the approximate order in which they appear.

Table 6: IP-over-IP show interfaces Output Fields

Field	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none

Table 6: IP-over-IP show interfaces Output Fields *(continued)*

Field	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under Common Output Fields Description.	All levels
IP Header	IP header of the logical interface.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels

Table 6: IP-over-IP show interfaces Output Fields *(continued)*

Field	Field Description	Level of Output
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input rate**—Rate of bits and packets received on the interface. • **Output rate**—Rate of bits and packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive none**
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed.	**brief**
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**detail extensive** none

Sample Output

show interfaces (IP-over-IP)

```
user@host> show interfaces ip-0/0/0
Physical interface: ip-0/0/0, Enabled, Physical link is Up
  Interface index: 133, SNMP ifIndex: 27
  Type: IPIP, Link-level type: IP-over-IP, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface ip-0/0/0.0 (Index 69) (SNMP ifIndex 49)
    Flags: Point-To-Point SNMP-Traps 16384
    IP-Header 2.2.2.1:2.2.2.2:4:df:64:00000000 Encapsulation: IPv4-NULL
```

```
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1480
      Flags: None
```

show interfaces brief (IP-over-IP)

```
user@host> show interfaces ip-0/0/0 brief
Physical interface: ip-0/0/0, Enabled, Physical link is Up
  Type: IPIP, Link-level type: IP-over-IP, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps

  Logical interface ip-0/0/0.0
    Flags: Point-To-Point SNMP-Traps 16384
    IP-Header 2.2.2.1:2.2.2.2:4:df:64:00000000 Encapsulation: IPv4-NULL
    inet
```

show interfaces detail (IP-over-iP)

```
user@host> show interfaces ip-0/0/0 detail
Physical interface: ip-0/0/0, Enabled, Physical link is Up
  Interface index: 133, SNMP ifIndex: 27, Generation: 14
  Type: IPIP, Link-level type: IP-over-IP, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps

  Logical interface ip-0/0/0.0 (Index 69) (SNMP ifIndex 49) (Generation 9)
    Flags: Point-To-Point SNMP-Traps 16384
    IP-Header 2.2.2.1:2.2.2.2:4:df:64:00000000 Encapsulation: IPv4-NULL
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol inet, MTU: 1480, Generation: 13, Route table: 0
      Flags: None
```

show interfaces extensive (IP-over-IP)

The output for the show interfaces extensive command is identical to that for the show interfaces detail command. For sample output, see show interfaces detail (IP-over-iP) on page 57.

show interfaces (Logical Tunnel)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified logical tunnel interface.

Options

interface-type—On M Series and T Series routers, the interface type is **lt-*fpc/pic/port***. On J Series routers, the interface type is **lt-*pim/0/port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Logical Tunnel) on page 62

Output Fields

Table 7 on page 58 lists the output fields for the **show interfaces** (logical tunnel) command. Output fields are listed in the approximate order in which they appear.

Table 7: Logical Tunnel show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under Common Output Fields Description.	All levels
Interface index	Physical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 7: Logical Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Type	Type of interface. **Software-Pseudo** indicates a standard software interface with no associated hardware device.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal or External** when configured. Otherwise, **Unspecified**.	All levels
Speed	Speed at which the interface is running.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Link type	Type of link.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under Common Output Fields Description.	All levels
Physical info	Information about the physical interface.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Current address	Configured MAC address.	**detail extensive** none
Hardware address	Hardware MAC address.	**detail extensive** none
Alternate link address	Backup link address.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**

Table 7: Logical Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under Common Output Fields Description.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels

Table 7: Logical Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input bytes**—Rate of bytes received on the interface. • **Output bytes**—Rate of bytes transmitted on the interface. • **Input packets**—Rate of packets received on the interface. • **Output packets**—Rate of packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Route table in which this address exists. For example, **Route table:0** refers to inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under Common Output Fields Description.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Sample Output

show interfaces extensive (Logical Tunnel)

```
user@host> show interfaces lt-1/0/0 extensive
Physical interface: lt-1/0/0, Enabled, Physical link is Up
  Interface index: 143, SNMP ifIndex: 70, Generation: 26
  Type: Logical-tunnel, Link-level type: Logical-tunnel, MTU: 0,
  Clocking: Unspecified, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link type      : Unspecified
  Link flags     : None
  Physical info  : 13
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:90:69:a6:48:7e, Hardware address: Unspecified
  Alternate link address: Unspecified
  Last flapped   : 2004-03-03 15:53:52 PST (22:08:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, MTU errors: 0

  Logical interface lt-1/0/0.0 (Index 66) (SNMP ifIndex 467) (Generation 3024)
    Flags: Point-To-Point SNMP-Traps 16384 DLCI 100 Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol inet, MTU: 4470, Generation: 7034, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.1.1/24, Local: 10.1.1.1, Broadcast: Unspecified,
        Generation: 2054
```

show interfaces (Multicast Tunnel)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified multicast tunnel interface and its logical encapsulation and de-encapsulation interfaces.

Options

interface-type—On M Series and T Series routers, the interface type is **mt-*fpc/pic/port***. On J Series routers, the interface type is **mt-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Additional Information

The multicast tunnel interface has two logical interfaces: encapsulation and de-encapsulation. These interfaces are automatically created by the Junos OS for every multicast-enabled VPN routing and forwarding (VRF) instance. The encapsulation interface carries multicast traffic traveling from the edge interface to the core interface. The de-encapsulation interface carries traffic coming from the core interface to the edge interface.

Required Privilege Level

view

List of Sample Output

Output Fields

Table 8 on page 64 lists the output fields for the **show interfaces** (Multicast Tunnel) command. Output fields are listed in the approximate order in which they appear.

Table 8: Multicast Tunnel show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

Table 8: Multicast Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	All levels

Sample Output

show interfaces (Multicast Tunnel)

```
user@host> show interfaces mt-1/2/0
Physical interface: mt-1/2/0, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 41
  Type: Multicast-GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
```

show interfaces brief (Multicast Tunnel)

```
user@host> show interfaces mt-1/2/0 brief
Physical interface: mt-1/2/0, Enabled, Physical link is Up
  Type: Multicast-GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
```

show interfaces detail (Multicast Tunnel)

```
user@host> show interfaces mt-1/2/0 detail
Physical interface: mt-1/2/0, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 41, Generation: 28
  Type: Multicast-GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :            170664562               560000 bps
    Output bytes  :            112345376               368176 bps
    Input  packets:              2439107                 1000 pps
    Output packets:              2439120                 1000 pps
```

show interfaces extensive (Multicast Tunnel)

```
user@host> show interfaces mt-1/2/0 extensive
Physical interface: mt-1/2/0, Enabled, Physical link is Up
   Interface index: 141, SNMP ifIndex: 529, Generation: 144
   Type: Multicast-GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
   Hold-times     : Up 0 ms, Down 0 ms
   Device flags   : Present Running
   Interface flags: SNMP-Traps
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :            170664562               560000 bps
    Output bytes  :            112345376               368176 bps
    Input  packets:              2439107                 1000 pps
    Output packets:              2439120                 1000 pps
    IPv6 transit statistics:
```

```
    Input  bytes  :                    0
    Output bytes  :                    0
    Input  packets:                    0
    Output packets:                    0

  Logical interface mt-1/2/0.32768 (Index 83) (SNMP ifIndex 556) (Generation
148)
    Flags: Point-To-Point SNMP-Traps 0x4000 IP-Header
232.1.1.1:10.0.0.6:47:df:64:0000000800000000 Encapsulation: GRE-NULL
    Traffic statistics:
     Input  bytes  :            170418430
     Output bytes  :            112070294
     Input  packets:              2434549
     Output packets:              2435593
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                80442
     Input  packets:                    0
     Output packets:                 1031
    Transit statistics:
     Input  bytes  :            170418430               560000 bps
     Output bytes  :            111989852               368176 bps
     Input  packets:              2434549                 1000 pps
     Output packets:              2434562                 1000 pps
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Protocol inet, MTU: 1572, Generation: 182, Route table: 4
      Flags: None
    Protocol inet6, MTU: 1572, Generation: 183, Route table: 4
      Flags: None

  Logical interface mt-1/2/0.1081344 (Index 84) (SNMP ifIndex 560) (Generation
149)
    Flags: Point-To-Point SNMP-Traps 0x6000 Encapsulation: GRE-NULL
    Traffic statistics:
     Input  bytes  :               246132
     Output bytes  :               355524
     Input  packets:                 4558
     Output packets:                 4558
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Local statistics:
     Input  bytes  :               246132
     Output bytes  :                    0
     Input  packets:                 4558
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :               355524                    0 bps
     Input  packets:                    0                    0 pps
```

```
    Output packets:                 4558                    0 pps
    IPv6 transit statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
   Protocol inet, MTU: Unlimited, Generation: 184, Route table: 4
     Flags: None
   Protocol inet6, MTU: Unlimited, Generation: 185, Route table: 4
     Flags: None
```

show interfaces (Multicast Tunnel Encapsulation)

```
user@host> show interfaces mt-3/1/0.32768
Logical interface mt-3/1/0.32768 (Index 67) (SNMP ifIndex 0)
    Flags: Point-To-Point SNMP-Traps 0x4000
    IP-Header 239.1.1.1:10.255.70.15:47:df:64:0000000800000000
    Encapsulation: GRE-NULL
  Input packets : 0
  Output packets: 2
    Protocol inet, MTU: Unlimited
      Flags: None
```

show interfaces (Multicast Tunnel De-Encapsulation)

```
user@host> show interfaces mt-3/1/0.49152
Logical interface mt-3/1/0.49152 (Index 74) (SNMP ifIndex 0)
    Flags: Point-To-Point SNMP-Traps 0x6000 Encapsulation: GRE-NULL
  Input packets : 0
  Output packets: 2
    Protocol inet, MTU: Unlimited
      Flags: None
```

show interfaces (PIM)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified Protocol Independent Multicast (PIM) de-encapsulation or PIM encapsulation interface, respectively.

Options

interface-type—On M Series and T Series routers, the PIM de-encapsulation interface type is **pd-*fpc/pic/port***. On J Series routers, it is **pd-*pim/0/port***. On M Series and T Series routers, the PIM encapsulation interface type is **pe-*fpc/pic/port***. On J Series routers, it is **pe-*pim/0/port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (PIM De-Encapsulation) on page 69
show interfaces brief (PIM De-Encapsulation) on page 70
show interfaces detail (PIM De-Encapsulation) on page 70
show interfaces extensive (PIM Encapsulation) on page 70
show interfaces (PIM Encapsulation) on page 70
show interfaces brief (PIM Encapsulation) on page 70
show interfaces detail (PIM Encapsulation) on page 70
show interfaces extensive (PIM Encapsulation) on page 71

Output Fields

Table 9 on page 68 lists the output fields for the **show interfaces** (PIM de-encapsulation or encapsulation) command. Output fields are listed in the approximate order in which they appear.

Table 9: PIM show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 9: PIM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

Sample Output

show interfaces (PIM De-Encapsulation)

```
user@host> show interfaces pd-0/0/0
Physical interface: pd-0/0/0, Enabled, Physical link is Up
  Interface index: 130, SNMP ifIndex: 25
  Type: PIMD, Link-level type: PIM-Decapsulator, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
```

```
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
```

show interfaces brief (PIM De-Encapsulation)

```
user@host> show interfaces pd-0/0/0 brief
Physical interface: pd-0/0/0, Enabled, Physical link is Up
  Type: PIMD, Link-level type: PIM-Decapsulator, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
```

show interfaces detail (PIM De-Encapsulation)

```
user@host> show interfaces pd-0/0/0 detail
Physical interface: pd-0/0/0, Enabled, Physical link is Up
  Interface index: 130, SNMP ifIndex: 25, Generation: 11
  Type: PIMD, Link-level type: PIM-Decapsulator, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
```

show interfaces extensive (PIM Encapsulation)

```
user@host> show interfaces pd-0/0/0 extensive
Physical interface: pd-0/0/0, Enabled, Physical link is Up
  Interface index: 130, SNMP ifIndex: 25, Generation: 11
  Type: PIMD, Link-level type: PIM-Decapsulator, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
```

show interfaces (PIM Encapsulation)

```
user@host> show interfaces pe-0/0/0
Physical interface: pe-0/0/0, Enabled, Physical link is Up
  Interface index: 131, SNMP ifIndex: 26
  Type: PIME, Link-level type: PIM-Encapsulator, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
```

show interfaces brief (PIM Encapsulation)

```
user@host> show interfaces pe-0/0/0 brief
Physical interface: pe-0/0/0, Enabled, Physical link is Up
  Type: PIME, Link-level type: PIM-Encapsulator, MTU: Unlimited, Speed: 800mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
```

show interfaces detail (PIM Encapsulation)

```
user@host> show interfaces pe-0/0/0 detail
Physical interface: pe-0/0/0, Enabled, Physical link is Up
  Interface index: 131, SNMP ifIndex: 26, Generation: 12
  Type: PIME, Link-level type: PIM-Encapsulator, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
```

```
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
```

show interfaces extensive (PIM Encapsulation)

```
user@host> show interfaces pe-0/0/0 extensive
Physical interface: pe-0/0/0, Enabled, Physical link is Up
  Interface index: 131, SNMP ifIndex: 26, Generation: 12
  Type: PIME, Link-level type: PIM-Encapsulator, MTU: Unlimited, Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
```

show interfaces (Virtual Loopback Tunnel)

Syntax

show interfaces vt-*fpc/pic/port*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified virtual loopback tunnel interface.

Options

vt-*fpc/pic/port*—Display standard information about the specified virtual loopback tunnel interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (Virtual Loopback Tunnel) on page 74
show interfaces brief (Virtual Loopback Tunnel) on page 75
show interfaces detail (Virtual Loopback Tunnel) on page 75
show interfaces extensive (Virtual Loopback Tunnel) on page 75

Output Fields

Table 10 on page 72 lists the output fields for the **show interfaces** (virtual loopback tunnel) command. Output fields are listed in the approximate order in which they appear.

Table 10: Virtual Loopback Tunnel show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none

Table 10: Virtual Loopback Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

Table 10: Virtual Loopback Tunnel show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Bandwidth	Bandwidth allotted to the logical interface, in kilobytes per second.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
protocol-family	Protocol family configured on the logical interface. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**brief**
Protocol	Protocol family configured on the logical interface. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**detail extensive** none
MTU	Maximum transmission unit size on the logical interface.	**detail extensive** none
Maximum labels	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about protocol family flags. Possible values are described in the "Family Flags" section under Common Output Fields Description.	**detail extensive** none

Sample Output

show interfaces (Virtual Loopback Tunnel)

```
user@host> show interfaces vt-1/2/0
Physical interface: vt-1/2/0, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 40
  Type: Loopback, Link-level type: Virtual-loopback-tunnel, MTU: Unlimited,
  Speed: 800mbps
  Device flags   : Present Running
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface vt-1/2/0.0 (Index 76) (SNMP ifIndex 57)
    Flags: Point-To-Point 16384 Encapsulation: Virtual-loopback-tunnel
  Input packets : 0
  Output packets: 0
```

```
    Protocol inet, MTU: Unlimited
      Flags: None
    Protocol mpls, MTU: Unlimited, Maximum labels: 3
      Flags: None
```

show interfaces brief (Virtual Loopback Tunnel)

```
user@host> show interfaces vt-1/2/0 brief
Physical interface: vt-1/2/0, Enabled, Physical link is Up
  Type: Loopback, Link-level type: Virtual-loopback-tunnel, MTU: Unlimited,
  Speed: 800mbps
  Device flags   : Present Running

  Logical interface vt-1/2/0.0
    Flags: Point-To-Point 16384 Encapsulation: Virtual-loopback-tunnel
    inet
    mpls
```

show interfaces detail (Virtual Loopback Tunnel)

```
user@host> show interfaces vt-1/2/0 detail
Physical interface: vt-1/2/0, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 40, Generation: 27
  Type: Loopback, Link-level type: Virtual-loopback-tunnel, MTU: Unlimited,
  Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps

  Logical interface vt-1/2/0.0 (Index 76) (SNMP ifIndex 57) (Generation 17)
    Flags: Point-To-Point 16384 Encapsulation: Virtual-loopback-tunnel
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol inet, MTU: Unlimited, Generation: 33, Route table: 0
      Flags: None
   Protocol mpls, MTU: Unlimited, Maximum labels: 3, Generation: 34, Route table:
 0
      Flags: None
```

show interfaces extensive (Virtual Loopback Tunnel)

```
user@host> show interfaces vt-1/2/0 extensive
Physical interface: vt-1/2/0, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 40, Generation: 27
  Type: Loopback, Link-level type: Virtual-loopback-tunnel, MTU: Unlimited,
  Speed: 800mbps
  Hold-times     : Up 0 ms, Down 0 ms
  Device flags   : Present Running
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
```

```
  Output packets:                    0                    0 pps

 Logical interface vt-1/2/0.0 (Index 76) (SNMP ifIndex 57) (Generation 17)
   Flags: Point-To-Point 16384 Encapsulation: Virtual-loopback-tunnel
   Traffic statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
   Transit statistics:
    Input  bytes  :                   0                    0 bps
    Output bytes  :                   0                    0 bps
    Input  packets:                   0                    0 pps
    Output packets:                   0                    0 pps
   Protocol inet, MTU: Unlimited, Generation: 33, Route table: 0
     Flags: None
   Protocol mpls, MTU: Unlimited, Maximum labels: 3, Generation: 34, Route table:
0
     Flags: None
```

PART 4

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