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Junos<sup>®</sup> OS

# PPPoE Layer 3 Wholesale for Subscriber Services Feature Guide

Release  
13.2



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*Junos® OS PPPoE Layer 3 Wholesale for Subscriber Services Feature Guide*

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# About the Documentation

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## Documentation and Release Notes

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

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

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

## Supported Platforms

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

- MX Series

## Using the Examples in This Manual

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

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

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

For more information about the **load** command, see the *CLI User Guide*.

## Documentation Conventions

Table 1 on page xiii defines notice icons used in this guide.

Table 1: Notice Icons

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

Table 2 on page xiii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

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

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

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

## Documentation Feedback

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

## Requesting Technical Support

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

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

## Self-Help Online Tools and Resources

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

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

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

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

## Opening a Case with JTAC

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

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

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



## PART 1

# Overview

- [Broadband Subscriber Management Basics Overview on page 3](#)
- [Broadband Subscriber Management Solution Hardware Overview on page 9](#)
- [Broadband Subscriber Management Solution Software Overview on page 15](#)
- [Broadband Subscriber Management PPPoE Wholesale Overview on page 19](#)



## CHAPTER 1

# Broadband Subscriber Management Basics Overview

- [Broadband Subscriber Management Overview on page 3](#)
- [Broadband Subscriber Management Platform Support on page 4](#)
- [Broadband Subscriber Management Solutions Terms and Acronyms on page 5](#)
- [Supporting Documentation for Broadband Subscriber Management on page 6](#)

## Broadband Subscriber Management Overview

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Broadband Subscriber Management is a method of dynamically provisioning and managing subscriber access in a multiplay or triple play network environment. This method uses AAA configuration in conjunction with dynamic profiles to provide dynamic, per-subscriber authentication, addressing, access, and configuration for a host of broadband services including Internet access, gaming, IPTV, Video on Demand (VoD), and subscriber wholesaling.



**NOTE:** The Junos OS broadband subscriber management solution currently supports Dynamic Host Configuration Protocols (DHCP)-based and Point-to-Point Protocol /Point-to-Point Protocol over Ethernet (PPP/PPPoE)-based configuration and RADIUS authentication and authorization.

This guide focuses on the general components necessary for configuring a Juniper Networks MX Series 3D Universal Edge Router to dynamically provision and manage subscribers. However, you can also use a Juniper Networks EX Series Ethernet Switch in a subscriber network.

Managing subscribers in a DHCP-based or PPP/PPPoE-based residential broadband network using an MX Series router requires the following:

- Planning and configuring a virtual LAN (VLAN) architecture for the access network.
- Configuring an authentication, authorization, and accounting (AAA) framework for subscriber authentication and authorization through external servers (for example, RADIUS) as well as accounting and dynamic-request change of authorization (CoA)

and disconnect operations through external servers, and address assignment through a combination of local address-assignment pools and RADIUS.

- Configuring DHCP local server or DHCP relay for subscriber address assignment for DHCP-based networks.
- Configuring address assignment pools for PPPoE-based networks.
- Configuring dynamic profiles to include dynamic IGMP, firewall filter, and class of service (CoS) configuration for subscriber access.
- Configuring multicast access to the core network.

To better understand the subscriber access network, this guide also provides general information about some hardware not from Juniper Networks and suggests methods for choosing different network configuration options. You can configure a subscriber network in many different ways. This guide does not cover all configuration scenarios. It is intended as a starting point for understanding subscriber management and how you can use Juniper Networks hardware and software to plan and build your own subscriber management solution.

**Related  
Documentation**

- [Broadband Subscriber Management Platform Support on page 4](#)
- [Broadband Subscriber Management Network Topology Overview](#)
- [Broadband Subscriber Management Solutions Terms and Acronyms on page 5](#)
- [Supporting Documentation for Broadband Subscriber Management on page 6](#)
- [Triple Play and Multiplay Overview](#)
- [Broadband History](#)

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## Broadband Subscriber Management Platform Support

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Juniper Networks currently supports DHCP and PPP/PPPoE broadband subscriber management solutions on MX Series routers and PPP/PPPoE broadband subscriber management solutions on M120 and M320 routers.



**NOTE:** This guide describes configuration on MX Series routers.

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**Related  
Documentation**

- [Broadband Subscriber Management Overview on page 3](#)
- [Broadband Subscriber Management Edge Router Overview on page 9](#)

## Broadband Subscriber Management Solutions Terms and Acronyms

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- **AAA (authentication, authorization, and accounting)**—An IP-based networking system that controls user access to computer resources and manages the activity of users over a network.
- **ASM (Any Source Multicast)**—A method of allowing a multicast receiver to listen to all traffic sent to a multicast group, regardless of its source.
- **BSR (broadband services router)**—A router used for subscriber management and edge routing.
- **CoA (change of authorization)**—RADIUS messages that contain information for dynamically changing session authorizations.
- **CoS (class of service)**—A method of managing network traffic by grouping similar types of traffic together and treating each traffic type as a “class” with a defined service priority.
- **DHCP (Dynamic Host Configuration Protocol)**—A mechanism through which hosts using TCP/IP can obtain protocol configuration parameters automatically from a DHCP server on the network; allocates IP addresses dynamically so that they can be reused when no longer needed.
- **IGMP (Internet Group Membership Protocol)**—A host-to-router signaling protocol for IPv4 used to support IP multicasting.
- **IS-IS (Intermediate System-to-Intermediate System)**—A link-state interior gateway routing protocol (IGRP) for IP networks that uses the shortest-path-first (SPF) algorithm to determine routes.
- **LSP (label-switched path)**—The path traversed by a packet that is routed by MPLS. Some LSPs act as tunnels. LSPs are unidirectional, carrying traffic only in the downstream direction from an ingress node to an egress node.
- **MPLS (Multiprotocol Label Switching)**—A mechanism for engineering network traffic patterns that functions by assigning to network packets short labels that describe how to forward the packets through the network.
- **MSAN (multiservice access node)**—A group of commonly used aggregation devices including digital subscriber line access multiplexers (DSLAMs) used in xDSL networks, optical line termination (OLT) for PON/FTTx networks, and Ethernet switches for Active Ethernet connections.
- **Multiplay**—A networking paradigm that enables the ability to add new and robust networking services that individual subscribers can access.
- **OIF (outgoing interface)**—An interface used by multicast functions within a router to determine which egress ports to use for forwarding multicast groups.
- **OSPF (Open Shortest Path First)**—A link-state interior gateway protocol (IGP) that makes routing decisions based on the shortest-path-first (SPF) algorithm (also referred to as the Dijkstra algorithm).

- **PIM (Protocol Independent Multicast)**—A multicast routing protocol used for delivering multicast messages in a routed environment.
- **PPP (Point-to-Point Protocol)**—A link-layer protocol that provides multiprotocol encapsulation. PPP is used for link-layer and network-layer configuration. Provides a standard method for transporting multiprotocol datagrams over point-to-point links.
- **PPPoE (Point-to-Point Protocol over Ethernet)**—A network protocol that encapsulates PPP frames in Ethernet frames and connects multiple hosts over a simple bridging access device to a remote access concentrator.
- **RADIUS (Remote Authentication Dial-In User Service)**—A networking protocol that provides centralized access, authorization, and accounting management for subscribers to connect and use a network service.
- **Residential gateway**—A firewall, Network Address Translation (NAT) router, or other routing device used as a customer premises equipment (CPE) terminator in the home, office, or local point of presence (POP).
- **SSM (single-source multicast)**—A routing method that allows a multicast receiver to detect only a specifically identified sender within a multicast group.
- **set-top box**—The end host or device used to receive IPTV video streams.
- **Triple play**—A networking paradigm that dedicates bandwidth to data, voice, and video service.
- **VOD (video on demand)**—A unicast streaming video offering by service providers that enables the reception of an isolated video session per user with rewind, pause, and similar VCR-like capabilities.
- **VSR (video services router)**—A router used in a video services network to route video streams between an access network and a metro or core network. The video services router is any M Series Multiservice Edge Router or MX Series router that supports the video routing package provided with Junos OS Release 8.3 or later.

**Related  
Documentation**

- [Broadband Subscriber Management Overview on page 3](#)

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## Supporting Documentation for Broadband Subscriber Management

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The *Junos OS Subscriber Management and Services Library* relies heavily on existing configuration documentation. In particular, this guide references configuration material presented in the *Junos OS Subscriber Management and Services Library*. We recommend you become familiar with the configuration options presented for subscriber access before reading this guide.

Several guides in the Junos OS documentation set provide detailed configuration information that is not fully covered in this guide. This guide might reference other Junos OS configuration and solutions documents that can provide more detail about a specific feature or configuration option.

For more detailed configuration information, see the following Junos OS documents:

- *Junos OS Subscriber Management and Services Library*
- *Junos OS Layer 2 Switching and Bridging Library for Routing Devices*
- *Multicast Protocols Feature Guide for Routing Devices*
- *Junos OS Network Interfaces Library for Routing Devices*
- *Routing Policy Feature Guide for Routing Devices*

In addition to related Junos OS documentation, you can obtain useful information from the JunosE Software documentation. Many features described in the *JunosE Broadband Access Configuration Guide* are similar to those described in both this guide and the *Junos OS Subscriber Management and Services Library*.

**Related  
Documentation**

- [Broadband Subscriber Management Overview on page 3](#)





## CHAPTER 2

# Broadband Subscriber Management Solution Hardware Overview

- [Broadband Subscriber Management Edge Router Overview on page 9](#)
- [Multiservice Access Node Overview on page 11](#)
- [Ethernet MSAN Aggregation Options on page 13](#)

## Broadband Subscriber Management Edge Router Overview

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The edge router is the demarcation point between the residential broadband access network and the core network. The Juniper Networks MX Series router (along with the Juniper Networks EX Series Ethernet Switch) can play multiple roles as an edge router. The most common include the following:

- **Broadband services router (BSR)**—This router supports high speed Internet access along with several other subscriber-based services including VoIP, IPTV, and gaming.
- **Video services router (VSR)**—The video services router capabilities are a subset of those provided by a broadband services router. In general, using the MX Series router as a video services router provides bi-directional traffic destined for the set-top box (STB). This traffic includes IPTV and video on demand (VoD) streams as well as associated control traffic such as IGMP and electronic program guide (EPG) updates.

You can also use the MX Series router in certain Layer 2 solutions. For information about configuring the MX Series router in Layer 2 scenarios, see the *Junos OS Layer 2 Switching and Bridging Library for Routing Devices* or the *Ethernet Networking Feature Guide for MX Series Routers*.

## Broadband Services Router Overview

A broadband services router is an edge router that traditionally supports primarily Internet-bound traffic. This router replaces and provides a superset of the functionality provided by a Broadband Remote Access Server (B-RAS). The broadband services router functions can be broken into two key areas—high speed Internet access and IPTV support.

### High-Speed Internet Access Support

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The broadband services router communicates with the RADIUS server to enforce which services each subscriber can access. For example, one subscriber might have signed up

for a smaller Internet access service of 1 Mbps where another subscriber might have signed up for a higher, 10 Mbps service. The broadband services router manages the traffic to each subscriber, ensuring that each subscriber obtains the level of access service they have purchased, while also ensuring that any VoIP traffic receives priority. The broadband services router also makes traffic forwarding decisions based on aggregate bandwidth detected on any adjacent multiservice access node (MSAN).

### IPTV Support

The broadband services router supports IPTV traffic including support for IGMP multicast group start and stop requests from downstream MSANs. The broadband services router manages the bandwidth allocations associated with high-bandwidth IPTV as well as video on demand (VoD) traffic to ensure high quality service delivery.

## Video Services Router

When configuring a multiedge network, you can use the MX Series router as a video services router (VSR) to support only video traffic without supporting the high-speed Internet access (HSIA) capabilities.



**NOTE:** We recommend a single-edge network model but the MX Series router allows for flexibility when defining a multiplay network topology.

Some advantages of using a separate video services router for video traffic include the following:

- Provides the ability to add IPTV service without the need to modify an existing edge router that is performing other functions.
- Reduces network bandwidth by moving the video edge further out to the network edge while still allowing for centralized broadband services router operation.
- Typically requires less capital investment because the video services router does not need to provide per-subscriber management.

## Services Router Placement

Depending on the type of network you are creating—single edge or multiedge—you can place a broadband services router or video services router in various locations.

### Single-Edge Placement

In a single-edge network, you use only broadband services routers because the single device must perform all of the necessary edge functions—providing subscriber management for high-speed Internet access and IPTV services. You can use the two following topology models when placing the broadband services router:

- **Centralized single edge**—The edge router is centrally located and placed at one location to cover a particular region. A secondary router is sometimes placed in this location to act as a backup. Downstream MSANs are connected to the broadband services router using a ring or mesh topology.

- **Distributed single edge**—The edge router is placed further out into the network, typically in the central office (CO) closest to the subscribers that it services. Downstream MSANs are typically connected directly to the broadband services router (in a true, single edge topology) or through an Ethernet aggregation switch.

In general, the addition of IPTV service favors a more distributed model because it pushes the need for subscriber management farther out into the network.

### Multiedge Placement

In a multiedge network, you use both broadband services routers and video services routers. The broadband services router controls any high-speed Internet traffic and the video services router controls video traffic. You can use the two following topology models when placing service routers in a multiedge network topology:

- **Co-located multiedge**—The broadband services router and video services router are housed in the same location and an Ethernet switch directs traffic in the CO to the appropriate edge router.



**NOTE:** A single MX Series router can serve as both Ethernet switch and video services router. For information about configuring the MX Series router in Layer 2 scenarios, see the *Junos OS Layer 2 Switching and Bridging Library for Routing Devices* or the *Ethernet Networking Feature Guide for MX Series Routers*.

- **Split multiedge**—The video services router and broadband services router reside in different locations. In this model, the broadband services router is typically located more centrally and video services routers are distributed.

#### Related Documentation

- [Multiservice Access Node Overview on page 11](#)
- [Ethernet MSAN Aggregation Options on page 13](#)
- [Broadband Subscriber Management Platform Support on page 4](#)

## Multiservice Access Node Overview

A *multiservice access node* is a broader term that refers to a group of commonly used aggregation devices. These devices include digital subscriber line access multiplexers (DSLAMs) used in xDSL networks, optical line termination (OLT) for PON/FTTx networks, and Ethernet switches for Active Ethernet connections. Modern MSANs often support all of these connections, as well as providing connections for additional circuits such as plain old telephone service (referred to as POTS) or Digital Signal 1 (DS1 or T1).

The defining function of a multiservice access node is to aggregate traffic from multiple subscribers. At the physical level, the MSAN also converts traffic from the *last mile technology* (for example, ADSL) to Ethernet for delivery to subscribers.

You can broadly categorize MSANs into three types based on how they forward traffic in the network:

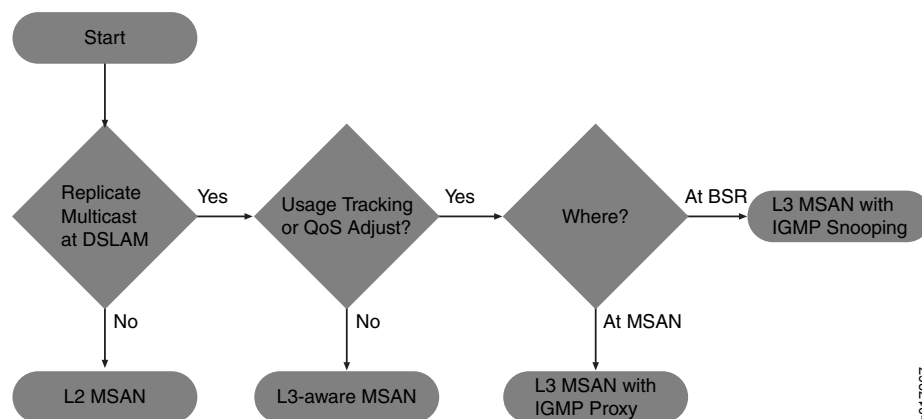
- **Layer–2 MSAN**—This type of MSAN is essentially a Layer 2 switch (though typically not a fully functioning switch) with some relevant enhancements. These MSANs use Ethernet (or ATM) switching to forward traffic. The MSAN forwards all subscriber traffic upstream to an edge router that acts as the centralized control point and prevents direct subscriber-to-subscriber communication. Ethernet Link Aggregation (LAG) provides the resiliency in this type of network.

Layer 2 DSLAMs cannot interpret IGMP, so they cannot selectively replicate IPTV channels.

- **Layer–3 aware MSAN**—This IP-aware MSAN can interpret and respond to IGMP requests by locally replicating a multicast stream and forwarding the stream to any subscriber requesting it. Layer 3 awareness is important when supporting IPTV traffic to perform channel changes (sometimes referred to as *channel zaps*). Static IP-aware MSANs always receive all multicast television channels. They do not have the ability to request that specific channels be forwarded to the DSLAM. Dynamic IP-aware DSLAMs, however, can inform the network to begin (or discontinue) sending individual channels to the DSLAM. Configuring IGMP proxy or IGMP snooping on the DSLAM accomplishes this function.
- **Layer–3 MSAN**—These MSANs use IP routing functionality rather than Layer 2 technologies to forward traffic. The advantage of this forwarding method is the ability to support multiple upstream links going to different upstream routers and improving network resiliency. However, to accomplish this level of resiliency, you must assign a separate IP subnetwork to each MSAN, adding a level of complexity that can be more difficult to maintain or manage.

In choosing a MSAN type, refer to [Figure 1 on page 12](#):

**Figure 1: Choosing an MSAN Type**



**Related Documentation**

- [Ethernet MSAN Aggregation Options on page 13](#)

## Ethernet MSAN Aggregation Options

Each MSAN can connect directly to an edge router (broadband services router or video services router), or an intermediate device (for example, an Ethernet switch) can aggregate MSAN traffic before being sent to the services router. [Table 3 on page 13](#) lists the possible MSAN aggregation methods and under what conditions they are used.

**Table 3: Ethernet MSAN Aggregation Methods**

Method	When Used
Direct connection	Each MSAN connects directly to the broadband services router and optional video services router.
Ethernet aggregation switch connection	Each MSAN connects directly to an intermediate Ethernet switch. The switch, in turn, connects to the broadband services router or optional video services router.
Ethernet ring aggregation connection	Each MSAN connects to a ring topology of MSANs. The head-end MSAN (the device closest to the upstream edge router) connects to the broadband services router.

You can use different aggregation methods in different portions of the network. You can also create multiple layers of traffic aggregation within the network. For example, an MSAN can connect to a central office terminal (COT), which, in turn, connects to an Ethernet aggregation switch, or you can create multiple levels of Ethernet aggregation switches prior to connecting to the edge router.

### Direct Connection

In the direct connection method, each MSAN has a point-to-point connection to the broadband services router. If an intermediate central office exists, traffic from multiple MSANs can be combined onto a single connection using wave-division multiplexing (WDM). You can also connect the MSAN to a video services router. However, this connection method requires that you use a Layer 3 MSAN that has the ability to determine which link to use when forwarding traffic.

When using the direct connection method, keep the following in mind:

- We recommend this approach when possible to simplify network management.
- Because multiple MSANs are used to connect to the services router, and Layer 3 MSANs generally require a higher equipment cost, this method is rarely used in a multiedge subscriber management model.
- Direct connection is typically used when most MSAN links are utilized less than 33 percent and there is little value in combining traffic from multiple MSANs.

### Ethernet Aggregation Switch Connection

An Ethernet aggregation switch aggregates traffic from multiple downstream MSANs into a single connection to the services router (broadband services router or optional video services router).

When using the Ethernet aggregation switch connection method, keep the following in mind:

- Ethernet aggregation is typically used when most MSAN links are utilized over 33 percent or to aggregate traffic from lower speed MSANs (for example, 1 Gbps) to a higher speed connection to the services router (for example, 10 Gbps).
- You can use an MX Series router as an Ethernet aggregation switch. For information about configuring the MX Series router in Layer 2 scenarios, see the *Junos OS Layer 2 Switching and Bridging Library for Routing Devices* or the *Ethernet Networking Feature Guide for MX Series Routers*.

## Ring Aggregation Connection

In a ring topology, the remote MSAN that connects to subscribers is called the remote terminal (RT). This device can be located in the outside plant (OSP) or in a remote central office (CO). Traffic traverses the ring until it reaches the central office terminal (COT) at the head-end of the ring. The COT then connects directly to the services router (broadband services router or video services router).



**NOTE:** The RT and COT must support the same ring resiliency protocol.

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You can use an MX Series router in an Ethernet ring aggregation topology. For information about configuring the MX Series router in Layer 2 scenarios, see the *Junos OS Layer 2 Switching and Bridging Library for Routing Devices* or the *Ethernet Networking Feature Guide for MX Series Routers*.

### Related Documentation

- [Multiservice Access Node Overview on page 11](#)

## CHAPTER 3

# Broadband Subscriber Management Solution Software Overview

- [Broadband Subscriber Management VLAN Architecture Overview on page 15](#)
- [AAA Service Framework and Broadband Subscriber Management Overview on page 17](#)

### Broadband Subscriber Management VLAN Architecture Overview

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The subscriber management logical network architecture is as important as the physical network architecture. You configure the logical portion of the subscriber management network using virtual local area networks (VLANs).

Three VLAN models deliver multiple services to subscribers. These models include the following:

- **Service VLAN**—The service VLAN (S-VLAN) provides many-to-one (N:1) subscriber-to-service connectivity: The service VLAN carries a service (for example, data, video, or voice) to all subscribers instead of having different services share a VLAN. Adding a new service requires adding a new VLAN and allocating bandwidth to the new service. The service VLAN model enables different groups that are using the broadband network (for example, external application providers) to manage a given service. One limitation of service VLANs is the absence of any logical isolation between user sessions at the VLAN level. This lack of isolation requires that the multiservice access node (MSAN) and broadband services router provide the necessary security filtering.
- **Customer VLAN**—The customer VLAN (C-VLAN) provides one-to-one (1:1) subscriber-to-service connectivity: One VLAN carries all traffic to each subscriber on the network. Having a single VLAN per subscriber simplifies operations by providing a 1:1 mapping of technology (VLANs) to subscribers. You can also understand what applications any subscriber is using at any given time. Because you use only one VLAN to carry traffic to each subscriber, this approach is not affected when adding new services. However, using a pure C-VLAN model consumes more bandwidth because a single television channel being viewed by multiple subscribers is carried across the network several times—once on each C-VLAN. This approach requires a more scalable, robust edge router that can support several thousand VLANs.
- **Hybrid C-VLAN**—The hybrid VLAN combines the best of both previous VLANs by using one VLAN per subscriber to carry unicast traffic and one shared multicast VLAN

(M-VLAN) for carrying broadcast (multicast) television traffic. You can use both the *pure* and *hybrid* C-VLAN models in different portions of the network, depending upon available bandwidth and MSAN capabilities.



**NOTE:** The term *C-VLAN*, when used casually, often refers to a *hybrid* C-VLAN implementation.

We recommend using one of the C-VLAN models to simplify configuration and management when expanding services. However, some MSANs are limited to the number of VLANs they can support, limiting the ability to use either C-VLAN model.



**NOTE:** Most MSANs can support the service VLAN model.

## Broadband Subscriber Management VLANs Across an MSAN

You configure VLANs to operate between the MSAN and the edge router (broadband services router or video services router). However, the MSAN might modify VLAN identifiers before forwarding information to the subscriber in the following ways:



**NOTE:** Not all MSANs support these options.

- The VLAN identifiers can be carried within the ATM VCs or they can be removed. The value of keeping the VLAN header is that it carries the IEEE 802.1p Ethernet priority bits. These priority bits can be added to upstream traffic by the residential gateway, allowing the DSLAM to easily identify and prioritize more important traffic (for example, control and VoIP traffic). Typically, a VLAN identifier of zero (0) is used for this purpose.
- In a C-VLAN model, the MSAN might modify the VLAN identifier so that the same VLAN is sent to each subscriber. This enables the use of the same digital subscriber line (DSL) modem and residential gateway configuration for all subscribers without the need to define a different VLAN for each device.

## Customer VLANs and Ethernet Aggregation

The 12-bit VLAN identifier (VLAN ID) can support up to 4095 subscribers. When using an aggregation switch with a C-VLAN topology, and fewer than 4095 subscribers are connected to a single edge router port, the aggregation switch can transparently pass all VLANs. However, if the VLAN can exceed 4095 subscribers per broadband services router port, you must use VLAN stacking (IEEE 802.1ad, also known as Q-in-Q). VLAN stacking includes two VLAN tags—an outer tag to identify the destination MSAN and an inner tag to identify the subscriber. For downstream traffic (that is, from the broadband services router or Ethernet switch to the MSAN), the outer tag determines which port to forward traffic. The forwarding device then uses the VLAN pop function on this tag before forwarding the traffic with a single tag. The reverse process occurs for upstream traffic.



VLAN stacking is not necessary for S-VLANs or M-VLANs. However, for the hybrid (C-VLAN and M-VLAN) model, the Ethernet switch or services router must be able to pop or push tags onto C-VLAN traffic while not modifying M-VLAN packets.

## VLANs and Residential Gateways

One function provided by a residential gateway is to enable each subscriber to have a private (in-home) network, unseen by other broadband subscribers, while enabling the subscriber to have multiple devices connected to the broadband network. This private network is made possible by using Network Address Translation (NAT).

Most conditional access systems (for example, video on demand) require detecting the real IP address of the set-top box (STB). This security measure means that traffic to and from the STB must be bridged, not routed, across all network elements including aggregation switches, MSANs, and residential gateways. NAT cannot be used at the residential gateway for traffic to and from the STB. In addition, some residential gateways associate VLANs (or ATM virtual circuits) with ports. Traffic on a given VLAN is always forwarded to specific downstream port. Use caution when mapping VLANs on an MSAN.

### Related Documentation

- *Static Subscriber Interfaces and VLAN Overview* in the *Junos OS Subscriber Management and Services Library*.

## AAA Service Framework and Broadband Subscriber Management Overview

You use AAA Service Framework for all authentication, authorization, accounting, address assignment, and dynamic request services that the services router uses for network access. The framework supports authentication and authorization through external servers, such as RADIUS. The framework also supports accounting and dynamic-request CoA and disconnect operations through external servers, and address assignment through a combination of local address-assignment pools and RADIUS.



**NOTE:** The broadband subscriber management solution currently supports the use of only RADIUS servers.

The broadband services router interacts with external servers to determine how individual subscribers access the broadband network. The router also obtains information from external servers for the following:

- Methods used for authentication and accounting.
- How accounting statistics are collected and used.
- How dynamic requests are handled.

### Related Documentation

- *AAA Service Framework Overview* in the *Junos OS Subscriber Management and Services Library*.
- *RADIUS-Initiated Change of Authorization (CoA) Overview* in the *Junos OS Subscriber Management and Services Library*.

- *RADIUS-Initiated Disconnect Overview* in the *Junos OS Subscriber Management and Services Library*.

## CHAPTER 4

# Broadband Subscriber Management PPPoE Wholesale Overview

- [Layer 2 and Layer 3 Wholesale Overview on page 19](#)
- [PPPoE Layer 3 Wholesale Configuration Interface Support on page 20](#)
- [Subscriber to Logical System and Routing Instance Relationship on page 20](#)
- [RADIUS VSAs and Broadband Subscriber Management Wholesale Configuration Overview on page 21](#)

## Layer 2 and Layer 3 Wholesale Overview

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In general, wholesaling broadband services allows service providers to resell broadband services and allows other providers to deploy their own services over the incumbent network. There are different methods to partitioning an access network for resale. The two most common approaches are based on either Layer 2 or Layer 3 information. Wholesale access is the process by which the access network provider (the *wholesaler*) partitions the access network into separately manageable and accountable subscriber segments for resale to other network providers (or *retailers*).

In a Layer 3 wholesale configuration, you partition the wholesaler access network at the network layer or the subscriber IP component by associating the IP component with a distinct Layer 3 domain. In a Layer 2 wholesale configuration, you partition the access network at the subscriber circuit or customer VLAN (C-VLAN) by backhauling the connection through the service provider backbone network to the subscribing retailer network where the access traffic can be managed at higher layers.

In a Junos OS Dynamic Host Configuration Protocol (DHCP) or Point-to-Point Protocol over Ethernet (PPPoE) subscriber access configuration, wholesale partitioning is accomplished through the use of logical systems and routing instances within the router. Logical systems offer a stricter partitioning of routing resources than routing instances. The purpose behind the use of logical systems is to distinctly partition the physical router into separate administrative domains. This partitioning enables multiple providers to administer the router simultaneously, with each provider having access only to the portions of the configuration relevant to their logical system. Junos OS supports up to 15 named logical systems in addition to the default logical system (that is, **inet.0**). Unless otherwise specified in configuration, all interfaces belong to the default logical system.



**NOTE:** This Junos OS release supports the use of only the default logical system. Partitioning currently occurs through the use of separate routing instances.

A logical system can have one or more routing instances. Typically used in Layer 3 VPN scenarios, a routing instance does not have the same level of administrative separation as a logical system because it does not offer administrative isolation. However, the routing instance defines a distinct routing table, set of routing policies, and set of interfaces.

**Related Documentation**

- *Broadband Subscriber Management DHCPv4 Layer 3 Wholesale Topology and Configuration Elements*
- [Broadband Subscriber Management PPPoE Layer 3 Wholesale Topology and Configuration Elements on page 25](#)
- *Broadband Subscriber Management Layer 2 Wholesale Topology and Configuration Elements*

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## PPPoE Layer 3 Wholesale Configuration Interface Support

PPPoE Layer 3 wholesale requires the use of PPP interfaces. This means that you must specify the PP0 interface when configuring Layer 3 wholesaling in a PPPoE network.

For general additional information about configuring PPPoE interfaces, see the *Junos OS Network Interfaces Library for Routing Devices*.

**Related Documentation**

- *Junos OS Network Interfaces Library for Routing Devices*
- *Configuring a Basic PPPoE Dynamic Profile in the Junos OS Subscriber Management and Services Library.*
- *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles in the Junos OS Subscriber Management and Services Library.*
- *Configuring a PPPoE Dynamic Profile with Additional Options in the Junos OS Subscriber Management and Services Library.*

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## Subscriber to Logical System and Routing Instance Relationship

As subscriber sessions are established, subscriber to logical system/routing instance memberships are established by the AAA framework configured for the default logical system. When configuring Layer 3 wholesaling, you typically configure global (wholesale) information within the default (master) logical system and default routing instance. Incoming subscribers must then be authenticated, but this authentication can be handled in one of two ways:

- Single (wholesaler only) authentication—Incoming subscribers are authenticated by the wholesaler RADIUS server. After authentication, the subscribers are assigned values

specified by dynamic profiles (routing instances, interfaces, and any configuration values) specific to a particular retailer.

- Dual (wholesaler and retailer) authentication—Sometimes referred to as *double-dip authentication*. Incoming subscribers are initially authenticated by RADIUS using the wholesale configuration. Authenticated subscribers are then redirected to other routing instances associated with individual retailer network space. When you redirect subscribers, and those subscribers are to be authenticated by AAA servers owned by individual retailers, the subscribers must be authenticated again by the AAA servers before they are provided an address and any dynamic profile values are assigned. After reauthentication, however, the subscribers are managed normally using any values specific to the retailer routing instance to which they are assigned.

**Related  
Documentation**

- See *Routing Instances Overview* in the *Junos OS Routing Protocols Library for Routing Devices*.

## RADIUS VSAs and Broadband Subscriber Management Wholesale Configuration Overview

You can use RADIUS to assign various values through the use of dynamic variables within dynamic profiles. However, the configuration of at least one of the two VSAs described in [Table 4 on page 21](#) is required for a wholesale network to function.

**Table 4: Required Juniper Networks VSAs for the Broadband Subscriber Management Wholesale Network Solution**

Attribute Number	Attribute Name	Description	Value
26-1	LSRI-Name	Client logical system/routing instance membership name. Allowed only from RADIUS server for "default" logical system/routing instance membership.	string: logical system:routing instance
26-25	Redirect-LSRI-Name	Client logical system/routing instance membership name indicating to which logical system/routing instance membership the request is redirected for user authentication.	string: logical system:routing instance

Specifying the **\$junos-routing-instance** dynamic variable in a dynamic profile triggers a RADIUS access-accept response of either the LSRI-Name VSA or the Redirect-LSRI-Name VSA. Returning an LSRI-Name attribute in the access-accept response provides the logical system and routing instance in which the logical interface is to be created and

the router updates the session database with the specified routing instance value. Returning a Redirect-LSRI-Name attribute in the access-accept response results in the router immediately sending a second access-request message (sometimes referred to as a *double-dip*) to the RADIUS server specified by the logical system:routing instance attribute specified by the Redirect-LSRI-Name VSA.



**NOTE:** Attributes returned as a result of a second access-request message to the logical system/routing instance membership specified by the Redirect-LSRI-Name VSA override any prior attributes returned by initial access-accept responses to the default logical system/routing instance membership.

**Related  
Documentation**

- *Juniper Networks VSAs Supported by the AAA Service Framework in the Junos OS Subscriber Management and Services Library.*

## PART 2

# Configuration

- [Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration on page 25](#)
- [Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration Statements on page 35](#)
- [Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration Examples on page 101](#)





## CHAPTER 5

# Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration

- [Broadband Subscriber Management PPPoE Layer 3 Wholesale Topology and Configuration Elements on page 25](#)
- [PPPoE Layer 3 Wholesale Network Topology Overview on page 27](#)
- [Configuring Loopback Interfaces for the PPPoE Layer 3 Wholesale Solution on page 27](#)
- [Configuring Static Customer VLANs for the PPPoE Layer 3 Wholesale Network Solution on page 29](#)
- [Configuring Access Components for the PPPoE Wholesale Network Solution on page 29](#)
- [Configuring Dynamic Profiles for the PPPoE Layer 3 Wholesale Network Solution on page 31](#)
- [Configuring Separate Routing Instances for PPPoE Service Retailers on page 33](#)

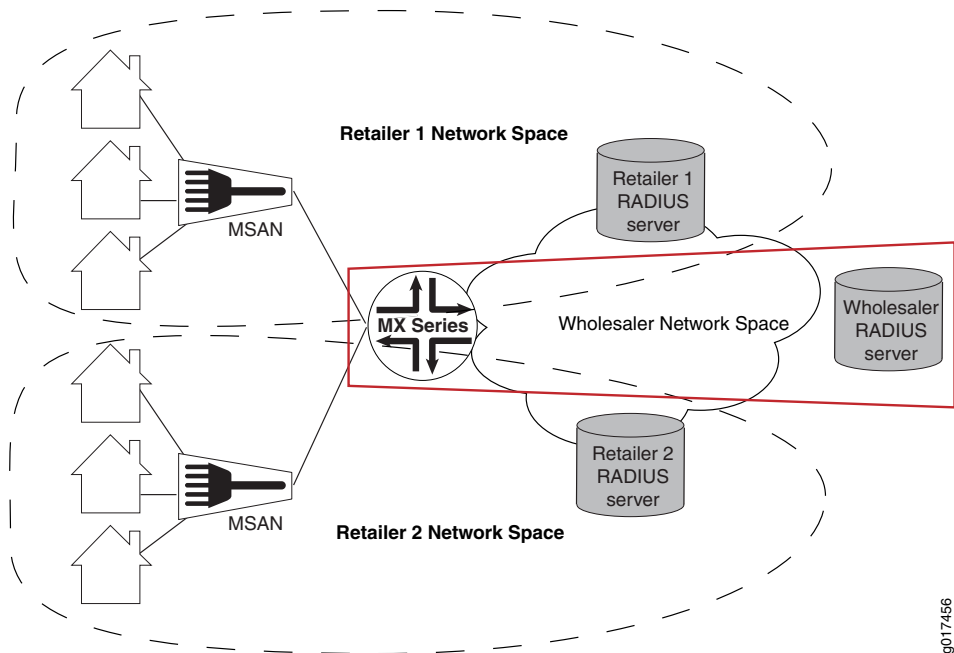
## Broadband Subscriber Management PPPoE Layer 3 Wholesale Topology and Configuration Elements

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The network topology for the subscriber management PPPoE Layer 3 wholesale solution includes configuring separate routing instances for individual retailers that use a portion of the router.

To explain the concept, but to limit complexity, this solution provides a configuration with one wholesaler and only two retailers. [Figure 2 on page 26](#) illustrates a basic PPPoE Layer 3 wholesale topology model from which you can expand.

**Figure 2: Basic Subscriber Management PPPoE Layer 3 Wholesale Solution Topology**



When you are configuring a PPPoE Layer 3 wholesale network solution, the following configuration elements are required:

- Subscriber network VLAN configuration
- Addressing server or addressing server access configuration
- RADIUS server access configuration
- Dynamic profile configuration for default (wholesaler) access
- Routing instance configuration for individual retailers
- Group configuration and forwarding options for the network
- Core network configuration

This implementation of PPPoE Layer 3 wholesale supports the following:

- Dynamic PPPoE interface creation.
- Static VLAN use only.
- AAA server assignment of subscribers to different routing instances within the same (default) logical system only.

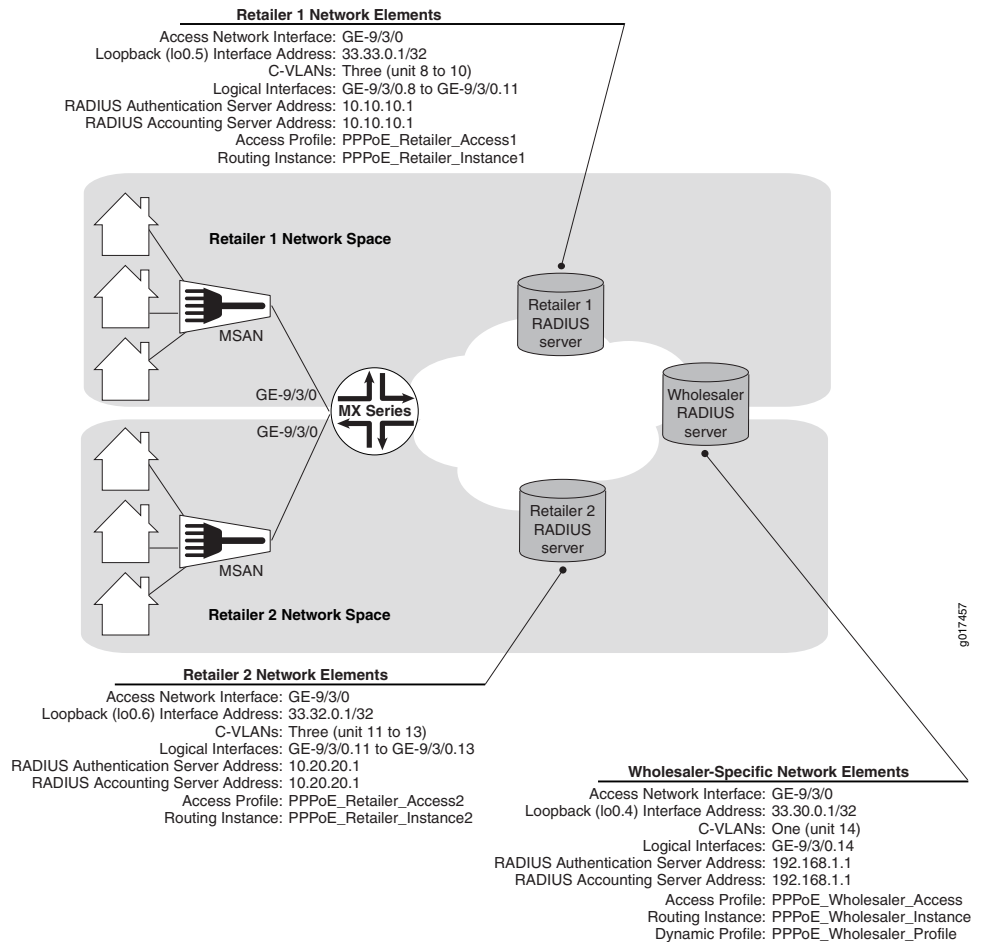
**Related Documentation**

- [Layer 2 and Layer 3 Wholesale Overview on page 19](#)
- [PPPoE Layer 3 Wholesale Network Topology Overview on page 27](#)

## PPPoE Layer 3 Wholesale Network Topology Overview

This configuration explains how to configure a simple PPPoE Layer 3 wholesale subscriber access network. This solution incorporates two retailers sharing resources on a wholesaler router. [Figure 3 on page 27](#) provides the reference topology for this configuration example.

**Figure 3: PPPoE Layer 3 Wholesale Network Reference Topology**



### Related Documentation

- [Layer 2 and Layer 3 Wholesale Overview on page 19](#)
- [Broadband Subscriber Management DHCPv4 Layer 3 Wholesale Topology and Configuration Elements](#)

## Configuring Loopback Interfaces for the PPPoE Layer 3 Wholesale Solution

You must configure loopback interfaces for use in the subscriber management access network. The loopback interfaces are automatically used for unnumbered interfaces.



**NOTE:** If you do not configure the loopback interface, the routing platform chooses the first interface to come online as the default. If you configure more than one address on the loopback interface, we recommend that you configure one to be the primary address to ensure that it is selected for use with unnumbered interfaces. By default, the primary address is used as the source address when packets originate from the interface.

To configure loopback interfaces:

1. Edit the loopback interface.

```
[edit]
user@host# edit interfaces lo0
```

2. Edit the unit for the wholesale loopback interface.

```
[edit interfaces lo0]
user@host# edit unit 4
```

3. Edit the wholesale loopback interface family.

```
[edit interfaces lo0 unit 4]
user@host# edit family inet
```

4. Specify the wholesale loopback interface address.

```
[edit interfaces lo0 unit 4 family inet]
user@host# set address 33.30.0.1/32
```

5. (Optional) Specify the loopback interface address as the primary loopback interface.

```
[edit interfaces lo0 unit 4 family inet]
user@host# set address 33.30.0.2/32 primary
```

6. Edit the unit for a retail loopback interface.

```
[edit interfaces lo0]
user@host# edit unit 5
```

7. Edit the retail loopback interface family.

```
[edit interfaces lo0 unit 5]
user@host# edit family inet
```

8. Specify the retail loopback interface address.

```
[edit interfaces lo0 unit 5 family inet]
user@host# set address 33.33.0.1/32
```

9. (Optional) Specify the loopback interface address as the primary loopback interface.

```
[edit interfaces lo0 unit 5 family inet]
user@host# set address 33.33.0.2/32 primary
```

10. Repeat steps 7 through 10 for additional retailers, making sure to use unique unit and address values for each retailer loopback interface.

**Related  
Documentation**

- *Configuring Top-Level Broadband Subscriber Management Elements*

- *Junos OS Network Interfaces Library for Routing Devices*

## Configuring Static Customer VLANs for the PPPoE Layer 3 Wholesale Network Solution

In this example configuration, the access interface (**ge-9/3/0**) connects to a device (that is, a DSLAM) on the access side of the network. You can define static customer VLANs (C-VLANs) for use by the wholesaler and any access network subscribers.

To configure the customer VLANs:

1. Edit the access side interface.

```
[edit]
user@host# edit interfaces ge-9/3/0
```

2. Specify the use of flexible VLAN tagging.

```
[edit interfaces ge-9/3/0]
user@host# set flexible-vlan-tagging
```

3. Edit the interface unit for the wholesaler VLAN.

```
[edit interfaces ge-9/3/0]
user@host# edit unit 14
```

4. Specify the type of encapsulation that you want the wholesaler VLAN to use.

```
[edit interfaces ge-9/3/0 unit 14]
user@host# set encapsulation ppp-over-ether
```

5. (Optional) Specify that you want the wholesaler VLAN to use Proxy ARP.

```
[edit interfaces ge-9/3/0 unit 14]
user@host# set proxy-arp
```

6. Define a unique VLAN ID for the wholesaler VLAN.

```
[edit interfaces ge-9/3/0 unit 14]
user@host# set vlan-id 14
```

7. Specify the dynamic profile that you want the wholesaler VLAN to use.

```
[edit interfaces ge-9/3/0 unit 14]
user@host# set pppoe-underlying-options dynamic-profile PPPoE_Wholesaler_Profile
```

## Configuring Access Components for the PPPoE Wholesale Network Solution

When configuring a wholesale network, you must configure several components globally. This configuration provides access to RADIUS servers (if used) that you want the wholesaler and any configured retailers to use globally. The access configuration includes the following general steps:

- [Configuring RADIUS Server Access on page 30](#)
- [Configuring a PPPoE Wholesaler Access Profile on page 30](#)
- [Configuring PPPoE Retailer Access Profiles on page 31](#)

## Configuring RADIUS Server Access

You can globally define any RADIUS servers in your network that either the wholesale access profile or retailer access profile can use. After you define the global RADIUS servers, you can specify specific RADIUS servers within individual access profiles.

To define RADIUS servers for profile access:

1. Access the **[edit access radius-server]** hierarchy level.

```
[edit ]
user@host# edit access radius-server
```

2. Specify the address and secret for any RADIUS servers in the network.

```
[edit access radius-server]
user@host# set 192.168.10.1 secret $9$CzBxBBfleWx-wM8xgaU.m345B02EcyKXL
user@host# set 10.10.10.1 secret $7$OsCsBAf1fXx-wY3xgaU.m123A02ZtyNMT
```

## Configuring a PPPoE Wholesaler Access Profile

You must define the network and interface over which you want subscribers to initially access the network with a wholesale access profile. When a subscriber attempts to access the network, the access profile provides initial access information including authentication and accounting values that the router uses for the accessing subscriber.

To define a wholesale access profile:

1. Create the wholesale access profile.

```
[edit]
user@host# edit access profile PPPoE_Wholesaler_Access
```

2. Specify the authentication methods for the profile and the order in which they are used.

```
[edit access profile PPPoE_Wholesaler_Access]
user@host# set authentication-order radius
```

3. Specify that you want to configure RADIUS support.

```
[edit access profile PPPoE_Wholesaler_Access]
user@host# edit radius
```

4. Specify the IP address of the RADIUS server used for authentication.

```
[edit access profile PPPoE_Wholesaler_Access radius]
user@host# set authentication-server 192.168.10.1
```

5. Specify the IP address of the RADIUS server used for accounting.

```
[edit access profile PPPoE_Wholesaler_Access radius]
user@host# set accounting-server 192.168.10.1
```

6. Configure any desired options for the RADIUS server.

*See Configuring RADIUS Server Options for Subscriber Access.*

7. Configure subscriber accounting (RADIUS accounting).

*See Configuring Per-Subscriber Session Accounting.*

## Configuring PPPoE Retailer Access Profiles

In this solution, subscribers are redirected to a networking space used by a specific retailer and defined by a unique routing instance. This method requires that you define the network and interface over which you want subscribers to access the network after being redirected by the wholesale access profile.

To define a retailer access profile:

1. Create the retailer access profile.

```
[edit]
user@host# edit access profile PPPoE_Retailer_Access1
```

2. Specify the authentication methods for the profile and the order in which they are used.

```
[edit access profile PPPoE_Retailer_Access1]
user@host# set authentication-order radius
```

3. Specify that you want to configure RADIUS support.

```
[edit access profile PPPoE_Retailer_Access1]
user@host# edit radius
```

4. Specify the IP address of the RADIUS server used for authentication.

```
[edit access profile PPPoE_Retailer_Access1 radius]
user@host# set authentication-server 10.10.10.1
```

5. Specify the IP address of the RADIUS server used for accounting.

```
[edit access profile PPPoE_Retailer_Access1 radius]
user@host# set accounting-server 10.10.10.1
```

6. Configure any desired options for the RADIUS server.

*See Configuring RADIUS Server Options for Subscriber Access.*

7. Configure subscriber accounting (RADIUS accounting).

*See Configuring Per-Subscriber Session Accounting.*

---

## Configuring Dynamic Profiles for the PPPoE Layer 3 Wholesale Network Solution

A dynamic profile is a set of characteristics, defined in a type of template, that you can use to provide services for broadband applications. These services are assigned dynamically to interfaces as they access the network. When configuring dynamic profiles for the PPPoE Layer 3 wholesale network, you can choose to configure one dynamic profile to address all incoming subscribers or you can configure individual dynamic profiles for use by the different network management groups (that is, the wholesaler and any retailers). In fact, you can create multiple dynamic profiles that you can use to roll out different services and selectively apply those dynamic profiles to different subscriber groups as necessary.

In this solution example, one dynamic profile is created for use by the wholesaler when subscribers initially access the network. Subscribers are assigned by the wholesaler RADIUS server to a particular retailer routing instance and can then be redirected to that retailer network space.

- [Configuring a Wholesale Dynamic Profile for use in the PPPoE Solution on page 32](#)

## Configuring a Wholesale Dynamic Profile for use in the PPPoE Solution

You can configure a basic access profile to initially manage PPPoE subscribers that access the network.

To configure a dynamic profile for use by the wholesaler:

1. Create a wholesale dynamic profile.

```
[edit]
user@host# edit dynamic-profiles PPPoE_Wholesaler_Profile
```

2. Define the dynamic routing instance variable in the dynamic profile.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile]
user@host# edit routing-instances $junos-routing-instance
```

3. Set the dynamic interface variable for the dynamic routing instance.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile routing-instances
"$junos-routing-instance"]
user@host# set interface $junos-interface-name
```

4. Specify that you want to configure the **pp0** interface in the dynamic profile.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile]
user@host# edit interfaces pp0
```

5. Configure the unit for the **pp0** interface.

- a. Configure the variable for the unit number of the **pp0** interface.

The variable is dynamically replaced with the unit number that RADIUS supplies when the subscriber logs in.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0]
user@host# edit unit $junos-interface-unit
```

- b. Configure PAP or CHAP (or both) to function on the interface.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
"$junos-interface-unit"]
user@host# set ppp-options chap pap
```

- c. Configure the variable for the underlying interface of the pp0 interfaces.

The variable is dynamically replaced with the underlying interface that RADIUS supplies when the subscriber logs in.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
"$junos-interface-unit"]
user@host# set pppoe-options underlying-interface $junos-underlying-interface
```



- d. Configure the router to act as a PPPoE server.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
 "$junos-interface-unit"]
user@host# set pppoe-options server
```

6. (Optional) Modify the PPPoE keepalive interval.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
 "$junos-interface-unit"]
user@host# set keepalives interval 15
```

7. Configure the family for the **pp0** interface.

- a. Specify that you want to configure the family.



**NOTE:** You can specify **inet** for IPv4 and **inet6** for IPv6. However, this solution provides the IPv4 configuration only.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
 "$junos-interface-unit"]
user@host# edit family inet
```

- b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles PPPoE_Wholesaler_Profile interfaces pp0 unit
 "$junos-interface-unit" family inet]
user@host# set unnumbered-address $junos-loopback-interface
```

## Configuring Separate Routing Instances for PPPoE Service Retailers

As the owner of the system, the wholesaler uses the default routing instance. You must create separate routing instances for each individual retailer to keep routing information for individual retailers separate and to define any servers and forwarding options specific to each retailer.

To define a retailer routing instance:

1. Create the retailer routing instance.

```
[edit]
user@host# edit routing-instances PPPoE_Retailer_Instance1
```

2. Specify the routing instance type for the retailer.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set instance-type vrf
```

3. Specify the access profile that you want the routing instance to use.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set access-profile PPPoE_Retailer_Access1
```

4. Specify the interface that faces the Retailer1 RADIUS server.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set interface ge-11/1/9.10
```

5. Specify the loopback interface unit for this routing instance.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set interface lo0.5
```



**NOTE:** Loopback interfaces must be unique for each routing instance.

6. Specify an identifier to distinguish the VPN to which the route belongs.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set route-distinguisher 1:1
```

7. Specify how routes are imported into the local PE router's VPN routing table from the remote PE router.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set vrf-import policyImport
```

8. Specify which routes are exported from the local instance table to the remote PE router.

```
[edit routing-instances "PPPoE_Retailer_Instance1"]
user@host# set vrf-export policyExport
```

9. Repeat this procedure for other retailers.

**Related  
Documentation**

- *[edit routing-instances] Hierarchy Level*

## CHAPTER 6

# Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration Statements

### access-profile (Routing Instances)

---

<b>Syntax</b>	<code>access-profile <i>profile-name</i>;</code>
<b>Hierarchy Level</b>	[edit], [edit routing-instances <i>routing-instances-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 12.3 for ACX Series routers.
<b>Description</b>	Specify the access profile for use by the master routing instance.
<b>Options</b>	<i>profile-name</i> —Name of the access profile.
<b>Required Privilege Level</b>	access—To view this statement in the configuration. access-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Access Components for the DHCP Layer 3 Wholesale Network Solution</i></li><li>• <a href="#">Configuring Access Components for the PPPoE Wholesale Network Solution on page 29</a></li><li>• <i>Configuring Address Server Elements for the Broadband Subscriber Management Solution</i></li></ul>

## accounting-server

---

<b>Syntax</b>	<code>accounting-server [ <i>ip-address</i> ];</code>
<b>Hierarchy Level</b>	[edit access profile <i>profile-name</i> <b>radius</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1.
<b>Description</b>	Specify a list of the RADIUS accounting servers used for accounting for DHCP, L2TP, and PPP clients.
<b>Options</b>	<i>ip-address</i> —IP version 4 (IPv4) address.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Authentication and Accounting Parameters for Subscriber Access</i></li></ul>

## address

```

Syntax  address address {
        arp ip-address (mac | multicast-mac) mac-address <publish>;
        broadcast address;
        destination address;
        destination-profile name;
        eui-64;
        master-only;
        multipoint-destination address dlcid dlcid-identifier;
        multipoint-destination address {
            epd-threshold cells;
            inverse-arp;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            shaping {
                (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
                 length);
                queue-length number;
            }
            vci vpi-identifier.vci-identifier;
        }
        primary;
        preferred;
        (vrrp-group | vrrp-inet6-group) group-number {
            (accept-data | no-accept-data);
            advertise-interval seconds;
            authentication-type authentication;
            authentication-key key;
            fast-interval milliseconds;
            (preempt | no-preempt) {
                hold-time seconds;
            }
            priority-number number;
            track {
                priority-cost seconds;
                priority-hold-time interface-name {
                    interface priority;
                    bandwidth-threshold bits-per-second {
                        priority;
                    }
                }
            }
            route ip-address/mask routing-instance instance-name priority-cost cost;
        }
        virtual-address [ addresses ];
    }
}

```

**Hierarchy Level** [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*]

**Release Information** Statement introduced before Junos OS Release 7.4.  
Statement introduced in Junos OS Release 11.1 for the QFX Series.

**Description** Configure the interface address.

**Options** *address*—Address of the interface.

The remaining statements are explained separately.



---

**NOTE:** The `edit logical-systems` hierarchy is not available on QFabric systems.


---

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

**Related Documentation**

- *Configuring the Protocol Family*
- *negotiate-address*
- *unnumbered-address (Ethernet)*
- *Junos OS Administration Library for Routing Devices*
- *family*

## authentication-order

<b>Syntax</b>	<code>authentication-order [ <i>authentication-methods</i> ];</code>
<b>Hierarchy Level</b>	<code>[edit access <i>profile</i> <i>profile-name</i>]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. <b>none</b> option introduced in Junos OS Release 11.2.
<b>Description</b>	Set the order in which the Junos OS tries different authentication methods when verifying that a client can access the router or switch. For each login attempt, the software tries the authentication methods in order, from first to last.
<b>Default</b>	<code>password</code>
<b>Options</b>	<p><i>authentication-methods</i></p> <ul style="list-style-type: none"> <li><b>none</b>—Grants authentication without examining the client credentials. Can be used, for example, when the Diameter function Gx-Plus is employed for notification during subscriber provisioning.</li> <li><b>password</b>—Verify the client using the information configured at the <code>[edit access profile <i>profile-name</i> client <i>client-name</i>]</code> hierarchy level.</li> <li><b>radius</b>—Verify the client using RADIUS authentication services.</li> </ul>
	<div>  <p><b>NOTE:</b> For subscriber access management, you must always specify the <b>radius</b> method. Subscriber access management does not support the <b>password</b> option (the default), and authentication fails when no method is specified.</p> </div>
<b>Required Privilege Level</b>	<p><code>admin</code>—To view this statement in the configuration.</p> <p><code>admin-control</code>—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><i>Example: Configuring CHAP Authentication with RADIUS</i></li> <li><i>Specifying the Authentication and Accounting Methods for Subscriber Access</i></li> <li><i>Configuring Access Profiles for L2TP or PPP Parameters</i></li> </ul>


## authentication-server

---

<b>Syntax</b>	authentication-server [ <i>ip-address</i> ];
<b>Hierarchy Level</b>	[edit access <a href="#">profile</a> <i>profile-name</i> <a href="#">radius</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1.
<b>Description</b>	Specify a list of the RADIUS authentication servers used to authenticate DHCP, L2TP, and PPP clients. The servers in the list are also used as RADIUS dynamic-request servers, from which the router accepts and processes RADIUS disconnect requests, CoA requests, and dynamic service activations and deactivations.
<b>Options</b>	<i>ip-address</i> —IPv4 address.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring RADIUS Server Parameters for Subscriber Access</i></li></ul>



## dynamic-profile (Dynamic PPPoE)

<b>Syntax</b>	<code>dynamic-profile <i>profile-name</i>;</code>
<b>Hierarchy Level</b>	<p>[edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> pppoe],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>pppoe-underlying-options</b>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> pppoe],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>pppoe-underlying-options</b>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 10.1.</p> <p>Support for the [edit ... <b>family pppoe</b>] hierarchies introduced in Junos OS Release 11.2.</p>
<b>Description</b>	<p>Attach a PPPoE dynamic profile to an underlying Ethernet interface. This underlying interface is configured with either the <b>encapsulation ppp-over-ether</b> statement or the <b>family pppoe</b> statement; the two statements are mutually exclusive. When the router creates a dynamic PPPoE logical interface on the underlying interface, it uses the information in the dynamic profile to determine the properties of the dynamic PPPoE logical interface.</p>
<div>  <p><b>NOTE:</b> The [edit ... <b>family pppoe</b>] hierarchies are supported only on MX Series routers with MPCs.</p> </div>	
<b>Options</b>	<p><b><i>profile-name</i></b>—Name of a previously configured PPPoE dynamic profile, up to 64 characters in length, defined at the [edit dynamic-profiles <i>profile-name</i> interfaces pp0] hierarchy level.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces</li> <li>Configuring the PPPoE Family for an Underlying Interface</li> <li>For information about creating static PPPoE interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>

## dynamic-profiles

```

Syntax  dynamic-profiles {
        profile-name {
            class-of-service {
                interfaces {
                    interface-name ;
                }
                unit logical-unit-number {
                    classifiers {
                        type (classifier-name | default);
                    }
                    output-traffic-control-profile (profile-name | $junos-cos-traffic-control-profile);
                    rewrite-rules {
                        dscp (rewrite-name | default);
                        dscp-ipv6 (rewrite-name | default);
                        ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
                        inet-precedence (rewrite-name | default);
                    }
                }
            }
        }
        scheduler-maps {
            map-name {
                forwarding-class class-name scheduler scheduler-name;
            }
        }
        schedulers {
            (scheduler-name) {
                buffer-size (seconds | percent percentage | remainder | temporal microseconds);
                drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
                    protocol (any | non-tcp | tcp) drop-profile profile-name;
                excess-priority (low | high | $junos-cos-scheduler-excess-priority);
                excess-rate (percent percentage | percent $junos-cos-scheduler-excess-rate);
                overhead-accounting (shaping-mode) <bytes (byte-value)>;
                priority priority-level;
                shaping-rate (rate | predefined-variable);
                transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
            }
        }
        traffic-control-profiles profile-name {
            delay-buffer-rate (percent percentage | rate | $junos-cos-delay-buffer-rate);
            excess-rate (percent percentage | proportion value | percent $junos-cos-excess-rate);
            guaranteed-rate (percent percentage | rate | $junos-cos-guaranteed-rate);
            overhead-accounting (shaping-mode) <bytes (byte-value)>;
            scheduler-map map-name;
            shaping-rate (rate | predefined-variable);
        }
    }
    firewall {
        family family {
            fast-update-filter filter-name {
                interface-specific;
                match-order [match-order];
            }
        }
    }

```

```
term term-name {
  from {
    match-conditions;
  }
  then {
    action;
    action-modifiers;
  }
  only-at-create;
}
}
firewall {
  family family {
    fast-update-filter filter-name {
      interface-specific;
      match-order [match-order];
      term term-name {
        from {
          match-conditions;
        }
        then {
          action;
          action-modifiers;
        }
        only-at-create;
      }
    }
    filter filter-name {
      interface-specific;
      term term-name {
        from {
          match-conditions;
        }
        then {
          action;
          action-modifiers;
        }
      }
    }
  }
  policer policer-name {
    filter-specific;
    if-exceeding {
      (bandwidth-limit bps | bandwidth-percent percentage);
      burst-size-limit bytes;
    }
    logical-bandwidth-policer;
    logical-interface-policer;
    physical-interface-policer;
    then {
      policer-action;
    }
  }
}
hierarchical-policer policer-name {
  aggregate {
    if-exceeding {
      bandwidth-limit-limit bps;
      burst-size-limit bytes;
    }
    then {
```

```

        policer-action;
    }
}
premium {
    if-exceeding {
        bandwidth-limit bps;
        burst-size-limit bytes;
    }
    then {
        policer-action;
    }
}
}
three-color-policer policer-name {
    action {
        loss-priority high then discard;
    }
    logical-interface-policer;
    single-rate {
        (color-aware | color-blind);
        committed-burst-size bytes;
        committed-information-rate bps;
        excess-burst-size bytes;
    }
    two-rate {
        (color-aware | color-blind);
        committed-burst-size bytes;
        committed-information-rate bps;
        peak-burst-size bytes;
        peak-information-rate bps;
    }
}
}
}
policy-options {
    prefix-list name {
        ip-addresses;
    }
}
}
}
interfaces interface-name {
    interface-set interface-set-name {
        interface interface-name {
            unit logical unit number {
                advisory-options {
                    downstream-rate rate;
                    upstream-rate rate;
                }
            }
        }
    }
}
}
unit logical-unit-number {
    auto-configure {
        agent-circuit-identifier {
            dynamic-profile profile-name;

```

```

    }
}
encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid |
atm-tcc-vc-mux | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux |
atm-snap | atm-tcc-snap | atm-vc-mux | ether-over-atm-llc |
ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet |
frame-relay-ccc | frame-relay-ppp | frame-relay-tcc | frame-relay-ether-type |
frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end | multilink-ppp |
ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc
| vlan-tcc | vlan-vpls);
family family {
    address address;
    filter {
        adf {
            counter;
            input-precedence precedence;
            not-mandatory;
            output-precedence precedence;
            rule rule-value;
        }
        input filter-name (
            precedence precedence;
        )
        output filter-name {
            precedence precedence;
        }
    }
}
rpf-check {
    fail-filter filter-name;
    mode loose;
}
service {
    input {
        service-set service-set-name {
            service-filter filter-name;
        }
        post-service-filter filter-name;
    }
    input-vlan-map {
        inner-tag-protocol-id tpid;
        inner-vlan-id number;
        (push | swap);
        tag-protocol-id tpid;
        vlan-id number;
    }
    output {
        service-set service-set-name {
            service-filter filter-name;
        }
    }
    output-vlan-map {
        inner-tag-protocol-id tpid;
        inner-vlan-id number;
        (pop | swap);
        tag-protocol-id tpid;
        vlan-id number;
    }
}

```

```

    }
  }
  unnumbered-address interface-name <preferred-source-address address>;
}
ppp-options {
  chap;
  pap;
}
vlan-id number;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
}
interfaces {
  demux0 {...}
}
interfaces {
  pp0 {...}
}
protocols {
  igmp {
    interface interface-name {
      accounting;
      disable;
      group-policy;
      immediate-leave;
      no-accounting;
      promiscuous-mode;
      ssm-map ssm-map-name;
      static {
        group group {
          source source;
        }
      }
      version version;
    }
  }
  mld {
    interface interface-name {
      disable;
      (accounting | no-accounting);
      group-policy;
      immediate-leave;
      oif-map;
      passive;
      ssm-map ssm-map-name;
      static {
        group multicast-group-address {
          exclude;
          group-count number;
          group-increment increment;
          source ip-address {
            source-count number;
            source-increment increment;
          }
        }
      }
    }
  }
  version version;
}

```

```

    }
  }
  router-advertisement {
    interface interface-name {
      current-hop-limit number;
      default-lifetime seconds;
      (managed-configuration | no-managed-configuration);
      max-advertisement-interval seconds;
      min-advertisement-interval seconds;
      (other-stateful-configuration | no-other-stateful-configuration);
      prefix prefix;
      reachable-time milliseconds;
      retransmit-timer milliseconds;
    }
  }
}
routing-instances routing-instance-name {
  interface interface-name;
  routing-options {
    access {
      route prefix {
        next-hop next-hop;
        metric route-cost;
        preference route-distance;
        tag route-tag;
      }
    }
    access-internal {
      route subscriber-ip-address {
        qualified-next-hop underlying-interface {
          mac-address address;
        }
      }
    }
    multicast {
      interface interface-name {
        no-qos-adjust;
      }
    }
  }
}
rib routing-table-name {
  access {
    route prefix {
      next-hop next-hop;
      metric route-cost;
      preference route-distance;
      tag route-tag;
    }
  }
  access-internal {
    route subscriber-ip-address {
      qualified-next-hop underlying-interface {
        mac-address address;
      }
    }
  }
}

```

```

    }
  }
}
routing-options {
  access {
    route prefix {
      next-hop next-hop;
      metric route-cost;
      preference route-distance;
      tag route-tag;
    }
  }
  access-internal {
    route subscriber-ip-address {
      qualified-next-hop underlying-interface {
        mac-address address;
      }
    }
  }
  multicast {
    interface interface-name {
      no-qos-adjust;
    }
  }
}
variables {
  variable-name {
    default-value default-value;
    equals expression;
    mandatory;
    radius {
      vendor-id id {
        attribute attribute-number;
        tag tag-number;
      }
    }
    uid;
    uid-reference;
  }
}
}

```

Hierarchy Level	[edit]
Release Information	Statement introduced in Junos OS Release 9.2. Support at the <b>filter</b> , <b>policer</b> , <b>hierarchical-policer</b> , <b>three-color-policer</b> , and <b>policy options</b> hierarchy levels introduced in Junos OS Release 11.4.
Description	Create dynamic profiles for use with DHCP or PPP client access.
Options	<b><i>profile-name</i></b> —Name of the dynamic profile; string of up to 80 alphanumeric characters.  The remaining statements are explained separately.



<b>Required Privilege</b>	routing—To view this statement in the configuration.
<b>Level</b>	routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring a Basic Dynamic Profile</i></li><li>• <i>Configuring Dynamic VLANs Based on Agent Circuit Identifier Information</i></li><li>• <i>Dynamic Profiles Overview</i></li></ul>

## encapsulation (Logical Interface)

<b>Syntax</b>	encapsulation (atm-ccc-cell-relay   atm-ccc-vc-mux   atm-cisco-nlpid   atm-mlppp-llc   atm-nlpid   atm-ppp-llc   atm-ppp-vc-mux   atm-snap   atm-tcc-snap   atm-tcc-vc-mux   atm-vc-mux   ether-over-atm-llc   ether-vpls-over-atm-llc   ether-vpls-over-fr   ether-vpls-over-ppp   ethernet   ethernet-ccc   ethernet-vpls   ethernet-vpls-fr   frame-relay-ccc   frame-relay-ether-type   frame-relay-ether-type-tcc   frame-relay-ppp   frame-relay-tcc   gre-fragmentation   multilink-frame-relay-end-to-end   multilink-ppp   ppp-over-ether   ppp-over-ether-over-atm-llc   vlan-bridge   vlan-ccc   vlan-vci-ccc   vlan-tcc   vlan-vpls);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ], [edit interfaces rlsq <i>number</i> <b>unit</b> <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers ( <b>vlan-ccc</b> and <b>vlan-tcc</b> options only). Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the <b>atm-ccc-cell-relay</b> and <b>atm-ccc-vc-mux</b> options are supported on ACX Series routers.
<b>Description</b>	Configure a logical link-layer encapsulation type.
<b>Options</b>	<p><b>atm-ccc-cell-relay</b>—Use ATM cell-relay encapsulation.</p> <p><b>atm-ccc-vc-mux</b>—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the <b>ccc</b> family only.</p> <p><b>atm-cisco-nlpid</b>—Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-mlppp-llc</b>—For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.</p> <p><b>atm-nlpid</b>—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-ppp-llc</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.</p> <p><b>atm-ppp-vc-mux</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.</p> <p><b>atm-snap</b>—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation.</p> <p><b>atm-tcc-snap</b>—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.</p>

**atm-tcc-vc-mux**—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

**atm-vc-mux**—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

**ether-over-atm-llc**—(All IP interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) For interfaces that carry IP traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

**ether-vpls-over-atm-llc**—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

**ether-vpls-over-fr**—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, per RFC 2427, *Multiprotocol Interconnect over Frame Relay*.



**NOTE:** The SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, and the DS3/E3 MIC do not support Ethernet over Frame Relay encapsulation.

**ether-vpls-over-ppp**—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Point-to-Point Protocol (PPP) encapsulation to support Bridged Ethernet over PPP-encapsulated TDM interfaces for VPLS applications.

**ethernet**—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

**ethernet-ccc**—Use Ethernet CCC encapsulation on Ethernet interfaces.

**ethernet-vpls**—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.



**NOTE:** The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

**ethernet-vpls-fr**—Use in a VPLS setup when a CE device is connected to a PE device over a time-division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

**frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**frame-relay-ether-type**—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

**frame-relay-ether-type-tcc**—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media. The physical interface must be configured with flexible-frame-relay encapsulation.

**frame-relay-ppp**—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only. J Series routers do not support frame-relay-ppp encapsulation.

**frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

**gre-fragmentation**—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the do not fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's maximum transmission unit (MTU) value, the packet is fragmented before encapsulation.

**multilink-frame-relay-end-to-end**—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

**multilink-ppp**—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

**ppp-over-ether**—For underlying Ethernet interfaces on J Series routers, use PPP over Ethernet encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface. You also use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

**ppp-over-ether-over-atm-llc**—(J Series routers and MX Series routers with MPCs using the ATM MIC with SFP only) For underlying ATM interfaces, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

**vlan-bridge**—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

**vlan-ccc**—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**vlan-vci-ccc**—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**vlan-tcc**—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

**vlan-vpls**—Use Ethernet VLAN encapsulation on VPLS circuits.

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

**Related Documentation**

- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring the Encapsulation for Layer 2 Switching TCCs*
- *Configuring Interface Encapsulation on Logical Interfaces*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Circuit and Translational Cross-Connects Overview*
- *Identifying the Access Concentrator*
- *Configuring ATM Interface Encapsulation*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring ISDN Logical Interface Properties*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM for Subscriber Access*
- *Junos OS Services Interfaces Library for Routing Devices*
- *CoS on ATM IMA Pseudowire Interfaces Overview*
- *Configuring Policing on an ATM IMA Pseudowire*

## family

```

Syntax  family family {
        accounting {
            destination-class-usage;
            source-class-usage {
                (input | output | input output);
            }
        }
        access-concentrator name;
        address address {
            ... the address subhierarchy appears after the main [edit interfaces interface-name unit
                logical-unit-number family family-name] hierarchy ...
        }
        bridge-domain-type (bvlan | svlan);
        bundle interface-name;
        core-facing;
        demux-destination {
            destination-prefix;
        }
        demux-source {
            source-prefix;
        }
        duplicate-protection;
        dynamic-profile profile-name;
        filter {
            group filter-group-number;
            input filter-name;
            input-list [ filter-names ];
            output filter-name;
            output-list [ filter-names ];
        }
        interface-mode (access | trunk);
        ipsec-sa sa-name;
        isid-list all-service-groups;
        keep-address-and-control;
        mac-validate (loose | strict);
        max-sessions number;
        max-sessions-vsa-ignore;
        mtu bytes;
        multicast-only;
        negotiate-address;
        no-redirects;
        policer {
            arp policer-template-name;
            input policer-template-name;
            output policer-template-name;
        }
        primary;
        protocols [inet iso mpls];
        proxy inet-address address;
        receive-options-packets;
        receive-ttl-exceeded;
        remote (inet-address address | mac-address address);

```

```

rpf-check {
    fail-filter filter-name
    mode loose;
}
sampling {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address dlci dlci-identifier;
    multipoint-destination address {
        epd-threshold cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (disable | seconds);
        shaping {
            (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
                sustained rate);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
}
preferred;
primary;
vrrp-group group-id {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    authentication-key key;
    authentication-type authentication;
}

```

```
fast-interval milliseconds;  
(preempt | no-preempt) {  
    hold-time seconds;  
}  
priority number;  
track {  
    interface interface-name {  
        bandwidth-threshold bits-per-second priority-cost priority;  
        priority-cost priority;  
    }  
    priority-hold-time seconds;  
    route prefix routing-instance instance-name priority-cost priority;  
}  
}  
virtual-address [ addresses ];  
}  
virtual-link-local-address ipv6-address;  
}
```

Hierarchy Level	[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> ]
Release Information	Statement introduced before Junos OS Release 7.4. Option <b>max-sessions-vs-a-ignore</b> introduced in Junos OS Release 11.4.
Description	Configure protocol family information for the logical interface.



NOTE: Not all subordinate stanzas are available to every protocol family.



**Options** *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering



**NOTE:** This option is not supported on T4000 Type 5 FPCs.

- **ethernet-switching**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite
- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16
- **multilink-ppp**—Multilink Point-to-Point Protocol
- **mpls**—Multiprotocol Label Switching (MPLS)
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite
- **tnp**—Trivial Network Protocol
- **vpls**—(M Series and T Series routers only) Virtual private LAN service

The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring the Protocol Family*
- *Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers*
- *Junos OS Services Interfaces Library for Routing Devices*

## family (Dynamic PPPoE)

---

**Syntax**    `family family {  
              unnumbered-address interface-name;  
              address address;  
              service {  
                  input {  
                      service-set service-set-name {  
                          service-filter filter-name;  
                          }  
                      post-service-filter filter-name;  
                      }  
                  output {  
                      service-set service-set-name {  
                          service-filter filter-name;  
                          }  
                      }  
                  }  
              }  
              filter {  
                  input filter-name {  
                      precedence precedence;  
                      }  
                  output filter-name {  
                      precedence precedence;  
                      }  
                  }  
              }  
          }`

**Hierarchy Level**    [edit `dynamic-profiles` *profile-name* `interfaces` pp0 unit "\$junos-interface-unit"]

**Release Information**    Statement introduced in Junos OS Release 10.1.

**Description**    Configure protocol family information for the logical interface.

**Options**    *family*—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite

The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring a Basic PPPoE Dynamic Profile*
- *Configuring a PPPoE Dynamic Profile with Additional Options*
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Library for Routing Devices*

## flexible-vlan-tagging

---

<b>Syntax</b>	flexible-vlan-tagging;
<b>Hierarchy Level</b>	[edit interfaces <i>ge-fpc/pic/port</i> ], [edit interfaces <i>et-fpc/pic/port</i> ], [edit interfaces <i>ps0</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1. Support for aggregated Ethernet added in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.1x48 for PTX Series Packet Transport Routers.
<b>Description</b>	<p>Support simultaneous transmission of 802.1Q VLAN single-tag and dual-tag frames on logical interfaces on the same Ethernet port, and on pseudowire logical interfaces.</p> <p>This statement is supported on M Series and T Series routers, for Fast Ethernet and Gigabit Ethernet interfaces only on Gigabit Ethernet IQ2 and IQ2-E, IQ, and IQE PICs, and for aggregated Ethernet interfaces with member links in IQ2, IQ2-E, and IQ PICs or in MX Series DPCs, or on Ethernet interfaces for PTX Series Packet Transport Routers or 100-Gigabit Ethernet Type 5 PIC with CFP.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Mixed Tagging</i></li><li>• <i>Configuring Flexible VLAN Tagging on PTX Series Packet Transport Routers</i></li></ul>

## instance-type

<b>Syntax</b>	<code>instance-type type;</code>
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> ], [edit routing-instances <i>routing-instance-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. <b>virtual-switch</b> and <b>layer2-control</b> options introduced in Junos OS Release 8.4. Statement introduced in Junos OS Release 9.2 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series. Statement introduced in Junos OS Release 12.3 for ACX Series routers. <b>evpn</b> option introduced in Junos OS Release 13.2 for MX 3D Series routers.
<b>Description</b>	Define the type of routing instance.

### Options



**NOTE:** On ACX Series routers, you can configure only the forwarding, virtual router, and VRF routing instances.

**type**—Can be one of the following:

- **evpn**—(MX 3D Series routers only) Enable an Ethernet VPN (EVPN) on the routing instance. You cannot configure the **evpn** option under the [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* instance-type] hierarchy level.
- **forwarding**—Provide support for filter-based forwarding, where interfaces are not associated with instances. All interfaces belong to the default instance. Other instances are used for populating RPD learned routes. For this instance type, there is no one-to-one mapping between an interface and a routing instance. All interfaces belong to the default instance inet.0.
- **l2backhaul-vpn**—Provide support for Layer 2 wholesale VLAN packets with no existing corresponding logical interface. When using this instance, the router learns both the outer tag and inner tag of the incoming packets, when the **instance-role** statement is defined as **access**, or the outer VLAN tag only, when the **instance-role** statement is defined as **nni**.
- **l2vpn**—Enable a Layer 2 VPN on the routing instance. You must configure the **interface**, **route-distinguisher**, **vrf-import**, and **vrf-export** statements for this type of routing instance.
- **layer2-control**—(MX Series routers only) Provide support for RSTP or MSTP in customer edge interfaces of a VPLS routing instance. This instance type cannot be used if the customer edge interface is multihomed to two provider edge interfaces. If the customer edge interface is multihomed to two provider edge interfaces, use the default BPDU tunneling.

- **no-forwarding**—This is the default routing instance. Do not create a corresponding forwarding instance. Use this routing instance type when a separation of routing table information is required. There is no corresponding forwarding table. All routes are installed into the default forwarding table. IS-IS instances are strictly nonforwarding instance types.
- **virtual-router**—Enable a virtual router routing instance. This instance type is similar to a VPN routing and forwarding instance type, but used for non-VPN-related applications. You must configure the **interface** statement for this type of routing instance. You do not need to configure the **route-distinguisher**, **vrf-import**, and **vrf-export** statements.
- **virtual-switch**—(MX Series routers only) Provide support for Layer 2 bridging. Use this routing instance type to isolate a LAN segment with its Spanning Tree Protocol (STP) instance and to separate its VLAN identifier space.
- **vpls**—Enable VPLS on the routing instance. Use this routing instance type for point-to-multipoint LAN implementations between a set of sites in a VPN. You must configure the **interface**, **route-distinguisher**, **vrf-import**, and **vrf-export** statements for this type of routing instance.
- **vrf**—VPN routing and forwarding (VRF) instance. Provides support for Layer 3 VPNs, where interface routes for each instance go into the corresponding forwarding table only. Required to create a Layer 3 VPN. Create a VRF table (*instance-name.inet.0*) that contains the routes originating from and destined for a particular Layer 3 VPN. For this instance type, there is a one-to-one mapping between an interface and a routing instance. Each VRF instance corresponds with a forwarding table. Routes on an interface go into the corresponding forwarding table. You must configure the **interface**, **route-distinguisher**, **vrf-import**, and **vrf-export** statements for this type of routing instance.

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

**Related Documentation**

- *Example: Using Virtual Routing Instances to Route Among VLANs on EX Series Switches*
- *Configuring Routing Instances on PE Routers in VPNs*
- *Configuring EVPN Routing Instances*
- *Configuring Virtual Routing Instances (CLI Procedure)*
- *Configuring Virtual Router Routing Instances*
- *Example: Configuring Filter-Based Forwarding on the Source Address*
- *Example: Configuring Filter-Based Forwarding on Logical Systems*
- *Layer 2 Routing Instance Types*

## interface (Dynamic Routing Instances)

---

<b>Syntax</b>	<code>interface <i>interface-name</i>;</code>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> <b>routing-instances</b> <i>routing-instance-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Assign the specified interface to the dynamically created routing instance.
<b>Options</b>	<i>interface-name</i> —The interface name variable ( <i>\$junos-interface-name</i> ). The interface name variable is dynamically replaced with the interface the accessing client uses when connecting to the router.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• [edit routing-instances] Hierarchy Level</li><li>• <i>Configuring a Dynamic Profile for use by a Retailer in the DHCPv4 Solution</i></li></ul>

## interface (Routing Instances)

---

<b>Syntax</b>	<code>interface <i>interface-name</i> {     description <i>text</i>; }</code>
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> ], [edit routing-instances <i>routing-instance-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.2 for EX Series switches. Statement introduced in Junos OS Release 12.3 for ACX Series routers. Statement introduced in Junos OS Release 13.2 for MX 3D Series routers.
<b>Description</b>	Interface over which the VPN traffic travels between the PE device and CE device. You configure the interface on the PE device. If the value <b>vrf</b> is specified for the <b>instance-type</b> statement included in the routing instance configuration, this statement is required.
<b>Options</b>	<i>interface-name</i> —Name of the interface.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Routing Instances on PE Routers in VPNs</i></li><li>• <i>Configuring EVPN Routing Instances</i></li><li>• <i>Example: Configuring MPLS-Based Layer 3 VPNs on EX Series Switches</i></li><li>• <i>interface (VPLS Routing Instances)</i></li></ul>

## interfaces (Static and Dynamic Subscribers)

```
Syntax  interfaces {
            interface-name {
                unit logical-unit-number {
                    auto-configure {
                        agent-circuit-identifier {
                            dynamic-profile profile-name;
                        }
                    }
                }
                family family {
                    access-concentrator name;
                    address address;
                    duplicate-protection;
                    dynamic-profile profile-name;
                    filter {
                        adf {
                            counter;
                            input-precedence precedence;
                            not-mandatory;
                            output-precedence precedence;
                            rule rule-value;
                        }
                        input filter-name (
                            precedence precedence;
                            shared-name filter-shared-name;
                        )
                        output filter-name {
                            precedence precedence;shared-name filter-shared-name;
                        }
                    }
                    max-sessions number;
                    max-sessions-vsa-ignore;
                    rpf-check {
                        mode loose;
                    }
                    service {
                        input {
                            service-set service-set-name {
                                service-filter filter-name;
                            }
                            post-service-filter filter-name;
                        }
                        output {
                            service-set service-set-name {
                                service-filter filter-name;
                            }
                        }
                    }
                    service-name-table table-name
                    short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
                        maximum-seconds>;
                    unnumbered-address interface-name <preferred-source-address address>;
                }
            }
        }
```

```
filter {
    input filter-name;
    shared-name filter-shared-name;
    output filter-name;
    shared-name filter-shared-name;
}
ppp-options {
    chap;
    pap;
}
proxy-arp;
vlan-id;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
vlan-tagging;
}
interface-set interface-set-name {
    interface interface-name {
        unit logical unit number {
            advisory-options {
                downstream-rate rate;
                upstream-rate rate;
            }
        }
    }
}
pppoe-underlying-options {
    max-sessions number;
}
}
demux0 {
    unit logical-unit-number {
        demux-options {
            underlying-interface interface-name
        }
        family family {
            access-concentrator name;
            address address;
            duplicate-protection;
            dynamic-profile profile-name;
            demux-source {
                source-prefix;
            }
        }
        filter {
            input filter-name {
                precedence precedence;
                shared-name filter-shared-name;
            }
            output filter-name {
                precedence precedence;
                shared-name filter-shared-name;
            }
        }
    }
    mac-validate (loose | strict);
    max-sessions number;
    max-sessions-vsa-ignore;
    rpf-check {
```



```

        fail-filter filter-name;
        mode loose;
    }
    service-name-table table-name
    short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
        maximum-seconds>;
    unnumbered-address interface-name <preferred-source-address address>;
}
filter {
    input filter-name;
    output filter-name;
}
vlan-id number;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
}
pp0 {
    unit logical-unit-number {
        keepalives interval seconds;
        no-keepalives;
        pppoe-options {
            underlying-interface interface-name;
            server;
        }
        ppp-options {
            authentication [ authentication-protocols ];
            chap {
                challenge-length minimum minimum-length maximum maximum-length;
            }
            pap;
        }
        family inet {
            unnumbered-address interface-name;
            address address;
            service {
                input {
                    service-set service-set-name {
                        service-filter filter-name;
                    }
                    post-service-filter filter-name;
                }
                output {
                    service-set service-set-name {
                        service-filter filter-name;
                    }
                }
            }
        }
        filter {
            input filter-name {
                precedence precedence;
                shared-name filter-shared-name;
            }
            output filter-name {
                precedence precedence;
                shared-name filter-shared-name;
            }
        }
    }
}

```

```

    }
  }
}

```

**Hierarchy Level** [edit **dynamic-profiles** *profile-name*]

**Release Information** Statement introduced in Junos OS Release 9.2.

**Description** Define interfaces for dynamic profiles.

**Options** *interface-name*—The interface variable (**\$junos-interface-ifd-name**). The interface variable is dynamically replaced with the interface the DHCP client accesses when connecting to the router.



**NOTE:** Though we do not recommend it, you can also enter the specific name of the interface you want to assign to the dynamic profile.

The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring Static Subscriber Interfaces in Dynamic Profiles*
- *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles*
- *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*
- *Configuring Dynamic VLANs Based on Agent Circuit Identifier Information*
- *Subscriber Interface Overview*
- *Relationship Between Subscribers and Interfaces in an Access Network*
- For general information about configuring static interfaces, see the *Junos OS Network Interfaces Library for Routing Devices*
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Library for Routing Devices*

## interfaces

---

<b>Syntax</b>	interfaces { ... }
<b>Hierarchy Level</b>	[edit]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure interfaces on the router or switch.
<b>Default</b>	The management and internal Ethernet interfaces are automatically configured. You must configure all other interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Physical Interface Configuration Statements Overview</i></li><li>• <i>Configuring Aggregated Ethernet Link Protection</i></li></ul>

## keepalives (Dynamic Profiles)

---

<b>Syntax</b>	<pre>keepalives {     interval <i>seconds</i>; }</pre>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit <i>logical-unit-number</i> ] [edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit"] [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit"]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.5. Support at the [edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit"] hierarchy level introduced in Junos OS Release 10.1. Support at the [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit"] hierarchy level introduced in Junos OS Release 12.2.
<b>Description</b>	Specify the keepalive interval in a PPP dynamic profile.
<b>Default</b>	Sending of keepalives is enabled by default.
<b>Options</b>	<b>interval <i>seconds</i></b> —The time in seconds between successive keepalive requests. <b>Range:</b> 1 through 32767 seconds <b>Default:</b> 30 seconds for LNS-based PPP sessions. 10 seconds for all other PPP sessions.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Dynamic Profiles Overview</i></li><li>• <i>Configuring Dynamic Authentication for PPP Subscribers</i></li><li>• <i>Applying PPP Attributes to L2TP LNS Subscribers Per Inline Service Interface</i></li></ul>

## pap (Dynamic PPP)

<b>Syntax</b>	<code>pap;</code>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit" <b>ppp-options</b> ], [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit" <b>ppp-options</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.5. Support at the [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit" <b>ppp-options</b> ] hierarchy level introduced in Junos OS Release 12.2.
<b>Description</b>	Specify PAP authentication in a PPP dynamic profile.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Dynamic Profiles Overview</i></li> <li>• <i>Configuring Dynamic Authentication for PPP Subscribers</i></li> <li>• <i>Attaching Dynamic Profiles to Static PPP Subscriber Interfaces</i></li> <li>• <i>Applying PPP Attributes to L2TP LNS Subscribers Per Inline Service Interface</i></li> </ul>

## pppoe-options (Dynamic PPPoE)

<b>Syntax</b>	<code>pppoe-options {     <b>underlying-interface</b> <i>interface-name</i>;     <b>server</b>; }</code>
<b>Hierarchy Level</b>	[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> pp0 unit "\$junos-interface-unit"]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.1.
<b>Description</b>	Configure the underlying interface and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.  The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring a Basic PPPoE Dynamic Profile</i></li> <li>• For information about creating static PPPoE interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>

## pppoe-underlying-options (Static and Dynamic Subscribers)

---

<b>Syntax</b>	<pre>pppoe-underlying-options {     access-concentrator <i>name</i>;     dynamic-profile <i>profile-name</i>;     duplicate-protection;     max-sessions <i>number</i>;     max-sessions-vsa-ignore;     service-name-table <i>table-name</i>;     short-cycle-protection &lt;lockout-time-min <i>minimum-seconds</i> lockout-time-max         <i>maximum-seconds</i>&gt;; }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.0.
<b>Description</b>	<p>Configure PPPoE-specific interface properties for the underlying interface on which the router creates a static or dynamic PPPoE logical interface. The underlying interface must be configured with PPPoE (<b>ppp-over-ether</b>) encapsulation.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring PPPoE</i> (for static interfaces)</li><li>• <i>Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces</i></li><li>• <i>Assigning a Service Name Table to a PPPoE Underlying Interface</i></li></ul>

## ppp-options (Dynamic PPP)

<b>Syntax</b>	<pre>ppp-options {   authentication [ <i>authentication-protocols</i> ];   chap {     challenge-length minimum <i>minimum-length</i> maximum <i>maximum-length</i>;   }   on-demand-ip-address;   pap; }</pre>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit"], [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit"]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.5. Support at the [edit dynamic-profiles <i>profile-name</i> interfaces "\$junos-interface-ifd-name" unit "\$junos-interface-unit"] hierarchy level introduced in Junos OS Release 12.2.
<b>Description</b>	Configure PPP-specific interface properties in a dynamic profile.  The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Dynamic Profiles Overview</i></li> <li>• <i>Configuring Dynamic Authentication for PPP Subscribers</i></li> <li>• <i>Attaching Dynamic Profiles to Static PPP Subscriber Interfaces</i></li> <li>• <i>Applying PPP Attributes to L2TP LNS Subscribers Per Inline Service Interface</i></li> </ul>

## profile (Access)

---

**Syntax**    `profile profile-name {`  
                  `accounting {`  
                    `address-change-immediate-update`  
                    `accounting-stop-on-access-deny;`  
                    `accounting-stop-on-failure;`  
                    `coa-immediate-update;`  
                    `coa-no-override service-class-attribute;`  
                    `duplication;`  
                    `duplication-vrf {`  
                      `access-profile-name profile-name;`  
                      `vrf-name vrf-name;`  
                    `}`  
                    `immediate-update;`  
                    `order [ accounting-method ];`  
                    `send-acct-status-on-config-change;`  
                    `statistics (time | volume-time);`  
                    `update-interval minutes;`  
                    `wait-for-acct-on-ack;`  
                    `}`  
                  `authentication-order [ authentication-methods ];`  
                  `client client-name {`  
                    `chap-secret chap-secret;`  
                    `group-profile profile-name;`  
                    `ike {`  
                      `allowed-proxy-pair {`  
                        `remote remote-proxy-address local local-proxy-address;`  
                      `}`  
                      `pre-shared-key (ascii-text character-string | hexadecimal hexadecimal-digits);`  
                      `ike-policy policy-name;`  
                      `interface-id string-value;`  
                    `}`  
                  `l2tp {`  
                    `aaa-access-profile profile-name;`  
                    `interface-id interface-id;`  
                    `lcp-renegotiation;`  
                    `local-chap;`  
                    `maximum-sessions-per-tunnel number;`  
                    `multilink {`  
                      `drop-timeout milliseconds;`  
                      `fragment-threshold bytes;`  
                    `}`  
                    `ppp-authentication (chap | pap);`  
                    `ppp-profile profile-name;`  
                    `shared-secret shared-secret;`  
                  `}`  
                  `pap-password pap-password;`  
                  `ppp {`  
                    `cell-overhead;`  
                    `encapsulation-overhead bytes;`  
                    `framed-ip-address ip-address;`  
                    `framed-pool framed-pool;`  
                    `idle-timeout seconds;`



```
    interface-id interface-id;  
    keepalive seconds;  
    primary-dns primary-dns;  
    primary-wins primary-wins;  
    secondary-dns secondary-dns;  
    secondary-wins secondary-wins;  
  }  
  user-group-profile profile-name;  
}  
domain-name-server;  
domain-name-server-inet;  
domain-name-server-inet6;  
provisioning-order (gx-plus | jsr);  
radius {  
  accounting-server [ ip-address ];  
  authentication-server [ ip-address ];  
  options {  
    accounting-session-id-format (decimal | description);  
    calling-station-id-delimiter delimiter-character;  
    calling-station-id-format {  
      agent-circuit-id;  
      agent-remote-id;  
      interface-description;  
      nas-identifier;  
    }  
    client-accounting-algorithm (direct | round-robin);  
    client-authentication-algorithm (direct | round-robin);  
    coa-dynamic-variable-validation;  
    ethernet-port-type-virtual;  
    interface-description-format {  
      exclude-adapter;  
      exclude-sub-interface;  
    }  
    juniper-dsl-attributes;  
    nas-identifier identifier-value;  
    nas-port-extended-format {  
      adapter-width width;  
      ae-width width;  
      port-width width;  
      slot-width width;  
      stacked-vlan-width width;  
      vlan-width width;  
      atm {  
        adapter-width width;  
        port-width width;  
        slot-width width;  
        vci-width width;  
        vpi-width width;  
      }  
    }  
    nas-port-id-delimiter delimiter-character;  
    nas-port-id-format {  
      agent-circuit-id;  
      agent-remote-id;  
      interface-description;  
      nas-identifier;
```

```
    }
    nas-port-type {
        ethernet {
            port-type;
        }
    }
    revert-interval interval;
    vlan-nas-port-stacked-format;
}
attributes {
    exclude {
        ...
    }
    ignore {
        framed-ip-netmask;
        input-filter;
        logical-system:routing-instance;
        output-filter;
    }
}
}
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
    routing-instance routing-instance-name;
    secret password;
    max-outstanding-requests value;
    source-address source-address;
    timeout seconds;
}
service {
    accounting-order (activation-protocol | radius);
}
session-options {
    client-group [ group-names ];
    client-idle-timeout minutes;
    client-session-timeout minutes;
}
}
```

**Hierarchy Level** [edit access]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Configure PPP CHAP, or a profile and its subscriber access, L2TP, or PPP properties.

**Options** *profile-name*—Name of the profile.

For CHAP, the name serves as the mapping between peer identifiers and CHAP secret keys. This entity is queried for the secret key whenever a CHAP challenge or response is received.


The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring the PPP Authentication Protocol*
- *Configuring Access Profiles for L2TP or PPP Parameters*
- *Configuring L2TP Properties for a Client-Specific Profile*
- *Configuring an L2TP LNS with Inline Service Interfaces*
- *Configuring PPP Properties for a Client-Specific Profile*
- *Configuring Service Accounting with JSRC*
- *AAA Service Framework Overview*
- [show network-access aaa statistics on page 106](#)
- *clear network-access aaa statistics*

## proxy-arp

<b>Syntax</b>	<code>proxy-arp (restricted   unrestricted);</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.6 for EX Series switches. <b>restricted</b> added in Junos OS Release 10.0 for EX Series switches. Statement introduced in Junos OS Release 12.2 for the QFX Series..
<b>Description</b>	For Ethernet interfaces only, configure the router or switch to respond to any ARP request, as long as the router or switch has an active route to the ARP request's target address.
	<div>  <p><b>NOTE:</b> You must configure the INET family and IP address of the interface when you enable proxy ARP.</p> </div>
<b>Default</b>	Proxy ARP is not enabled. The router or switch responds to an ARP request only if the destination IP address is its own.
<b>Options</b>	<ul style="list-style-type: none"> <li>• <b>none</b>—The router or switch responds to any ARP request for a local or remote address if the router or switch has a route to the target IP address.</li> <li>• <b>restricted</b>—(Optional) The router or switch responds to ARP requests in which the physical networks of the source and target are different and does not respond if the source and target IP addresses are in the same subnet. The router or switch must also have a route to the target IP address.</li> <li>• <b>unrestricted</b>—(Optional) The router or switch responds to any ARP request for a local or remote address if the router or switch has a route to the target IP address.</li> </ul> <p><b>Default:</b> <b>unrestricted</b></p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring Restricted and Unrestricted Proxy ARP</i></li> <li>• <i>Configuring Proxy ARP (CLI Procedure)</i></li> <li>• <i>Example: Configuring Proxy ARP on an EX Series Switch</i></li> <li>• <i>Configuring Gratuitous ARP</i></li> </ul>

## radius (Access Profile)

```
Syntax  radius {
    accounting-server [ ip-address ];
    attributes {
        exclude
        ...
    }
    ignore {
        framed-ip-netmask;
        input-filter;
        logical-system-routing-instance;
        output-filter;
    }
}
authentication-server [ ip-address ];
options {
    accounting-session-id-format (decimal | description);
    calling-station-id-delimiter delimiter-character;
    calling-station-id-format {
        agent-circuit-id;
        agent-remote-id;
        interface-description;
        nas-identifier;
    }
    client-accounting-algorithm (direct | round-robin);
    client-authentication-algorithm (direct | round-robin);
    coa-dynamic-variable-validation;
    ethernet-port-type-virtual;
    interface-description-format {
        exclude-adapter;
        exclude-sub-interface;
    }
    ip-address-change-notify message;
    juniper-dsl-attributes;
    nas-identifier identifier-value;
    nas-port-extended-format {
        adapter-width width;
        ae-width width;
        port-width width;
        slot-width width;
        stacked-vlan-width width;
        vlan-width width;
        atm {
            adapter-width width;
            port-width width;
            slot-width width;
            vci-width width;
            vpi-width width;
        }
    }
    nas-port-id-delimiter delimiter-character;
    nas-port-id-format {
        agent-circuit-id;
```

```
    agent-remote-id;
    interface-description;
    nas-identifier;
  }
  nas-port-type {
    ethernet {
      port-type;
    }
  }
  revert-interval interval;
  vlan-nas-port-stacked-format;
}
```

<b>Hierarchy Level</b>	[edit access <a href="#">profile</a> <i>profile-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 9.1 for EX Series switches.
<b>Description</b>	<p>Configure the RADIUS parameters that the router uses for AAA authentication and accounting for subscribers.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring RADIUS Server Parameters for Subscriber Access</i></li><li>• <i>RADIUS Server Options for Subscriber Access</i></li></ul>

## radius-server

<b>Syntax</b>	<pre>radius-server server-address {     accounting-port <i>port-number</i>;     port <i>port-number</i>;     retry <i>attempts</i>;     routing-instance <i>routing-instance-name</i>;     secret <i>password</i>;     max-outstanding-requests <i>value</i>;     source-address <i>source-address</i>;     timeout <i>seconds</i>; }</pre>
<b>Hierarchy Level</b>	[edit access], [edit access <b>profile</b> <i>profile-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	<p>Configure RADIUS for subscriber access management, L2TP, or PPP.</p> <p>To configure multiple RADIUS servers, include multiple <b>radius-server</b> statements. The servers are tried in order and in a round-robin fashion until a valid response is received from one of the servers or until all the configured retry limits are reached.</p>
<b>Options</b>	<p><b>server-address</b>—Address of the RADIUS authentication server.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring RADIUS Authentication for L2TP</i></li> <li>• <i>Configuring the PPP Authentication Protocol</i></li> <li>• <i>Configuring RADIUS Authentication</i></li> <li>• <i>Configuring Authentication and Accounting Parameters for Subscriber Access</i></li> <li>• <i>Configuring an EX Series Switch to Use Junos Pulse Access Control Service for Network Access Control (CLI Procedure)</i></li> <li>• <a href="#">show network-access aaa statistics on page 106</a></li> <li>• <i>clear network-access aaa statistics</i></li> </ul>

## route-distinguisher

<b>Syntax</b>	<code>route-distinguisher (as-number:id   ip-address:id);</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols l2vpn mesh-group <i>mesh-group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols l2vpn mesh-group <i>mesh-group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for EX Series switches.</p> <p>Support at [edit routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>] hierarchy level introduced in Junos OS Release 11.2.</p> <p>Statement introduced in Junos OS Release 12.3 for ACX Series routers.</p> <p>Support at [edit routing-instances <i>routing-instance-name</i> protocols l2vpn mesh-group <i>mesh-group-name</i>] hierarchy level introduced in Junos OS Release 13.2.</p>
<b>Description</b>	<p>Specify an identifier attached to a route, enabling you to distinguish to which VPN or VPLS the route belongs. Each routing instance must have a unique route distinguisher associated with it. The route distinguisher is used to place bounds around a VPN so that the same IP address prefixes can be used in different VPNs without having them overlap. If the instance type is <b>vrf</b>, the <b>route-distinguisher</b> statement is required.</p> <p>For Layer 2 VPNs and VPLS, if you configure the <b>l2vpn-use-bgp-rules</b> statement, you must configure a unique route distinguisher for each PE router participating in the routing instance.</p> <p>For other types of VPNs, we recommend that you use a unique route distinguisher for each PE router participating in specific routing instance. Although you can use the same route distinguisher on all PE routers for the same VPN routing instance, if you use a unique route distinguisher, you can determine the CE router from which a route originated within the VPN.</p> <p>For Layer 2 VPNs and VPLS, if you configure mesh groups, the route distinguisher in each mesh group must be unique.</p>



**CAUTION:** We strongly recommend that if you change a route distinguisher that has already been configured, make the change during a maintenance window, as follows:

1. Deactivate the routing instance.
2. Change the route distinguisher.
3. Activate the routing instance.



This is not required if you are configuring the route distinguisher for the first time.

**Options** *as-number:number—***as-number** is an assigned AS number, and **number** is any 2-byte or 4-byte value. The AS number can be from 1 through 4,294,967,295. If the AS number is a 2-byte value, the administrative number is a 4-byte value. If the AS number is 4-byte value, the administrative number is a 2-byte value. A route distinguisher consisting of a 4-byte AS number and a 2-byte administrative number is defined as a type 2 route distinguisher in RFC 4364 *BGP/MPLS IP Virtual Private Networks (VPNs)*.



**NOTE:** In Junos OS Release 9.1 and later, the numeric range for AS numbers is extended to provide BGP support for 4-byte AS numbers, as defined in RFC 4893, *BGP Support for Four-octet AS Number Space*. All releases of Junos OS support 2-byte AS numbers. To configure a route distinguisher that includes a 4-byte AS number, append the letter “L” to the end of the AS number. For example, a route distinguisher with the 4-byte AS number 7,765,000 and an administrative number of 1,000 is represented as 7765000L:1000.

In Junos OS Release 9.2 and later, you can also configure a 4-byte AS number using the AS dot notation format of two integer values joined by a period: *<16-bit high-order value in decimal>.<16-bit low-order value in decimal>*. For example, the 4-byte AS number of 65,546 in the plain-number format is represented as 1.10 in AS dot notation format.

*ip-address:id*—IP address (*ip-address* is a 4-byte value) within your assigned prefix range and a 2-byte value for the *id*. The IP address can be any globally unique unicast address.

**Range:** 0 through 4,294,967,295 ( $2^{32} - 1$ ). If the router you are configuring is a BGP peer of a router that does not support 4-byte AS numbers, you need to configure a local AS number. For more information, see *Using 4-Byte Autonomous System Numbers in BGP Networks Technology Overview*.

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

**Related  
Documentation**

- *Example: Configuring BGP Route Target Filtering for VPNs*
- *Example: Configuring FEC 129 BGP Autodiscovery for VPWS*
- *Configuring EVPN Routing Instances*
- *Configuring Routing Instances on PE Routers in VPNs*
- *Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)*
- *Configuring an MPLS-Based Layer 3 VPN (CLI Procedure)*
- *l2vpn-use-bgp-rules*

## routing-instances

```
Syntax  routing-instances routing-instance-name {
        interface interface-name;
        routing-options {
            access {
                route prefix {
                    metric route-cost;
                    next-hop next-hop;
                    preference route-distance;
                    tag route-tag;
                }
            }
            access-internal {
                route subscriber-ip-address {
                    qualified-next-hop underlying-interface {
                        mac-address address;
                    }
                }
            }
        }
        multicast {
            interface interface-name {
                no-qos-adjust;
            }
        }
        rib routing-table-name {
            access {
                route prefix {
                    metric route-cost;
                    next-hop next-hop;
                    preference route-distance;
                    tag route-tag;
                }
            }
            access-internal {
                route subscriber-ip-address {
                    qualified-next-hop underlying-interface {
                        mac-address address;
                    }
                }
            }
        }
    }
```

**Hierarchy Level** [edit [dynamic-profiles](#)]

**Release Information** Statement introduced in Junos OS Release 9.6.  
The **routing-options** statement introduced in Junos OS Release 10.1.

**Description** Dynamically configure an additional routing entity for a router.

**Options**    *routing-instance-name*—The routing instance variable (*\$junos-routing-instance*). The routing instance variable is dynamically replaced with the routing instance the accessing client uses when connecting to the router.



**NOTE:** Though we do not recommend it, you can also enter a specific name for the routing instance, a maximum of 31 characters.

The remaining statement is explained separately.

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

**Related Documentation**    • *Configuring a Dynamic Profile for use by a Retailer in the DHCPv4 Solution*

## routing-instances (Multiple Routing Entities)

<b>Syntax</b>	<code>routing-instances <i>routing-instance-name</i> { ... }</code>
<b>Hierarchy Level</b>	[edit], [edit logical-systems <i>logical-system-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Configure an additional routing entity for a router. You can create multiple instances of BGP, IS-IS, OSPF, OSPFv3, and RIP for a router. You can also create multiple routing instances for separating routing tables, routing policies, and interfaces for individual wholesale subscribers (retailers) in a Layer 3 wholesale network.</p> <p>Each routing instance consist of the following:</p> <ul style="list-style-type: none"> <li>• A set of routing tables</li> <li>• A set of interfaces that belong to these routing tables</li> <li>• A set of routing option configurations</li> </ul> <p>Each routing instance has a unique name and a corresponding IP unicast table. For example, if you configure a routing instance with the name <b>my-instance</b>, its corresponding IP unicast table is my-instance.inet.0. All routes for <b>my-instance</b> are installed into my-instance.inet.0.</p> <p>Routes are installed into the default routing instance inet.0 by default, unless a routing instance is specified.</p> <p>In Junos OS Release 9.0 and later, you can no longer specify a routing-instance name of <i>master</i>, <i>default</i>, or <i>bgp</i> or include special characters within the name of a routing instance.</p> <p>In Junos OS Release 9.6 and later, you can include a slash (/) in a routing-instance name only if a logical system is not configured. That is, you cannot include the slash character in a routing-instance name if a logical system other than the default is explicitly configured. Routing-instance names, further, are restricted from having the form <code>__.*__</code> (beginning and ending with underscores). The colon : character cannot be used when multitopology routing (MTR) is enabled.</p>
<b>Default</b>	Routing instances are disabled for the router.
<b>Options</b>	<p><b><i>routing-instance-name</i></b>—Name of the routing instance. This must be a non-reserved string of not more than 128 characters.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>

- Related Documentation**
- *Example: Configuring Interprovider Layer 3 VPN Option A*
  - *Example: Configuring Interprovider Layer 3 VPN Option B*
  - *Example: Configuring Interprovider Layer 3 VPN Option C*
  - *Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers*

---

## secret

---

<b>Syntax</b>	<code>secret password;</code>
<b>Hierarchy Level</b>	[edit access profile <i>profile-name</i> <b>radius-server</b> <i>server-address</i> ], [edit access radius-disconnect <i>client-address</i> ], [edit access <b>radius-server</b> <i>server-address</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure the password to use with the RADIUS server. The secret password used by the local router or switch must match that used by the server.
<b>Options</b>	<b>password</b> —Password to use; it can include spaces if the character string is enclosed in quotation marks.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Authentication and Accounting Parameters for Subscriber Access</i></li><li>• <i>Configuring Router or Switch Interaction with RADIUS Servers</i></li><li>• <i>Example: Configuring CHAP Authentication with RADIUS</i></li><li>• <i>Configuring RADIUS Authentication for L2TP</i></li><li>• <i>Configuring the RADIUS Disconnect Server for L2TP</i></li><li>• <i>Configuring an EX Series Switch to Use Junos Pulse Access Control Service for Network Access Control (CLI Procedure)</i></li></ul>

## server (Dynamic PPPoE)

---

Syntax	server;
Hierarchy Level	[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 unit "\$junos-interface-unit" <a href="#">ppoe-options</a> ]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	In a dynamic profile, configure the router to act as a PPPoE server, also known as a remote access concentrator, when a PPPoE logical interface is dynamically created.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><li>• <i>Configuring a Basic PPPoE Dynamic Profile</i></li><li>• For information about creating static PPPoE interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>

## underlying-interface (Dynamic PPPoE)

---

Syntax	underlying-interface <i>interface-name</i> ;
Hierarchy Level	[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 unit "\$junos-interface-unit" <a href="#">ppoe-options</a> ]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	In a dynamic profile, configure the underlying interface on which the router creates the dynamic PPPoE logical interface.
Options	<b><i>interface-name</i></b> —Variable used to specify the name of the underlying interface on which the PPPoE logical interface is dynamically created. In the <b><i>underlying-interface interface-name</i></b> statement for dynamic PPPoE logical interfaces, you must use the predefined variable <b><i>\$junos-underlying-interface</i></b> in place of <b><i>interface-name</i></b> . When the router creates the dynamic PPPoE interface, the <b><i>\$junos-underlying-interface</i></b> predefined variable is dynamically replaced with the name of the underlying interface supplied by the network when the subscriber logs in.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><li>• <i>Configuring a Basic PPPoE Dynamic Profile</i></li><li>• For information about creating static PPPoE interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>

## unit

```

Syntax  unit logical-unit-number {
            accept-source-mac {
                mac-address mac-address {
                    policer {
                        input cos-policer-name;
                        output cos-policer-name;
                    }
                }
            }
            accounting-profile name;
            advisory-options {
                downstream-rate rate;
                upstream-rate rate;
            }
            allow-any-vci;
            atm-scheduler-map (map-name | default);
            backup-options {
                interface interface-name;
            }
            bandwidth rate;
            cell-bundle-size cells;
            clear-dont-fragment-bit;
            compression {
                rtp {
                    maximum-contexts number <force>;
                    f-max-period number;
                    queues [ queue-numbers ];
                    port {
                        minimum port-number;
                        maximum port-number;
                    }
                }
            }
            compression-device interface-name;
            copy-tos-to-outer-ip-header;
            demux-destination family;
            demux-source family;
            demux-options {
                underlying-interface interface-name;
            }
            description text;
            interface {
                l2tp-interface-id name;
                (dedicated | shared);
            }
            dialer-options {
                activation-delay seconds;
                callback;
                callback-wait-period time;
                deactivation-delay seconds;
                dial-string [ dial-string-numbers ];
                idle-timeout seconds;
            }
        }

```



```

incoming-map {
  caller caller-id | accept-all;
  initial-route-check seconds;
  load-interval seconds;
  load-threshold percent;
  pool pool-name;
  redial-delay time;
  watch-list {
    [ routes ];
  }
}
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
family family-name {
  ... the family subhierarchy appears after the main [edit interfaces interface-name unit
    logical-unit-number] hierarchy ...
}
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  up-count cells;
  down-count cells;
}
oam-period (disable | seconds);

```

```
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap |
    swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-restart-timer milliseconds;
    pap {
        access-profile name;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
pppoe-underlying-options {
    access-concentrator name;
    dynamic-profile profile-name;
    max-sessions number;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
    length);
    queue-length number;
}
short-sequence;
targeted-distribution;
```

```
transmit-weight number;  
(traps | no-traps);  
trunk-bandwidth rate;  
trunk-id number;  
tunnel {  
    backup-destination address;  
    destination address;  
    key number;  
    routing-instance {  
        destination routing-instance-name;  
    }  
    source source-address;  
    ttl number;  
}  
vci vpi-identifier.vci-identifier;  
vci-range start start-vci end end-vci;  
vpi vpi-identifier;  
vlan-id number;  
vlan-id-range number-number;  
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;  
family family {  
    accounting {  
        destination-class-usage;  
        source-class-usage {  
            (input | output | input output);  
        }  
    }  
    access-concentrator name;  
    address address {  
        ... the address subhierarchy appears after the main [edit interfaces interface-name unit  
            logical-unit-number family family-name] hierarchy ...  
    }  
    bridge-domain-type (bvlan | svlan);  
    bundle interface-name;  
    core-facing;  
    demux-destination {  
        destination-prefix;  
    }  
    demux-source {  
        source-prefix;  
    }  
    duplicate-protection;  
    dynamic-profile profile-name;  
    filter {  
        group filter-group-number;  
        input filter-name;  
        input-list [ filter-names ];  
        output filter-name;  
        output-list [ filter-names ];  
    }  
    interface-mode (access | trunk);  
    ipsec-sa sa-name;  
    isid-list all-service-groups;  
    keep-address-and-control;  
    mac-validate (loose | strict);  
    max-sessions number;
```

```
mtu bytes;  
multicast-only;  
no-redirects;  
policer {  
    arp policer-template-name;  
    input policer-template-name;  
    output policer-template-name;  
}  
primary;  
protocols [inet iso mpls];  
proxy inet-address address;  
receive-options-packets;  
receive-ttl-exceeded;  
remote (inet-address address | mac-address address);  
rpf-check {  
    fail-filter filter-name  
    mode loose;  
}  
sampling {  
    input;  
    output;  
}  
service {  
    input {  
        post-service-filter filter-name;  
        service-set service-set-name <service-filter filter-name>;  
    }  
    output {  
        service-set service-set-name <service-filter filter-name>;  
    }  
}  
service-name-table table-name  
(translate-discard-eligible | no-translate-discard-eligible);  
(translate-fecn-and-becn | no-translate-fecn-and-becn);  
translate-plp-control-word-de;  
unnumbered-address interface-name destination address destination-profile profile-name;  
vlan-id number;  
vlan-id-list [number number-number];  
address address {  
    arp ip-address (mac | multicast-mac) mac-address <publish>;  
    broadcast address;  
    destination address;  
    destination-profile name;  
    eui-64;  
    master-only;  
    multipoint-destination address {  
        dlci dlci-identifier;  
        epd-threshold cells <plp1 cells>;  
        inverse-arp;  
        oam-liveness {  
            up-count cells;  
            down-count cells;  
        }  
        oam-period (disable | seconds);  
        shaping {
```

```

        (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
         sustained rate);
        queue-length number;
    }
    vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
        hold-time seconds;
    }
    priority number;
    track {
        interface interface-name {
            bandwidth-threshold bits-per-second priority-cost number;
        }
        priority-hold-time seconds;
        route ip-address/prefix-length routing-instance instance-name priority-cost cost;
    }
    virtual-address [ addresses ];
    virtual-link-local-address ipv6-address;
    vrrp-inherit-from {
        active-interface interface-name;
        active-group group-number;
    }
}
}
}
}

```

**Hierarchy Level** [edit interfaces *interface-name*],  
[edit logical-systems *logical-system-name* interfaces *interface-name*],  
[edit interfaces interface-set *interface-set-name* interface *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 1,073,741,823 for demux and PPPoE static interfaces only. 0 through 16,385 for all other static interface types.

The remaining statements are explained separately.

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

- Related Documentation**
- *Configuring Logical Interface Properties*
  - *Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers*
  - *Junos OS Services Interfaces Library for Routing Devices*

## unit (Dynamic Demux Interface)

```
Syntax  unit logical-unit-number {
        demux-options {
            underlying-interface interface-name
        }
        family family {
            access-concentrator name;
            address address;
            demux-source {
                source-address;
            }
            duplicate-protection;
            dynamic-profile profile-name;
            filter {
                input filter-name;
                output filter-name;
            }
            mac-validate (loose | strict);
            max-sessions number;
            max-sessions-vsa-ignore;
            rpf-check {
                fail-filter filter-name;
                mode loose;
            }
            service-name-table table-name
            short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
                maximum-seconds>;
            unnumbered-address interface-name <preferred-source-address address>;
        }
        filter {
            input filter-name;
            output filter-name;
        }
    }
    vlan-id number;
```

**Hierarchy Level** [edit **dynamic-profiles** *profile-name* **interfaces** demux0]

**Release Information** Statement introduced in Junos OS Release 9.3.

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

**Options** ***logical-unit-number***—Either the specific unit number of the interface or the unit number variable (**\$junos-interface-unit**). The variable is used to specify the unit of the interface when a new demux interface is dynamically created. The static unit number variable is dynamically replaced with the unit number that DHCP supplies when the subscriber logs in.

The remaining statements are explained separately.

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles</i></li><li>• For information about static IP demux interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>

---

## unnumbered-address (Dynamic PPPoE)

---

<b>Syntax</b>	unnumbered-address <i>interface-name</i> ;
<b>Hierarchy Level</b>	[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 unit "\$junos-interface-unit" <a href="#">family</a> inet]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.1.
<b>Description</b>	For dynamic PPPoE interfaces, enable the local address to be derived from the specified interface. Configuring unnumbered Ethernet interfaces enables IP processing on the interface without assigning an explicit IP address to the interface.
<b>Options</b>	<p><i>interface-name</i>—Interface from which the local address is derived. The interface name must include a logical unit number and must have a configured address.</p> <p>The <b>destination</b> statement is explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring a Basic PPPoE Dynamic Profile</i></li><li>• For information about creating static PPPoE interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>



## vlan-id (VLAN ID to Be Bound to a Logical Interface)

---

<b>Syntax</b>	<code>vlan-id <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.
<b>Options</b>	<p><i>number</i>—A valid VLAN identifier.</p> <p><b>Range:</b> For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023.</p> <p>For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094.</p> <p>VLAN ID 0 is reserved for tagging the priority of frames.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Mixed Tagging</i></li></ul>

## vrf-export

---

<b>Syntax</b>	<code>vrf-export [ <i>policy-names</i> ];</code>
<b>Hierarchy Level</b>	<code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols</code> <code>    vpls mesh-group <i>mesh-group-name</i>]</code> <code>[edit routing-instances <i>routing-instance-name</i>]</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for EX Series switches. Statement introduced in Junos OS Release 12.3 for ACX Series routers.
<b>Description</b>	<p>Specify how routes are exported from the local PE router's VRF table (<i>routing-instance-name</i>.inet.0) to the remote PE router. If the value <b>vrf</b> is specified for the <b>instance-type</b> statement included in the routing instance configuration, this statement is required.</p> <p>You can configure multiple export policies on the PE router or PE switch (EX8200 switch only).</p>
<b>Default</b>	If the instance-type is <b>vrf</b> , <b>vrf-export</b> is a required statement. The default action is to reject.
<b>Options</b>	<b><i>policy-names</i></b> —Names for the export policies.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">instance-type on page 60</a></li><li>• <i>Configuring Policies for the VRF Table on PE Routers in VPNs</i></li></ul>

## vrf-import

<b>Syntax</b>	<code>vrf-import [ <i>policy-names</i> ];</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>]</p> <p>[edit routing-instances <i>routing-instance-name</i>]</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols vpls mesh-group <i>mesh-group-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for EX Series switches.</p>
<b>Description</b>	<p>Specify how routes are imported into the VRF table (<i>routing-instance-name</i>.inet.0) of the local provider edge (PE) router or switch (EX8200 only) from the remote PE. If the value <b>vrf</b> is specified for the <b>instance-type</b> statement included in the routing instance configuration, this statement is required.</p> <p>You can configure multiple import policies on the PE router or PE switch (EX8200 switch only).</p>
<b>Default</b>	If the instance-type is <b>vrf</b> , <b>vrf-import</b> is a required statement. The default action is to accept.
<b>Options</b>	<i>policy-names</i> —Names for the import policies.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">instance-type on page 60</a></li> <li>• <i>Configuring Policies for the VRF Table on PE Routers in VPNs</i></li> </ul>



## CHAPTER 7

# Broadband Subscriber Management PPPoE Layer 3 Wholesale Network Configuration Examples

- [Example: Wholesaler Dynamic Profile for a PPPoE Wholesale Network on page 101](#)
- [Example: Retailer Routing Instances for a PPPoE Wholesale Network on page 102](#)

### Example: Wholesaler Dynamic Profile for a PPPoE Wholesale Network

---

This example specifies a dynamic profile name of *PPPoE\_Wholesaler\_Profile*, uses pp0 interfaces, and references the predefined input firewall filter.

```
PPPoE_Wholesaler_Profile {
  routing-instances {
    "$junos-routing-instance" {
      interface "$junos-interface-name";
    }
  }
  interfaces {
    pp0 {
      unit "$junos-interface-unit" {
        ppp-options {
          chap;
          pap;
        }
        pppoe-options {
          underlying-interface "$junos-underlying-interface";
          server;
        }
        keepalives interval 15;
        family inet {
          filter {
            input "$junos-input-filter";
            output "$junos-output-filter";
          }
          unnumbered-address "$junos-loopback-interface";
        }
      }
    }
  }
}
```

```
}
```

- Related Documentation**
- [Configuring Dynamic Profiles for the PPPoE Layer 3 Wholesale Network Solution on page 31](#)

---

## Example: Retailer Routing Instances for a PPPoE Wholesale Network

---

```
routing-instances {  
  PPPoE_Retailer_Instance1 {  
    instance-type vrf;  
    access-profile PPPoE_Retailer_Access1;  
    interface ge-11/1/9.10;  
    interface lo0.5;  
    route-distinguisher 1:1;  
    vrf-import policyImport;  
    vrf-export policyExport;  
  }  
  Retailer_Instance2 {  
    instance-type vrf;  
    access-profile PPPoE_Retailer_Access2;  
    interface ge-11/1/9.10;  
    interface lo0.6;  
    route-distinguisher 2:2;  
    vrf-import policyImport;  
    vrf-export policyExport;  
  }  
}
```

- Related Documentation**
- [Configuring Separate Routing Instances for PPPoE Service Retailers on page 33](#)

## PART 3

# Administration

- [Subscriber Management AAA and PPPoE CLI Commands on page 105](#)
- [Subscriber Management Interface CLI Commands on page 113](#)
- [Subscriber Management Subscriber CLI Commands on page 149](#)





## CHAPTER 8

# Subscriber Management AAA and PPPoE CLI Commands

## show network-access aaa statistics

<b>Syntax</b>	<pre>show network-access aaa statistics &lt;accounting&gt; &lt;address-assignment (client   pool <i>pool-name</i>)&gt; &lt;dynamic-requests&gt; &lt;radius&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.1.</p> <p>Option <b>address-assignment</b> introduced in Junos OS Release 10.0.</p> <p>Option <b>radius</b> introduced in Junos OS Release 11.4.</p>
<b>Description</b>	Display AAA accounting, address-assignment, dynamic request statistics, and RADIUS settings and statistics.
<b>Options</b>	<p><b>accounting</b>—(Optional) Display AAA accounting statistics.</p> <p><b>address-assignment (client   pool <i>pool-name</i>)</b>—(Optional) Display AAA address-assignment client and pool statistics.</p> <p><b>dynamic-requests</b>—(Optional) Display AAA dynamic requests.</p> <p><b>radius</b>— (Optional) Display RADIUS settings and statistics.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><i>Verifying and Managing Subscriber AAA Information</i></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show network-access aaa statistics accounting on page 108</a></p> <p><a href="#">show network-access aaa statistics address-assignment client on page 108</a></p> <p><a href="#">show network-access aaa statistics address-assignment pool on page 108</a></p> <p><a href="#">show network-access aaa statistics dynamic-requests on page 108</a></p> <p><a href="#">show network-access aaa statistics radius on page 108</a></p>
<b>Output Fields</b>	Table 5 on page 106 lists the output fields for the <b>show network-access aaa statistics</b> command. Output fields are listed in the approximate order in which they appear.

**Table 5: show network-access aaa statistics Output Fields**

Field Name	Field Description
Requests received	<ul style="list-style-type: none"> <li>Number of accounting requests generated by the AAA framework.</li> <li>Number of dynamic requests received from the external server.</li> </ul>
Accounting Response failures	Number of accounting requests not acknowledged (NAK) by the accounting server.
Accounting Response Success	Number of accounting requests acknowledged by the accounting server.

Table 5: show network-access aaa statistics Output Fields (*continued*)

Field Name	Field Description
<b>Requests timedout</b>	Number of accounting requests to the accounting server that timed out.
<b>Client</b>	Client type; for example, DHCP, Mobile IP, PPP.
<b>Out of Memory</b>	Number of times an address was not given to the client due to memory issues.
<b>No Matches</b>	Number of times there were no network matches for the pool.
<b>Pool Name</b>	Name of the address-assignment pool for this client.
<b>Out of Addresses</b>	Number of times there were no available addresses in the pool.
<b>Address total</b>	Number of addresses in the pool.
<b>Addresses in use</b>	Number of addresses in use.
<b>Address Usage (percent)</b>	Percentage of total addresses in use.
<b>processed successfully</b>	Number of dynamic requests processed successfully by the AAA framework.
<b>errors during processing</b>	Number of dynamic requests that resulted in processing errors by the AAA framework.
<b>Link Name</b>	Name of the secondary address-assignment pool to which the primary pool is linked.
<b>Pool Usage</b>	Percentage of allocated addresses in the specified address pool.
<b>silently dropped</b>	Number of dynamic requests dropped by the AAA framework due to multiple back-to-back or duplicate requests.
<b>RADIUS Server</b>	IP address of the RADIUS server to which the router is sending requests.
<b>Profile</b>	Name of the RADIUS profile associated with the RADIUS server. A RADIUS server can be associated with more than one RADIUS profile.
<b>Configured</b>	Configured maximum number of outstanding requests from the router to the RADIUS server for a specific profile. An outstanding request is a request to which the RADIUS server has not yet responded. The range of values is 0 through 2000 outstanding requests. The default value is 1000.
<b>Current</b>	Current number of outstanding requests from the router to the RADIUS server for a specific profile. An outstanding request is a request to which the RADIUS server has not yet responded.
<b>Peak</b>	<p>Highest number of outstanding requests from the router to the RADIUS server for a specific profile at any point in time since the router was started or since the counter was last cleared.</p> <p><b>NOTE:</b> If the value of this field is equal to the value of the <b>Configured</b> field, you may want to increase the value of the <b>Configured</b> field.</p>

Table 5: show network-access aaa statistics Output Fields (*continued*)

Field Name	Field Description
<b>Exceeded</b>	Number of times that the router attempted to send requests to the RADIUS server in excess of the configured maximum value for a specific profile.
<b>NOTE:</b> If the value of this field is nonzero, you may want to increase the value of the <b>Configured</b> field.	

## Sample Output

### show network-access aaa statistics accounting

```
user@host> show network-access aaa statistics accounting
Accounting module statistics
  Requests received: 0
  Accounting Response failures: 0
  Accounting Response Success: 0
  Requests timeout: 0
```

### show network-access aaa statistics address-assignment client

```
user@host> show network-access aaa statistics address-assignment client
Address-assignment statistics
  Client: jdhcpd
  Out of Memory: 0
  No Matches: 2
```

### show network-access aaa statistics address-assignment pool

```
user@host> show network-access aaa statistics address-assignment pool isp_1
Address-assignment statistics
  Pool Name: isp_1
  Pool Name: (all pools in chain)
  Out of Memory: 0
  Out of Addresses: 9
  Address total: 47
  Addresses in use: 47
  Address Usage (percent): 100
```

### show network-access aaa statistics dynamic-requests

```
user@host> show network-access aaa statistics dynamic-requests
requests received: 0
processed successfully: 0
errors during processing: 0
silently dropped: 0
```

### show network-access aaa statistics radius

```
user@host> show network-access aaa statistics radius
Outstanding Requests
RADIUS Server    Profile    Configured    Current    Peak    Exceeded
172.28.32.239    prof1      1000          0          1000    14
                  prof2      500           17         432     0
171.27.82.211    myprof     200           0          200     27
12.1.11.254      pppoe-auth 111           0          1        0
```

## show network-access aaa subscribers

<b>Syntax</b>	<code>show network-access aaa subscribers</code> <code>&lt;logical-system <i>logical-system-name</i>&gt;</code> <code>&lt;routing-instance <i>routing-instance-name</i>&gt;</code> <code>&lt;statistics&gt;</code> <code>&lt;username&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.1.
<b>Description</b>	Display subscriber-specific AAA statistics.
<b>Options</b>	<p><code>logical-system <i>logical-system-name</i></code>—(Optional) List subscribers in the specific logical system.</p> <p><code>routing-instance <i>routing-instance-name</i></code>—(Optional) List subscribers for the specific routing instance. If you do not specify a routing instance name, the default routing instance is assumed.</p> <p><code>statistics</code>—(Optional) Display statistics for the subscriber events.</p> <p><code>username</code>—(Optional) Display information for the specified subscriber.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Verifying and Managing Subscriber AAA Information</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show network-access aaa subscribers logical-system on page 110</a> <a href="#">show network-access aaa subscribers logical-system routing-instance on page 110</a> <a href="#">show network-access aaa subscribers statistics username on page 111</a> <a href="#">show network-access aaa subscribers username on page 111</a>
<b>Output Fields</b>	<a href="#">Table 6 on page 109</a> lists the output fields for the <b>show network-access aaa subscribers</b> command. Output fields are listed in the approximate order in which they appear.

**Table 6: show network-access aaa subscribers Output Fields**

Field Name	Field Description
Challenge requests	Number of authentication requests challenged by the authentication server for this subscriber.
Challenge responses	Number of challenge responses sent by the subscriber to the authentication server.
START sent successfully	Number of accounting start requests generated by the AAA framework for this subscriber.
START send failures	Number of accounting start requests that failed to make it to the accounting server for this subscriber.
START ack received	Number of accounting start requests acknowledged by the accounting server for this subscriber.

Table 6: show network-access aaa subscribers Output Fields (*continued*)

Field Name	Field Description
<b>INTERIM sent successfully</b>	Number of accounting interim requests generated by the AAA framework for this subscriber.
<b>INTERIM send failures</b>	Number of accounting interim requests that failed to make it to the accounting server for this subscriber.
<b>INTERIM ack received</b>	Number of accounting interim requests acknowledged by the accounting server for this subscriber.
<b>Requests received</b>	Number of reauthentication requests received by the authentication server.
<b>Successful responses</b>	Number of successful reauthentication requests granted by the authentication server.
<b>Aborts handled</b>	Number of reauthentication requests aborted by the authentication server.
<b>Service name</b>	Name of the subscriber service.
<b>Creation requests</b>	Number of requests to create the service.
<b>Deletion requests</b>	Number of requests to delete the service.
<b>Request timeouts</b>	Number of times the service request was timed out.
<b>Client type</b>	Type of client; for example, DHCP, Mobile IP, PPP.
<b>Session-ID</b>	ID of the subscriber session.
<b>Session uptime</b>	How long the session has been up, in <i>HH:MM:SS</i> .
<b>Accounting</b>	Status of accounting, and type of accounting if accounting is on.

## Sample Output

### show network-access aaa subscribers logical-system

```

user@host> show network-access aaa subscribers logical-system
Username           Client type      Logical system/Routing instance
cbenson@addr.net   ppp             default
00010e020304.1231  dhcp            isp-bos-metro-12:isp-cmbrg-12
conley@isp3.com    dhcp            default:isp-gtown-r3-00
0020df980102.2334  dhcp            isp-bos-metro-16:isp-cmbrg-12

```

### show network-access aaa subscribers logical-system routing-instance

```

user@host> show network-access aaa subscribers logical-system isp-bos-metro-16
routing-instance isp-cmbrg-12-32
Username           Client type      Logical system/Routing instance
00010e020304.1231  dhcp            isp-bos-metro-12:isp-cmbrg-12
conley@isp3.com    dhcp            default:isp-gtown-r3-00
0020df980102.2334  dhcp            isp-bos-metro-16:isp-cmbrg-12

```

**show network-access aaa subscribers statistics username**

```

user@host> show network-access aaa subscribers statistics username 00010e020304.1231
Authentication statistics
  Challenge requests: 0
  Challenge responses: 0
Accounting statistics
  START sent successfully: 1
  START send failures: 0
  START ack received: 1
  INTERIM sent successfully: 0
  INTERIM send failures: 0
  INTERIM ack received: 0
Re-authentication statistics
  Requests received: 0
  Successful responses: 0
  Aborts handled: 0
Service statistics
  Service name: filter-serv
  Creation requests: 1
  Deletion requests: 0
  Request timeouts: 0
  Service name: filter-serv2
  Creation requests: 144
  Deletion requests: 0
  Request timeouts: 144

```

**show network-access aaa subscribers username**

```

user@host> show network-access aaa subscribers username fred@isp5.net
Logical system/Routing instance  Client type  Session-ID  Session uptime
Accounting
isp-bos-metro-16:isp-cmbrg-12    dhcp        7           01:12:56
on/volume
Service name      Service type  Quota      Accounting
I-Cast            volume        1200 Mbps  on/volume+time
Voip               time          6000 secs  on/volume
GamingBurst

```

## show network-access address-assignment pool

<b>Syntax</b>	<code>show network-access address-assignment pool <i>pool-name</i></code> <code>&lt;logical-system <i>logical-system-name</i>&gt;</code> <code>&lt;routing-instance <i>routing-instance-name</i>&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0.
<b>Description</b>	Display state information for each address-assignment pool.
<b>Options</b>	<p><b>none</b>—Display information about clients that have obtained addresses from the address-assignment pool.</p> <p><b>pool <i>pool-name</i></b>—Display information about the specified address-assignment pool.</p> <p><b>logical-system <i>logical-system-name</i></b>—(Optional) Perform this operation on the specified logical system.</p> <p><b>routing-instance <i>routing-instance-name</i></b>—(Optional) Perform this operation on the specified routing instance.</p>
<b>Required Privilege Level</b>	view and system
<b>List of Sample Output</b>	<a href="#">show network-access address-assignment pool on page 112</a>
<b>Output Fields</b>	<a href="#">Table 7 on page 112</a> lists the output fields for the <b>show address-assignment pool</b> command. Output fields are listed in the approximate order in which they appear.

**Table 7: show network-access address-assignment pool Output Fields**

Field Name	Field Description
IP address	IP address of the client.
Hardware address	MAC address of the client.
Type	Type of client.

## Sample Output

### show network-access address-assignment pool

```

user@host> show network-access address-assignment pool sunnywest logical-system ls1
routing-instance routinst2
IP address      Hardware address  Type
192.168.2.1     00:05:1b:00:b9:01 DHCP
192.168.2.2     00:05:1b:00:b9:02 DHCP
192.168.2.3     00:05:1b:00:b9:03 DHCP
192.168.2.4     00:05:1b:00:b9:04 DHCP

```



## CHAPTER 9

# Subscriber Management Interface CLI Commands

## show interfaces (Loopback)

**Syntax**    `show interfaces lo0`  
               `<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 local loopback interface.



**NOTE:** Logical interface lo0.16385 is the loopback interface for the internal routing instance. Created by the internal routing service process, this interface facilitates internal traffic. It prevents any filter created on loopback lo0.0 from blocking internal traffic.

**Options**    **lo0**—Display standard status information about the local loopback interface.

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

**descriptions**—(Optional) Display interface description strings.

**media**—(Optional) Display media-specific information.

**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 \(Loopback\) on page 117](#)  
                                   [show interfaces brief \(Loopback\) on page 118](#)  
                                   [show interfaces detail \(Loopback\) on page 118](#)  
                                   [show interfaces extensive \(Loopback\) on page 119](#)

**Output Fields**    [Table 8 on page 114](#) lists the output fields for the **show interfaces** (loopback) command. Output fields are listed in the approximate order in which they appear.

**Table 8: Loopback show interfaces Output Fields**

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Physical Interface</b>	Name of the physical interface.	All levels

Table 8: Loopback show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface index</b>	Physical interface index number, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Type</b>	Type of interface.	All levels
<b>Link-level type</b>	Encapsulation type used on the physical interface.	All levels
<b>MTU</b>	Size of the largest packet to be transmitted.	All levels
<b>Clocking</b>	Reference clock source of the interface.	All levels
<b>Speed</b>	Network speed on the interface.	All levels
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Link type</b>	Data transmission type.	<b>detail extensive</b>
<b>Link flags</b>	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Physical info</b>	Information about the physical interface.	<b>detail extensive</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down. Value is in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive</b>
<b>Hardware address</b>	Media access control (MAC) address of the interface.	<b>detail extensive</b>
<b>Alternate link address</b>	Backup link address.	<b>detail extensive</b>
<b>Last flapped</b>	Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	<b>detail extensive</b>
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>

Table 8: Loopback show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes, Output bytes</b>—Number of bytes received and transmitted on the interface.</li> <li>• <b>Input packets, Output packets</b>—Number of packets received and transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<ul style="list-style-type: none"> <li>• <b>Errors</b>—Input errors on the interface.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Frames received smaller than the runt threshold.</li> <li>• <b>Giants</b>—Frames received larger than the giant threshold.</li> <li>• <b>Policed Discards</b>—Frames that the incoming packet match code discarded because the frames were not recognized or were not of interest. Usually, this field reports protocols that Junos does not support.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. 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, possibly once every 10 seconds, the cable, the remote system, or the interface is malfunctioning.</li> <li>• <b>Errors</b>—Sum of outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—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 dropped by the ASIC RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets larger than the MTU threshold.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Logical interface index number, which reflects its initialization sequence.	<b>detail extensive</b>
<b>SNMP ifIndex</b>	Logical interface SNMP interface index number.	<b>detail extensive</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	<b>brief detail extensive</b>
<b>Encapsulation</b>	Encapsulation on the logical interface.	<b>brief detail extensive</b>
<b>Input packets</b>	Number of packets received on the logical interface.	None specified

Table 8: Loopback show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Output packets</b>	Number of packets transmitted on the logical interface.	None specified
<b>Traffic statistics</b>	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.	<b>detail extensive</b>
<b>Local statistics</b>	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.	<b>detail extensive</b>
<b>Protocol</b>	Protocol family configured on the logical interface (such as <b>iso</b> or <b>inet6</b> ).	<b>detail extensive none</b>
<b>MTU</b>	MTU size on the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route Table</b>	Route table in which this address exists; for example, <b>Route table:0</b> refers to inet.0.	<b>detail extensive</b>
<b>Flags</b>	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Addresses, Flags</b>	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive</b>
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive none</b>
<b>Local</b>	IP address of the logical interface.	<b>detail extensive none</b>
<b>Broadcast</b>	Broadcast address on the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

## Sample Output

### show interfaces (Loopback)

```

user@host> show interfaces lo0
Physical interface: lo0, Enabled, Physical link is Up
Interface index: 6, SNMP ifIndex: 6
Type: Loopback, MTU: Unlimited
Device flags   : Present Running Loopback
Interface flags: SNMP-Traps
Link flags     : None
Last flapped   : Never
  Input packets : 0
  Output packets: 0

```

```

Logical interface lo0.0 (Index 64) (SNMP ifIndex 16)
  Flags: SNMP-Traps Encapsulation: Unspecified
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: Unlimited
    Flags: None
    Addresses, Flags: Is-Default Is-Primary
      Local: 10.0.0.1
    Addresses
      Local: 127.0.0.1
  Protocol iso, MTU: Unlimited
    Flags: None
    Addresses, Flags: Is-Default Is-Primary
      Local: 49.0004.1000.0000.0001

Logical interface lo0.16385 (Index 65) (SNMP ifIndex 76)
  Flags: SNMP-Traps Encapsulation: Unspecified
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: Unlimited
    Flags: None

```

#### show interfaces brief (Loopback)

```

user@host> show interfaces lo0 brief
Physical interface: lo0, Enabled, Physical link is Up
  Type: Loopback, Link-level type: Unspecified, MTU: Unlimited,
  Clocking: Unspecified, Speed: Unspecified
  Device flags   : Present Running Loopback
  Interface flags: SNMP-Traps

Logical interface lo0.0
  Flags: SNMP-Traps Encapsulation: Unspecified
  inet  10.0.0.1          --> 0/0
        127.0.0.1        --> 0/0
  iso   49.0004.1000.0000.0001

Logical interface lo0.16385
  Flags: SNMP-Traps Encapsulation: Unspecified
  inet

```

#### show interfaces detail (Loopback)

```

user@host> show interfaces lo0 detail
Physical interface: lo0, Enabled, Physical link is Up
  Interface index: 6, SNMP ifIndex: 6, Generation: 4
  Type: Loopback, Link-level type: Unspecified, MTU: Unlimited,
  Clocking: Unspecified, Speed: Unspecified
  Device flags   : Present Running Loopback
  Interface flags: SNMP-Traps
  Link type      : Unspecified
  Link flags     : None
  Physical info  : Unspecified
  Hold-times    : Up 0 ms, Down 0 ms
  Current address: Unspecified, Hardware address: Unspecified
  Alternate link address: Unspecified
  Last flapped  : Never
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0

```

```

Output bytes : 0
Input packets: 0
Output packets: 0
Logical interface lo0.0 (Index 64) (SNMP ifIndex 16) (Generation 3)
Flags: SNMP-Traps Encapsulation: Unspecified
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

Protocol inet, MTU: Unlimited, Generation: 10, Route table: 0
Flags: None
Addresses, Flags: Is-Default Is-Primary
Destination: Unspecified, Local: 10.0.0.1, Broadcast: Unspecified,
Generation: 10
Addresses, Flags: None
Destination: Unspecified, Local: 127.0.0.1, Broadcast: Unspecified,
Generation: 12
Protocol iso, MTU: Unlimited, Generation: 11, Route table: 0
Flags: None
Addresses, Flags: Is-Default Is-Primary
Destination: Unspecified, Local: 49.0004.1000.0000.0001,
Broadcast: Unspecified, Generation: 14

Logical interface lo0.16385 (Index 65) (SNMP ifIndex 76) (Generation 4)
Flags: SNMP-Traps Encapsulation: Unspecified
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
Protocol inet, MTU: Unlimited, Generation: 12, Route table: 1
Flags: None

```

### show interfaces extensive (Loopback)

```

user@host> show interfaces lo0 extensive
Physical interface: lo0, Enabled, Physical link is Up
Interface index: 6, SNMP ifIndex: 6, Generation: 4
Type: Loopback, Link-level type: Unspecified, MTU: Unlimited,
Clocking: Unspecified, Speed: Unspecified
Device flags : Present Running Loopback
Interface flags: SNMP-Traps
Link type : Unspecified
Link flags : None
Physical info : Unspecified
Hold-times : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified

```

```
Last flapped      : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes      :          0
  Output bytes     :          0
  Input packets    :          0
  Output packets   :          0
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
  Resource errors: 0
```

```
Logical interface lo0.0 (Index 64) (SNMP ifIndex 16) (Generation 3)
Flags: SNMP-Traps Encapsulation: Unspecified
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
Protocol inet, MTU: Unlimited, Generation: 10, Route table: 0
  Flags: None
  Addresses, Flags: Is-Default Is-Primary
    Destination: Unspecified, Local: 10.0.0.1, Broadcast: Unspecified,
    Generation: 10
  Addresses, Flags: None
    Destination: Unspecified, Local: 127.0.0.1, Broadcast: Unspecified,
    Generation: 12
Protocol iso, MTU: Unlimited, Generation: 11, Route table: 0
  Flags: None
  Addresses, Flags: Is-Default Is-Primary
    Destination: Unspecified, Local: 49.0004.1000.0000.0001,
    Broadcast: Unspecified, Generation: 14
```

```
Logical interface lo0.16385 (Index 65) (SNMP ifIndex 76) (Generation 4)
Flags: SNMP-Traps Encapsulation: Unspecified
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
Protocol inet, MTU: Unlimited, Generation: 12, Route table: 1
  Flags: None
```



## show interfaces filters

<b>Syntax</b>	show interfaces filters <interface-name>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced on PTX Series Packet Transport Routers for Junos OS Release 12.1.
<b>Description</b>	Display all firewall filters that are installed on each interface in a system.
<b>Options</b>	<b>none</b> —Display filter information about all interfaces.  <b>interface-name</b> —(Optional) Display filter information about a particular interface.
<b>Additional Information</b>	For information about how to configure firewall filters, see the <i>Routing Policy Feature Guide for Routing Devices</i> . For related operational mode commands, see the <i>Junos OS Operational Mode Commands</i> .
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces filters on page 122</a> <a href="#">show interfaces filters interface-name on page 122</a> <a href="#">show interfaces filters (PTX Series Packet Transport Routers) on page 122</a>
<b>Output Fields</b>	<a href="#">Table 9 on page 121</a> lists the output fields for the <b>show interfaces filters</b> command. Output fields are listed in the approximate order in which they appear.

**Table 9: show interfaces filters Output Fields**

Field Name	Field Description
<b>Interface</b>	Name of the interface.
<b>Admin</b>	Interface state: <b>up</b> or <b>down</b> .
<b>Link</b>	Link state: <b>up</b> or <b>down</b> .
<b>Proto</b>	Protocol configured on the interface.
<b>Input Filter</b>	Names of any firewall filters to be evaluated when packets are received on the interface, including any filters attached through activation of dynamic service.
<b>Output Filter</b>	Names of any firewall filters to be evaluated when packets are transmitted on the interface, including any filters attached through activation of dynamic service.

## Sample Output

### show interfaces filters

```

user@host> show interfaces filters
Interface      Admin Link Proto Input Filter      Output Filter
ge-0/0/0       up    up    inet
ge-0/0/0.0     up    up    iso
ge-5/0/0       up    up
ge-5/0/0.0     up    up    any      f-any
               inet     f-inet
               multiservice
gr-0/3/0       up    up
ip-0/3/0       up    up
mt-0/3/0       up    up
pd-0/3/0       up    up
pe-0/3/0       up    up
vt-0/3/0       up    up
at-1/0/0       up    up
at-1/0/0.0     up    up    inet
               iso
at-1/1/0       up    down
at-1/1/0.0     up    down inet
               iso
....

```

### show interfaces filters interface-name

```

user@host> show interfaces filters so-2/1/0
Interface      Admin Link Proto Input Filter      Output Filter
so-2/1/0       up    down
so-2/1/0.0     up    down inet    goop    outfilter
               iso
               inet6 v6in    v6out

user@host > show interfaces filters ge-3/0/1
Interface      Admin Link Proto Input Filter      Output Filter
ge-3/0/1       up    up
ge-3/0/1.0     up    up    inet    F1-ge-3/0/1.0-in    F2-ge-3/0/1.0-out
               inet    F3-ge-3/0/1.0-in

```

### show interfaces filters (PTX Series Packet Transport Routers)

```

user@host > show interfaces filters em0
Interface      Admin Link Proto Input Filter      Output Filter
em0            up    up
em0.0          up    up    inet

```

## show interfaces (PPPoE)

<b>Syntax</b>	<pre>show interfaces pp0.logical &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index snmp-index&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series Services Routers, M120 routers, M320 routers, and MX Series routers only) Display status information about the PPPoE interface.
<b>Options</b>	<p><b>pp0.logical</b>—Display standard status information about the PPPoE interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information about PPPoE interfaces.</p> <p><b>snmp-index snmp-index</b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display PPPoE interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces (PPPoE) on page 129</a> <a href="#">show interfaces (PPPoE over Aggregated Ethernet) on page 129</a> <a href="#">show interfaces brief (PPPoE) on page 130</a> <a href="#">show interfaces detail (PPPoE) on page 130</a> <a href="#">show interfaces detail (PPPoE on J Series Services Routers) on page 131</a> <a href="#">show interfaces extensive (PPPoE on M120 and M320 Routers) on page 132</a>
<b>Output Fields</b>	Table 10 on page 123 lists the output fields for the <b>show interfaces (PPPoE)</b> command. Output fields are listed in the approximate order in which they appear.

Table 10: show interfaces (PPPoE) Output Fields

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

Table 10: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Type</b>	Physical interface type (PPPoE).	All levels
<b>Link-level type</b>	Encapsulation on the physical interface (PPPoE).	All levels
<b>MTU</b>	MTU size on the physical interface.	All levels
<b>Clocking</b>	Reference clock source. It can be <b>Internal</b> or <b>External</b> .	All levels
<b>Speed</b>	Speed at which the interface is running.	All levels
<b>Device flags</b>	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
<b>Link type</b>	Physical interface link type: <b>full duplex</b> or <b>half duplex</b> .	All levels
<b>Link flags</b>	Information about the interface. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
<b>Input rate</b>	Input rate in bits per second (bps) and packets per second (pps).	None specified
<b>Output rate</b>	Output rate in bps and pps.	None specified
<b>Physical Info</b>	Physical interface information.	All levels
<b>Hold-times</b>	Current interface hold-time up and hold-time down, in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive</b>
<b>Hardware address</b>	MAC address of the hardware.	<b>detail extensive</b>
<b>Alternate link address</b>	Backup address of the link.	<b>detail extensive</b>
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>

Table 10: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	<p>Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</p> <p><b>NOTE:</b> These fields include dropped traffic and exception traffic, as those fields are not separately defined.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<p>Input errors on the interface:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—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.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Policed discards</b>—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.</li> <li>• <b>Resource errors</b>—Sum of B chip Tx drops and IXP Tx net transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b> —Number of times the interface has gone from <b>down</b> to <b>up</b>. 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), then the cable, the far-end system, or the PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—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.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of B chip Tx drops and IXP Tx net transmit drops.</li> </ul>	<b>extensive</b>

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#### Logical Interface

---

Table 10: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Logical interface index number (which reflects its initialization sequence).	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	Logical interface SNMP interface index number.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Encapsulation</b>	Type of encapsulation configured on the logical interface.	All levels
<b>PPP parameters</b>	PPP status: <ul style="list-style-type: none"> <li>• LCP restart timer—Length of time (in milliseconds) between successive Link Control Protocol (LCP) configuration requests.</li> <li>• NCP restart timer—Length of time (in milliseconds) between successive Network Control Protocol (NCP) configuration requests.</li> </ul>	<b>detail</b>
<b>PPPoE</b>	PPPoE status: <ul style="list-style-type: none"> <li>• <b>State</b>—State of the logical interface (<b>up</b> or <b>down</b>).</li> <li>• <b>Session ID</b>—PPPoE session ID.</li> <li>• <b>Service name</b>—Type of service required. Can be used to indicate an Internet service provider (ISP) name or a class or quality of service.</li> <li>• <b>Configured AC name</b>—Configured access concentrator name.</li> <li>• <b>Auto-reconnect timeout</b>—Time after which to try to reconnect after a PPPoE session is terminated, in seconds.</li> <li>• <b>Idle Timeout</b>—Length of time (in seconds) that a connection can be idle before disconnecting.</li> <li>• <b>Underlying interface</b>—Interface on which PPPoE is running.</li> </ul>	All levels
<b>Link</b>	Name of the physical interfaces for member links in an aggregated Ethernet bundle for a PPPoE over aggregated Ethernet configuration. PPPoE traffic goes out on these interfaces.	All levels
<b>Traffic statistics</b>	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. This counter usually takes less than 1 second to stabilize.	<b>detail extensive</b>

Table 10: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
IPv6 transit statistics	<p>Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.</p> <p><b>NOTE:</b> The packet and byte counts in these fields include traffic that is dropped and does not leave the router.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	detail extensive
Local statistics	<p>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. This counter usually takes less than 1 second to stabilize.</p>	detail extensive
Transit statistics	<p>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. This counter usually takes less than 1 second to stabilize.</p> <p><b>NOTE:</b> The packet and byte counts in these fields include traffic that is dropped and does not leave the router.</p>	detail extensive
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> <li>• <b>interval seconds</b>—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds.</li> <li>• <b>down-count number</b>—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3.</li> <li>• <b>up-count number</b>—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1.</li> </ul>	detail extensive
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> <li>• <b>Input</b>—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> <li>• (last seen 00:00:00 ago)—Time the last keepalive packet was received, in the format <i>hh:mm:ss</i>.</li> </ul> </li> <li>• <b>Output</b>—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> <li>• (last seen 00:00:00 ago)—Time the last keepalive packet was sent, in the format <i>hh:mm:ss</i>.</li> </ul> </li> </ul> <p>(MX Series routers with MPCs/MICs) When an MX Series router with MPCs/MICs is using PPP fast keepalive for a PPP link, the display does not include the number of keepalive packets received or sent, or the amount of time since the router received or sent the last keepalive packet.</p>	detail extensive
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: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>LCP state</b>	(PPP) Link Control Protocol state.  <ul style="list-style-type: none"> <li>• <b>Conf-ack-received</b>—Acknowledgement was received.</li> <li>• <b>Conf-ack-sent</b>—Acknowledgement was sent.</li> <li>• <b>Conf-req-sent</b>—Request was sent.</li> <li>• <b>Down</b>—LCP negotiation is incomplete (not yet completed or has failed).</li> <li>• <b>Not-configured</b>—LCP is not configured on the interface.</li> <li>• <b>Opened</b>—LCP negotiation is successful.</li> </ul>	none <b>detail extensive</b>
<b>NCP state</b>	(PPP) Network Control Protocol state.  <ul style="list-style-type: none"> <li>• <b>Conf-ack-received</b>—Acknowledgement was received.</li> <li>• <b>Conf-ack-sent</b>—Acknowledgement was sent.</li> <li>• <b>Conf-req-sent</b>—Request was sent.</li> <li>• <b>Down</b>—NCP negotiation is incomplete (not yet completed or has failed).</li> <li>• <b>Not-configured</b>—NCP is not configured on the interface.</li> <li>• <b>Opened</b>—NCP negotiation is successful.</li> </ul>	<b>detail extensive</b> none
<b>CHAP state</b>	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.  <ul style="list-style-type: none"> <li>• <b>Chap-Chal-received</b>—Challenge was received but response not yet sent.</li> <li>• <b>Chap-Chal-sent</b>—Challenge was sent.</li> <li>• <b>Chap-Resp-received</b>—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.)</li> <li>• <b>Chap-Resp-sent</b>—Response was sent for the challenge received.</li> <li>• <b>Closed</b>—CHAP authentication is incomplete.</li> <li>• <b>Failure</b>—CHAP authentication failed.</li> <li>• <b>Not-configured</b>—CHAP is not configured on the interface.</li> <li>• <b>Success</b>—CHAP authentication was successful.</li> </ul>	none <b>detail extensive</b>
<b>Protocol</b>	Protocol family configured on the logical interface.	<b>detail extensive</b> none
<i><b>protocol-family</b></i>	Protocol family configured on the logical interface. If the protocol is <b>inet</b> , the IP address of the interface is also displayed.	<b>brief</b>
<b>MTU</b>	MTU size on the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route table</b>	Routing table in which the logical interface address is located. For example, <b>0</b> refers to the routing table <b>inet.0</b> .	<b>detail extensive</b> none
<b>Flags</b>	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive</b> none



Table 10: show interfaces (PPPoE) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Addresses, Flags</b>	Information about the addresses configured for the protocol family. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive none</b>
<b>Local</b>	IP address of the logical interface.	<b>detail extensive none</b>
<b>Broadcast</b>	Broadcast address.	<b>detail extensive none</b>

## Sample Output

### show interfaces (PPPoE)

```

user@host> show interfaces pp0
Physical interface: pp0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 24
  Type: PPPoE, Link-level type: PPPoE, MTU: 1532
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link type      : Full-Duplex
  Link flags     : None
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

Logical interface pp0.0 (Index 72) (SNMP ifIndex 72)
  Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
  PPPoE:
    State: SessionDown, Session ID: None,
    Service name: None, Configured AC name: sapphire,
    Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
    Underlying interface: at-5/0/0.0 (Index 70)
  Input packets : 0
  Output packets: 0
  LCP state: Not-configured
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mp1s: Not-configured
  CHAP state: Closed
    Protocol inet, MTU: 100
    Flags: User-MTU, Negotiate-Address

```

### show interfaces (PPPoE over Aggregated Ethernet)

```

user@host> show interfaces pp0.1073773821
Logical interface pp0.1073773821 (Index 80) (SNMP ifIndex 32584)
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
  PPPoE:
    State: SessionUp, Session ID: 1,
    Session AC name: alcor, Remote MAC address: 00:10:94:00:00:01,
    Underlying interface: demux0.100 (Index 88)
  Link:
    ge-1/0/0.32767
    ge-1/0/1.32767
  Input packets : 6

```

```
Output packets: 6
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
CHAP state: Closed
PAP state: Success
Protocol inet, MTU: 1500
Flags: Sendbroadcast-pkt-to-re
Addresses, Flags: Is-Primary
Local: 45.63.24.1
```

#### show interfaces brief (PPPoE)

```
user@host> show interfaces pp0 brief
Physical interface: pp0, Enabled, Physical link is Up
Type: PPPoE, Link-level type: PPPoE, MTU: 1532, Speed: Unspecified
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps

Logical interface pp0.0
Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
PPPoE:
State: SessionDown, Session ID: None,
Service name: None, Configured AC name: sapphire,
Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
Underlying interface: at-5/0/0.0 (Index 70)
inet
```

#### show interfaces detail (PPPoE)

```
user@host> show interfaces pp0 detail
Physical interface: pp0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 24, Generation: 9
Type: PPPoE, Link-level type: PPPoE, MTU: 1532, Speed: Unspecified
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link type : Full-Duplex
Link flags : None
Physical info : Unspecified
Hold-times : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
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 pp0.0 (Index 72) (SNMP ifIndex 72) (Generation 14)
Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
PPPoE:
State: SessionDown, Session ID: None,
Service name: None, Configured AC name: sapphire,
Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
Underlying interface: at-5/0/0.0 (Index 70)
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
LCP state: Not-configured
NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
Protocol inet, MTU: 100, Generation: 14, Route table: 0
Flags: User-MTU, Negotiate-Address

```

### show interfaces detail (PPPoE on J Series Services Routers)

```

user@host> show interfaces pp0 detail
Physical interface: pp0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 24, Generation: 9
Type: PPPoE, Link-level type: PPPoE, MTU: 1532, Speed: Unspecified
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link type : Full-Duplex
Link flags : None
Physical info : Unspecified
Hold-times : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
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, Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
Resource errors: 0

Logical interface pp0.0 (Index 72) (SNMP ifIndex 72) (Generation 14)
Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
PPPoE:
State: SessionDown, Session ID: None,
Service name: None, Configured AC name: sapphire,
Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
Underlying interface: at-5/0/0.0 (Index 70)
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
LCP state: Not-configured
NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
Protocol inet, MTU: 100, Generation: 14, Route table: 0
Flags: User-MTU, Negotiate-Address

```

### show interfaces extensive (PPPoE on M120 and M320 Routers)

```

user@host> show interfaces pp0 extensive
Physical interface: pp0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 93, Generation: 129
Type: PPPoE, Link-level type: PPPoE, MTU: 1532, Speed: Unspecified
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link type : Full-Duplex
Link flags : None
Physical info : Unspecified
Hold-times : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
Statistics last cleared: Never
Traffic statistics:
Input bytes : 972192 0 bps
Output bytes : 975010 0 bps
Input packets: 1338 0 pps
Output packets: 1473 0 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
0,
Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0

Logical interface pp0.0 (Index 69) (SNMP ifIndex 96) (Generation 194)
Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
PPPoE:
State: SessionUp, Session ID: 26,
Session AC name: None, AC MAC address: 00:17:cb:48:c8:12,
Service name: None, Configured AC name: None,
Auto-reconnect timeout: Never, Idle timeout: Never,
Underlying interface: ge-3/0/1.0 (Index 67)
Traffic statistics:
Input bytes : 252
Output bytes : 296
Input packets: 7
Output packets: 8
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0

```

```
Output packets:          0
Local statistics:
Input bytes  :          252
Output bytes :          296
Input packets:           7
Output packets:          8
Transit statistics:
Input bytes  :           0          0 bps
Output bytes :           0          0 bps
Input packets:           0          0 pps
Output packets:          0          0 pps
IPv6 transit statistics:
Input bytes  :           0
Output bytes :           0
Input packets:           0
Output packets:          0
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
Input : 1 (last seen 00:00:00 ago)
Output: 1 (last sent 00:00:03 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
CHAP state: Closed
PAP state: Closed
Protocol inet, MTU: 1492, Generation: 171, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 12.12.12.2, Local: 12.12.12.1, Broadcast: Unspecified,
Generation: 206
```

## show interfaces routing

<b>Syntax</b>	show interfaces routing <brief   detail> <interface-name> <logical-system (all   <i>logical-system-name</i> )>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	Display the state of the router's interfaces. Use this command for performing router diagnostics only, when you are determining whether the routing protocols and the Junos OS differ about the state of an interface.
<b>Options</b>	<p><b>none</b>—Display standard information about the state of all router interfaces on all logical systems.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface-name</b>—(Optional) Name of a specific interface.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
<b>Additional Information</b>	For information about how to configure routing protocols, see the <i>Junos OS Routing Protocols Library for Routing Devices</i> . For information about related operational mode commands for routing instances and protocols, see the <i>Junos OS Operational Mode Commands</i> .
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces routing brief on page 135</a> <a href="#">show interfaces routing brief (TX Matrix Plus Router) on page 136</a> <a href="#">show interfaces routing detail on page 136</a> <a href="#">show interfaces routing detail (TX Matrix Plus Router) on page 137</a>
<b>Output Fields</b>	Table 11 on page 134 lists the output fields for the <b>show interfaces routing</b> command. Output fields are listed in the approximate order in which they appear.

Table 11: show interfaces routing Output Fields

Field Name	Field Description	Level of Output
<b>Interface</b>	Name of the physical interface.	none <b>brief</b>
<b>State</b>	State of the physical interface: <b>Up</b> or <b>Down</b> .	none <b>brief</b>
<b>Addresses</b>	Protocols and addresses configured on the interface.	none <b>brief</b>
<b>Index</b>	Interface index number, which reflects its initialization sequence.	<b>detail</b>

Table 11: show interfaces routing Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Refcount</b>	Number of references to the interface in the routing software.	<b>detail</b>
<b>State</b>	State ( <b>Up</b> or <b>Down</b> ) and type of interface.	<b>detail</b>
<b>Change</b>	Reflects one or more of the following recent changes to the interface: <ul style="list-style-type: none"> <li>• <b>Add</b>—The interface was just added.</li> <li>• <b>Address</b>—The interface's link-layer address has changed.</li> <li>• <b>Delete</b>—The interface is being deleted.</li> <li>• <b>Encapsulation</b>—The type of encapsulation on the interface has changed.</li> <li>• <b>Metric</b>—The interface's metric value has changed.</li> <li>• <b>MTU</b>—The interface's maximim transmission unit size has changed.</li> <li>• <b>UpDown</b>—The interface has made an up or down transition.</li> </ul>	<b>detail</b>
<b>Up/down transitions</b>	Number of times the interface has gone from <b>Down</b> to <b>Up</b> .	<b>detail</b>
<b>Link layer</b>	Describes the link layer of the interface.	<b>detail</b>
<b>Encapsulation</b>	Encapsulation on the interface.	<b>detail</b>
<b>Bandwidth</b>	Speed at which the interface is running.	<b>detail</b>
<b>Protocol address</b>	Information about the configuration of protocols on the interface: <ul style="list-style-type: none"> <li>• <b>Address</b>—Address configured on the interface for the protocol type.</li> <li>• <b>State</b>—State (<b>Up</b> or <b>down</b>) and type of interface.</li> <li>• <b>Change</b>—Reflects one or more of the following recent changes to the interface: <ul style="list-style-type: none"> <li>• <b>Add</b>—The interface was just added.</li> <li>• <b>Address</b>—The interface's address has changed.</li> <li>• <b>Broadcast</b>—The interface's broadcast address has changed.</li> <li>• <b>Delete</b>—The interface is being deleted.</li> <li>• <b>Netmask</b>—The interface's netmask has changed.</li> <li>• <b>UpDown</b>—The interface has made an up or down transition.</li> </ul> </li> <li>• <b>Preference</b>—Preference value for the route for this address.</li> <li>• <b>Metric</b>—Metric value on the interface for the protocol type.</li> <li>• <b>MTU</b>—Maximim transmission unit value of the interface.</li> <li>• <b>Local address</b>—On a point-to-point link, the address of the local side of the link. Not used for multicast links.</li> <li>• <b>Destination</b>—For a point-to-point link, the address of the remote side of the link. For multicast links, the network address.</li> </ul>	<b>detail</b>

## Sample Output

### show interfaces routing brief

```
user@host> show interfaces routing brief
```

Interface	State	Addresses
so-5/0/3.0	Down	ISO enabled
so-5/0/2.0	Up	MPLS enabled
		ISO enabled
		INET 192.168.2.120
		INET enabled
so-5/0/1.0	Up	MPLS enabled
		ISO enabled
		INET 192.168.2.130
		INET enabled
at-1/0/0.3	Up	CCC enabled
at-1/0/0.2	Up	CCC enabled
at-1/0/0.0	Up	ISO enabled
		INET 192.168.90.10
		INET enabled
lo0.0	Up	ISO 47.0005.80ff.f800.0000.0108.0001.1921.6800.5061.00
		ISO enabled
		INET 127.0.0.1
fxp1.0	Up	
fxp0.0	Up	INET 192.168.6.90

#### show interfaces routing brief (TX Matrix Plus Router)

```

user@host> show interfaces routing brief
Interface      State Addresses
...
ge-23/0/4.0    Up      INET  2.9.1.1
              ISO   enabled
              MPLS enabled
ge-23/0/3.0    Up      INET  2.8.1.1
              ISO   enabled
              MPLS enabled
ge-23/0/2.0    Up      INET  2.7.1.1
              ISO   enabled
              MPLS enabled
ge-23/0/1.0    Up      INET  2.6.1.1
              ISO   enabled
              MPLS enabled
ge-23/0/0.0    Up      INET  2.5.1.1
              ISO   enabled
              MPLS enabled
ge-31/0/7.599  Up      INET  2.14.10.93
ge-31/0/7.598  Up      INET  2.14.10.89
ge-31/0/7.597  Up      INET  2.14.10.85
ge-31/0/7.596  Up      INET  2.14.10.81
ge-31/0/7.595  Up      INET  2.14.10.77
ge-31/0/7.594  Up      INET  2.14.10.73
...
ixgbe1.0       Up      INET  10.34.0.4
              INET  162.0.0.4
              INET6 fe80::200:1ff:fe22:4
              INET6 fec0::a:22:0:4
ixgbe0.0       Up      INET  10.34.0.4
              INET  162.0.0.4
              INET6 fe80::200:ff:fe22:4
              INET6 fec0::a:22:0:4
em0.0          Up      INET  192.168.178.11

```

#### show interfaces routing detail

```

user@host> show interfaces routing detail

```



```

so-5/0/3.0
  Index: 15, Refcount: 2, State: Up <Broadcast PointToPoint Multicast> Change:<>

  Metric: 0, Up/down transitions: 0, Full-duplex
  Link layer: HDLC serial line Encapsulation: PPP Bandwidth: 155Mbps
  ISO address (null)
    State: <Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
so-5/0/2.0
  Index: 14, Refcount: 7, State: <Up Broadcast PointToPoint Multicast> Change:<>

  Metric: 0, Up/down transitions: 0, Full-duplex
  Link layer: HDLC serial line Encapsulation: PPP Bandwidth: 155Mbps
  MPLS address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4458 bytes
  ISO address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
  INET address 192.168.2.120
    State: <Up Broadcast PointToPoint Multicast Localup> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
    Local address: 192.168.2.120
    Destination: 192.168.2.110/32
  INET address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
...

```

### show interfaces routing detail (TX Matrix Plus Router)

```

user@host> show interfaces routing detail
ge-23/0/4.0
  Index: 77, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
  0 metric, 0 up/down transitions, reth state 0, full-duplex
  Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
  Link address #0 0.1d.b5.14.da.2d
  INET address 2.9.1.1
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <RT-Change>
    Preference 0, metric 0, MTU 1500 bytes
    Broadcast address 2.9.1.3
    Destination: 2.9.1.0/30
    System flags: <Is-Preferred Is-Primary>
  ISO address (null)
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
    Preference 0, metric 0, MTU 1497 bytes
    System flags: <>
  MPLS address (null)
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
    Preference 0, metric 0, MTU 1488 bytes
    System flags: <>
ge-23/0/3.0
  Index: 76, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
  0 metric, 0 up/down transitions, reth state 0, full-duplex
  Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
  Link address #0 0.1d.b5.14.da.2c
  INET address 2.8.1.1
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <RT-Change>
    Preference 0, metric 0, MTU 1500 bytes
    Broadcast address 2.8.1.3
    Destination: 2.8.1.0/30

```

```

    System flags: <Is-Preferred Is-Primary>
ISO address (null)
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
    Preference 0, metric 0, MTU 1497 bytes
    System flags: <>
MPLS address (null)
    State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
    Preference 0, metric 0, MTU 1488 bytes
    System flags: <>
ge-23/0/2.0
    Index: 75, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
    0 metric, 0 up/down transitions, reth state 0, full-duplex
    Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
    Link address #0 0.1d.b5.14.da.2b
    INET address 2.7.1.1
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <RT-Change>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 2.7.1.3
        Destination: 2.7.1.0/30
        System flags: <Is-Preferred Is-Primary>
    ISO address (null)
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1497 bytes
        System flags: <>
    MPLS address (null)
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1488 bytes
        System flags: <>
ge-23/0/1.0
    Index: 74, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
    0 metric, 0 up/down transitions, reth state 0, full-duplex
    Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
    Link address #0 0.1d.b5.14.da.2a
    INET address 2.6.1.1
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <RT-Change>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 2.6.1.3
    ...
ixgbe1.0
    Index: 5, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
    0 metric, 0 up/down transitions, reth state 0, full-duplex
    Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
    Link address #0 2.0.1.22.0.4
    INET address 10.34.0.4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 10.255.255.255
        Destination: 10.0.0.0/8
        System flags: <Is-Preferred>
    INET address 162.0.0.4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 191.255.255.255
        Destination: 128.0.0.0/2
        System flags: <Primary Is-Preferred Is-Primary>
    INET6 address fe80::200:1ff:fe22:4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Destination: fe80::/64
        System flags: <Is-Preferred>
    INET6 address fec0::a:22:0:4

```

```

    State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
    Preference 0, metric 0, MTU 1500 bytes
    Destination: fec0::/64
    System flags: <Is-Preferred Is-Primary>
ixgbe0.0
    Index: 4, Refcount: 5, State: <Up Broadcast Multicast> Change: <>
    0 metric, 0 up/down transitions, reth state 0, full-duplex
    Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 1000Mbps
    Link address #0 2.0.0.22.0.4
    INET address 10.34.0.4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 10.255.255.255
        Destination: 10.0.0.0/8
        System flags: <Is-Preferred>
    INET address 162.0.0.4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 191.255.255.255
        Destination: 128.0.0.0/2
        System flags: <Primary Is-Default Is-Preferred Is-Primary>
    INET6 address fe80::200:ff:fe22:4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Destination: fe80::/64
        System flags: <Is-Preferred>
    INET6 address fec0::a:22:0:4
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Destination: fec0::/64
        System flags: <Is-Default Is-Preferred Is-Primary>
em0.0
    Index: 3, Refcount: 2, State: <Up Broadcast Multicast> Change: <>
    0 metric, 0 up/down transitions, reth state 0, full-duplex
    Link layer: Ethernet Encapsulation: Ethernet Bandwidth: 100Mbps
    Link address #0 0.80.f9.26.0.c0
    INET address 192.168.178.11
        State: <Up Broadcast Multicast Localup> Change: <> Flags: <>
        Preference 0, metric 0, MTU 1500 bytes
        Broadcast address 192.168.178.127
        Destination: 192.168.178.0/25
        System flags: <Is-Preferred Is-Primary>

```

## show ppp interface

<b>Syntax</b>	<code>show ppp interface <i>interface-name</i></code> <code>&lt;extensive  terse&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 7.5.
<b>Description</b>	Display information about PPP interfaces.
<b>Options</b>	<i>interface-name</i> —Name of a logical interface.  <b>extensive   terse</b> —(Optional) Display the specified level of output.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show ppp interface on page 147</a> <a href="#">show ppp interface extensive on page 147</a> <a href="#">show ppp interface terse on page 148</a>
<b>Output Fields</b>	<a href="#">Table 12 on page 140</a> lists the output fields for the <b>show ppp interface</b> command. Output fields are listed in the approximate order in which they appear.

Table 12: show ppp interface Output Fields

Field Name	Field Description	Level of Output
<b>Session</b>	Name of the logical interface on which the session is running.	All levels
<b>Type</b>	Session type: PPP.	All levels
<b>Phase</b>	PPP process phase: <b>Authenticate</b> , <b>Pending</b> , <b>Establish</b> , <b>LCP</b> , <b>Network</b> , <b>Disabled</b> , and <b>Tunneled</b> .	All levels
<b>Session flags</b>	Special conditions present in the session: <b>Bundled</b> , <b>TCC</b> , <b>No-keepalives</b> , <b>Looped</b> , <b>Monitored</b> , and <b>NCP-only</b> .	All levels
<b><i>protocol</i> State</b>	Protocol state information. See specific protocol state fields for information.	None specified
<b>AUTHENTICATION</b>	Challenge-Handshake Authentication Protocol (CHAP) authentication state information or Password Authentication Protocol (PAP) state information. See the <b>Authentication</b> field description for further information.	None specified

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Keepalive settings</b>	<p>Keepalive settings for the PPP sessions on the L2TP network server (LNS). LNS based PPP sessions are supported only on service interfaces (si).</p> <ul style="list-style-type: none"> <li>• <b>Interval</b>—Time in seconds between successive keepalive requests. Keepalive aging timeout is calculated as a product of the <b>interval</b> and <b>Down-count</b> values. If the keepalive aging timeout is greater than 180 seconds, the keepalive packets are handled by the Routing Engine. If the aging timeout is less than or equal to 180 seconds, the packets are handled by the Packet Forwarding Engine.</li> <li>• <b>Up-count</b>—The number of keepalive packets a destination must receive to change a link's status from down to up.</li> <li>• <b>Down-count</b>—The number of keepalive packets a destination must fail to receive before the network takes down a link.</li> </ul>	<b>extensive</b>
<b>RE Keepalive statistics</b>	<p>Keepalive statistics for the packets handled by the Routing Engine.</p> <ul style="list-style-type: none"> <li>• <b>LCP echo req Tx</b>—LCP echo requests sent from the Routing Engine.</li> <li>• <b>LCP echo req Rx</b>—LCP echo requests received at the Routing Engine.</li> <li>• <b>LCP echo rep Tx</b>—LCP echo responses sent from the Routing Engine.</li> <li>• <b>LCP echo rep Rx</b>—LCP echo responses received at the Routing Engine.</li> <li>• <b>LCP echo req timeout</b>—Number of keepalive packets where the keepalive aging timer has expired.</li> <li>• <b>LCP Rx echo req Magic Num Failures</b>—LCP echo requests where the magic numbers shared between the PPP peers during LCP negotiation did not match.</li> <li>• <b>LCP Rx echo rep Magic Num Failures</b>—LCP echo responses where the magic numbers shared between the PPP peers during LCP negotiation did not match.</li> </ul>	<b>extensive</b>

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
LCP	<p><b>LCP information:</b></p> <ul style="list-style-type: none"> <li>• <b>State</b>—LCP protocol state (all platforms except M120 and M320 routers): <ul style="list-style-type: none"> <li>• <b>Ack-rcvd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is not available for traffic.</li> <li>• <b>Opened</b>—Link is administratively available for traffic.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection.</li> </ul> </li> <li>• <b>State</b>—LCP protocol state (M120 and M320 routers): <ul style="list-style-type: none"> <li>• <b>Ack-rcvd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is available (up), but no Open has occurred.</li> <li>• <b>Closing</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> <li>• <b>Opened</b>—Link is administratively available for traffic. A Configure-Ack has been both sent and received.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.</li> <li>• <b>Starting</b>—An administrative Open has been initiated, but the lower layer is still unavailable (Down).</li> <li>• <b>Stopped</b>—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.</li> <li>• <b>Stopping</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> </ul> </li> <li>• <b>Last started</b>—LCP state start time.</li> <li>• <b>Last completed</b>—LCP state completion time.</li> </ul>	extensive

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
	<ul style="list-style-type: none"> <li>• <b>Negotiated options:</b> <ul style="list-style-type: none"> <li>• <b>ACFC</b>—Address and-Control Field Compression. A configuration option that provides a method to negotiate the compression of the Data Link Layer Address and Control fields.</li> <li>• <b>Asynchronous map</b>—Asynchronous control character map. A configuration option used on asynchronous links such as telephone lines to identify control characters that must be replaced by a two-character sequence to prevent them from being interpreted by equipment used to establish the link.</li> <li>• <b>Authentication protocol</b>—Protocol used for authentication. This option provides a method to negotiate the use of a specific protocol for authentication. It requires a peer to authenticate itself before allowing network-layer protocol packets to be exchanged. By default, authentication is not required.</li> <li>• <b>Authentication algorithm</b>—Type of authentication algorithm. The Message Digest algorithm (MD5) is the only algorithm supported.</li> <li>• <b>Endpoint discriminator class</b>—For multilink PPP (MLPPP), a configuration option that identifies the system transmitting the packet. This option advises a system that the peer on this link could be the same as the peer on another existing link.</li> <li>• <b>Magic number</b>—A configuration option that provides a method to detect looped-back links and other data-link layer anomalies. By default, the magic number is not negotiated.</li> <li>• <b>MRU</b>—Maximum receive unit. A configuration option that may be sent to inform the peer that the implementation can receive larger packets, or to request that the peer send smaller packets. The default value is 1500 octets.</li> <li>• <b>MRRU</b>—For multilink PPP, the maximum receive reconstructed unit. A configuration option that specifies the maximum number of octets in the Information fields of reassembled packets.</li> <li>• <b>Multilink header suspendable classes</b>—For MLPPP, an LCP option that advises the peer that the implementation wishes to receive fragments with a format given by the code number, with the maximum number of suspendable classes given.</li> <li>• <b>Multilink header format classes</b>—For MLPPP, an LCP option that advises the peer that the implementation wishes to receive fragments with a format given by the code number.</li> <li>• <b>PFC</b>—Protocol-Field-Compression. A configuration option that provides a method to negotiate the compression of the PPP Protocol field.</li> <li>• <b>short sequence</b>—For MLPPP, an option that advises the peer that the implementation wishes to receive fragments with short, 12-bit sequence numbers.</li> </ul> </li> </ul>	

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Authentication</b>	<p>CHAP or PAP authentication state information. For CHAP authentication:</p> <ul style="list-style-type: none"> <li>• <b>Chap-ans-rcvd</b>—Packet was sent from the peer, indicating that the peer received the <b>Chap-resp-sent</b> packet.</li> <li>• <b>Chap-ans-sent</b>—Packet was sent from the authenticator, indicating that the authenticator received the peer's <b>Chap-resp-rcvd</b> packet.</li> <li>• <b>Chap-chal-rcvd</b>—Challenge packet has been received by the peer.</li> <li>• <b>Chap-chal-sent</b>—Challenge packet has been sent by the authenticator to begin the CHAP protocol or has been transmitted at any time during the Network-Layer Protocol (NCP) phase to ensure that the connection has not been altered.</li> <li>• <b>Chap-resp-rcvd</b>—CHAP response packet has been received by the authenticator.</li> <li>• <b>Chap-resp-sent</b>—CHAP response packet has been sent to the authenticator.</li> <li>• <b>Closed</b>—Link is not available for authentication.</li> <li>• <b>Failure</b>—Authenticator compares the response value in the response packet from the peer with its own response value, but the value does not match. Authentication fails.</li> <li>• <b>Success</b>—Authenticator compares the response value in the response packet from the peer with its own response value, and the value matches. Authentication is successful.</li> </ul> <p>For PAP authentication:</p> <ul style="list-style-type: none"> <li>• <b>Pap-resp-sent</b>—PAP response sent to peer (ACK/NACK).</li> <li>• <b>Pap-req-rcvd</b>—PAP request packet received from peer.</li> <li>• <b>Pap-resp-rcvd</b>—PAP response received from the peer (ACK/NACK).</li> <li>• <b>Pap-req-sent</b>—PAP request packet sent to the peer.</li> <li>• <b>Closed</b>—Link is not available for authentication.</li> <li>• <b>Failure</b>—Authenticator compares the response value in the response packet from the peer with its own response value, but the value does not match. Authentication fails.</li> <li>• <b>Success</b>—Authenticator compares the response value in the response packet from the peer with its own response value, and the value matches. Authentication is successful.</li> </ul>	None specified



Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
IPCP	<p>Internet Protocol Control Protocol (IPCP) information.</p> <ul style="list-style-type: none"> <li>• <b>State</b>—(All platforms except M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvcd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is not available for traffic.</li> <li>• <b>Opened</b>—Link is administratively available for traffic.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection.</li> </ul> </li> <li>• <b>State</b>—(M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvcd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is available (up), but no Open has occurred.</li> <li>• <b>Closing</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> <li>• <b>Opened</b>—Link is administratively available for traffic. A Configure-Ack has been both sent and received.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.</li> <li>• <b>Starting</b>—An administrative Open has been initiated, but the lower layer is still unavailable (Down).</li> <li>• <b>Stopped</b>—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.</li> <li>• <b>Stopping</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> </ul> </li> <li>• <b>Last started</b>—IPCP state start time.</li> <li>• <b>Last completed</b>—IPCP state authentication completion time.</li> <li>• <b>Negotiated options</b>: <ul style="list-style-type: none"> <li>• <b>compression protocol</b>—Negotiate the use of a specific compression protocol. By default, compression is not enabled.</li> <li>• <b>local address</b>—Desired local address of the sender of a Configure-Request. If all four octets are set to zero, the peer provides the IP address.</li> <li>• <b>primary DNS server</b>—Negotiate with the remote peer to select the address of the primary DNS server to be used on the local end of the link.</li> <li>• <b>primary WINS server</b>—Negotiate with the remote peer to select the address of the primary WINS server to be used on the local end of the link.</li> <li>• <b>remote address</b>—IP address of the remote end of the link in dotted quad notation.</li> <li>• <b>secondary DNS server</b>—Negotiate with the remote peer to select the address of the secondary DNS server to be used on the local end of the link.</li> <li>• <b>secondary WINS server</b>—Negotiate with the remote peer to select the address of the secondary WINS server to be used on the local end of the link.</li> </ul> </li> </ul>	extensive

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
IPV6CP	<p>Internet Protocol version 6 Control Protocol (IPV6CP) information.</p> <ul style="list-style-type: none"> <li>• <b>State</b>—(All platforms except M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is not available for traffic.</li> <li>• <b>Opened</b>—Link is administratively available for traffic.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection.</li> </ul> </li> <li>• <b>State</b>—(M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is available (up), but no Open has occurred.</li> <li>• <b>Closing</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> <li>• <b>Opened</b>—Link is administratively available for traffic. A Configure-Ack has been both sent and received.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.</li> <li>• <b>Starting</b>—An administrative Open has been initiated, but the lower layer is still unavailable (Down).</li> <li>• <b>Stopped</b>—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.</li> <li>• <b>Stopping</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> </ul> </li> <li>• <b>Last started</b>—IPV6CP state start time.</li> <li>• <b>Last completed</b>—IPV6CP state authentication completion time.</li> <li>• <b>Negotiated options</b>: <ul style="list-style-type: none"> <li>• <b>local interface identifier</b>—Desired local address of the sender of a Configure-Request. If all four octets are set to zero, the peer provides the IP address.</li> <li>• <b>remote interface identifier</b>—IP address of the remote end of the link in dotted quad notation.</li> </ul> </li> </ul>	extensive
OSINLCP State	<p>OSI Network Layer Control Protocol (OSINLCP) protocol state information (all platforms except M120 and M320 routers):</p> <ul style="list-style-type: none"> <li>• <b>State</b>: <ul style="list-style-type: none"> <li>• <b>Ack-rcvd</b>—Configure-Request has been sent and Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—Configure-Request and Configure-Ack have both been sent, but Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is not available for traffic.</li> <li>• <b>Opened</b>—Link is administratively available for traffic.</li> <li>• <b>Req-sent</b>—Attempt has been made to configure the connection.</li> </ul> </li> <li>• <b>Last started</b>—OSINLCP state start time.</li> <li>• <b>Last completed</b>—OSINLCP state completion time.</li> </ul>	extensive

Table 12: show ppp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>TAGCP</b>	<p>TAGCP information.</p> <ul style="list-style-type: none"> <li>• <b>State</b>—(All platforms except M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvcd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is not available for traffic.</li> <li>• <b>Opened</b>—Link is administratively available for traffic.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection.</li> </ul> </li> <li>• <b>State</b>—(M120 and M320 routers) One of the following values: <ul style="list-style-type: none"> <li>• <b>Ack-rcvcd</b>—A Configure-Request has been sent and a Configure-Ack has been received.</li> <li>• <b>Ack-sent</b>—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.</li> <li>• <b>Closed</b>—Link is available (up), but no Open has occurred.</li> <li>• <b>Closing</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> <li>• <b>Opened</b>—Link is administratively available for traffic. A Configure-Ack has been both sent and received.</li> <li>• <b>Req-sent</b>—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.</li> <li>• <b>Starting</b>—An administrative Open has been initiated, but the lower layer is still unavailable (Down).</li> <li>• <b>Stopped</b>—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.</li> <li>• <b>Stopping</b>—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.</li> </ul> </li> <li>• <b>Last started</b>—TAGCP state start time.</li> <li>• <b>Last completed</b>—TAGCP state authentication completion time.</li> </ul>	<b>extensive</b> <b>none</b>

## Sample Output

### show ppp interface

```

user@host> show ppp interface si-1/3/0.0
Session si-1/3/0.0, Type: PPP, Phase: Authenticate
Session flags: Monitored
LCP State: Opened
AUTHENTICATION: CHAP State: Chap-resp-sent, Chap-ans-sent
IPCP State: Closed, OSINLCP State: Closed

```

### show ppp interface extensive

```

user@host> show ppp interface si-0/0/3.0 extensive
Session si-0/0/3.0, Type: PPP, Phase: Network
Keepalive settings: Interval 30 seconds, Up-count 1, Down-count 3
RE Keepalive statistics:
LCP echo req Tx      : 657 (last sent 00:50:10 ago)
LCP echo req Rx      : 0 (last seen: never)
LCP echo rep Tx      : 0

```

```
LCP echo rep Rx      : 657
LCP echo req timeout : 0
LCP Rx echo req Magic Num Failures : 0
LCP Rx echo rep Magic Num Failures : 0
LCP
  State: Opened
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  Negotiated options:
    Authentication protocol: PAP, Magic number: 2341124815, MRU: 4470
  Authentication: PAP
  State: Success
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  IPCP
  State: Opened
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  Negotiated options:
    Local address: 10.10.10.1, Remote address: 10.10.10.2
```

#### show ppp interface terse

```
user@host> show ppp interface si-1/3/0 terse
Session name  Session type  Session phase  Session flags
si-1/3/0.0    PPP           Authenticate   Monitored
```

## CHAPTER 10

# Subscriber Management Subscriber CLI Commands

## show subscribers

---

**Syntax**    show subscribers  
              <detail | extensive | terse>  
              <aci-interface-set-name *aci-interface-set-name*>  
              <address *address*>  
              <agent-circuit-identifier *agent-circuit-identifier-substring*>  
              <client-type *client-type*>  
              <count>  
              <interface *interface*>  
              <logical-system *logical-system*>  
              <mac-address *mac-address*>  
              <physical-interface *physical-interface-name*>  
              <profile-name *profile-name*>  
              <routing-instance *routing-instance*>  
              <stacked-vlan-id *stacked-vlan-id*>  
              <subscriber-state *subscriber-state*>  
              <user-name *user-name*>  
              <vci *vci-identifier*>  
              <vpi *vpi-identifier*>  
              <vlan-id *vlan-id*>

**Release Information**    Command introduced in Junos OS Release 9.3.  
                              Command introduced in Junos OS Release 9.3 for EX Series switches.  
                              **client-type**, **mac-address**, **subscriber-state**, and **extensive** options introduced in Junos OS Release 10.2.  
                              **count** option usage with other options introduced in Junos OS Release 10.2.  
                              Command introduced in Junos OS Release 11.1 for the QFX Series.  
                              Options **aci-interface-set-name** and **agent-circuit-identifier** introduced in Junos OS Release 12.2.  
                              The **physical-interface** and **user-name** options introduced in Junos OS Release 12.3.  
                              Options **vci** and **vpi** introduced in Junos OS Release 12.3R3 and supported in later 12.3Rx releases.  
                              Options **vci** and **vpi** supported in Junos OS Release 13.2 and later releases. (Not supported in Junos OS Release 13.1.)

**Description**    Display information for active subscribers.

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

**aci-interface-set-name**—(Optional) Display all dynamic subscriber sessions that use the specified agent circuit identifier (ACI) interface set. Use the ACI interface set name generated by the router, such as aci-1003-ge-1/0/0.4001, and not the actual ACI value found in the DHCP or PPPoE control packets.

**address**—(Optional) Display subscribers whose IP address matches the specified address. You must specify the IPv4 or IPv6 address prefix without a netmask (for example, 192.168.17.1). If you specify the IP address as a prefix with a netmask (for example, 192.168.17.1/32), the router displays a message that the IP address is invalid, and rejects the command.

***agent-circuit-identifier-substring***—(Optional) Display all dynamic subscriber sessions whose ACI value matches the specified substring.

***client-type***—(Optional) Display subscribers whose client type matches the specified client type (DHCP, L2TP, PPP, PPPOE, VLAN, or static).

***count***—(Optional) Display the count of total subscribers and active subscribers for any specified option. You can use the ***count*** option alone or with the ***address***, ***client-type***, ***interface***, ***logical-system***, ***mac-address***, ***profile-name***, ***routing-instance***, ***stacked-vlan-id***, ***subscriber-state***, or ***vlan-id*** options.

***id***—(Optional) Display a specific subscriber session whose session id matches the specified subscriber ID. You can display subscriber IDs by using the ***show subscribers extensive*** or the ***show subscribers interface extensive*** commands.

***interface***—(Optional) Display subscribers whose interface matches the specified interface.

***logical-system***—(Optional) Display subscribers whose logical system matches the specified logical system.

***mac-address***—(Optional) Display subscribers whose MAC address matches the specified MAC address.

***physical-interface-name***—(M120, M320, and MX Series routers only) (Optional) Display subscribers whose physical interface matches the specified physical interface.

***profile-name***—(Optional) Display subscribers whose dynamic profile matches the specified profile name.

***routing-instance***—(Optional) Display subscribers whose routing instance matches the specified routing instance.

***subscriber-state***—(Optional) Display subscribers whose subscriber state matches the specified subscriber state (ACTIVE, CONFIGURED, INIT, TERMINATED, or TERMINATING).

***user-name***—(M120, M320, and MX Series routers only) (Optional) Display subscribers whose username matches the specified subscriber name.

***vci-identifier***—(MX Series routers with MPCs and ATM MICs with SFP only) (Optional) Display active ATM subscribers whose ATM virtual circuit identifier (VCI) matches the specified VCI identifier. The range of values is 0 through 255.

***vpi-identifier***—(MX Series routers with MPCs and ATM MICs with SFP only) (Optional) Display active ATM subscribers whose ATM virtual path identifier (VPI) matches the specified VPI identifier. The range of values is 0 through 65535.

***vlan-id***—(Optional) Display subscribers whose VLAN ID matches the specified VLAN ID.

***stacked-vlan-id***—(Optional) Display subscribers whose stacked VLAN ID matches the specified stacked VLAN ID.



NOTE: Due to display limitations, logical system and routing instance output values are truncated when necessary.

Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"><li>• <a href="#">show subscribers summary on page 168</a></li><li>• <i>Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration</i></li></ul>
List of Sample Output	<a href="#">show subscribers (IPv4) on page 156</a> <a href="#">show subscribers (IPv6) on page 156</a> <a href="#">show subscribers (IPv4 and IPv6 Dual Stack) on page 156</a> <a href="#">show subscribers (LNS on MX Series Routers) on page 157</a> <a href="#">show subscribers (L2TP Switched Tunnels) on page 157</a> <a href="#">show subscribers client-type dhcp detail on page 157</a> <a href="#">show subscribers count on page 157</a> <a href="#">show subscribers address detail (IPv6) on page 157</a> <a href="#">show subscribers detail (IPv4) on page 158</a> <a href="#">show subscribers detail (IPv6) on page 158</a> <a href="#">show subscribers detail (IPv6 Static Demux Interface) on page 159</a> <a href="#">show subscribers detail (L2TP LNS Subscribers on MX Series Routers) on page 159</a> <a href="#">show subscribers detail (L2TP Switched Tunnels) on page 159</a> <a href="#">show subscribers detail (Tunneled Subscriber) on page 160</a> <a href="#">show subscribers detail (IPv4 and IPv6 Dual Stack) on page 160</a> <a href="#">show subscribers detail (ACI Interface Set Session) on page 161</a> <a href="#">show subscribers detail (PPPoE Subscriber Session with ACI Interface Set) on page 161</a> <a href="#">show subscribers extensive on page 161</a> <a href="#">show subscribers extensive (RPF Check Fail Filter) on page 162</a> <a href="#">show subscribers extensive (L2TP LNS Subscribers on MX Series Routers) on page 162</a> <a href="#">show subscribers extensive (IPv4 and IPv6 Dual Stack) on page 162</a> <a href="#">show subscribers extensive (Effective Shaping-Rate) on page 163</a> <a href="#">show subscribers aci-interface-set-name detail (Subscriber Sessions Using Specified ACI Interface Set) on page 164</a> <a href="#">show subscribers agent-circuit-identifier detail (Subscriber Sessions Using Specified ACI Substring) on page 164</a> <a href="#">show subscribers interface extensive on page 165</a> <a href="#">show subscribers logical-system terse on page 165</a> <a href="#">show subscribers physical-interface count on page 166</a> <a href="#">show subscribers routing-instance inst1 count on page 166</a> <a href="#">show subscribers stacked-vlan-id detail on page 166</a> <a href="#">show subscribers stacked-vlan-id vlan-id detail (Combined Output) on page 166</a> <a href="#">show subscribers stacked-vlan-id vlan-id interface detail (Combined Output for a Specific Interface) on page 166</a> <a href="#">show subscribers user-name detail on page 166</a> <a href="#">show subscribers vlan-id on page 167</a>



[show subscribers vlan-id detail on page 167](#)

[show subscribers vpi vci extensive \(PPPoE-over-ATM Subscriber Session\) on page 167](#)

**Output Fields** Table 13 on page 153 lists the output fields for the **show subscribers** command. Output fields are listed in the approximate order in which they appear.

**Table 13: show subscribers Output Fields**

Field Name	Field Description
<b>Interface</b>	Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface.  The * character indicates a continuation of addresses for the same session.
<b>IP Address/VLAN ID</b>	Subscriber IP address or VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i>  No IP address or VLAN ID is assigned to an L2TP tunnel-switched session. For these subscriber sessions the value is <b>Tunnel-switched</b> .
<b>User Name</b>	Name of subscriber.
<b>LS:RI</b>	Logical system and routing instance associated with the subscriber.
<b>Type</b>	Subscriber client type (DHCP, L2TP, PPP, PPPoE, STATIC-INTERFACE, VLAN).
<b>IP Address</b>	Subscriber IPv4 address.
<b>IP Netmask</b>	Subscriber IP netmask.
<b>Primary DNS Address</b>	IP address of primary DNS server.
<b>Secondary DNS Address</b>	IP address of secondary DNS server.
<b>Primary WINS Address</b>	IP address of primary WINS server.
<b>Secondary WINS Address</b>	IP address of secondary WINS server.
<b>IPv6 Address</b>	Subscriber IPv6 address, or multiple addresses.
<b>IPv6 Prefix</b>	Subscriber IPv6 prefix. If you are using DHCPv6 prefix delegation, this is the delegated prefix.
<b>IPv6 User Prefix</b>	IPv6 prefix obtained through ND/RA.
<b>IPv6 Address Pool</b>	Subscriber IPv6 address pool. The IPv6 address pool is used to allocate IPv6 prefixes to the DHCPv6 clients.
<b>IPv6 Network Prefix Length</b>	Length of the network portion of the IPv6 address.
<b>IPv6 Prefix Length</b>	Length of the subscriber IPv6 prefix.

Table 13: show subscribers Output Fields (*continued*)

Field Name	Field Description
<b>Logical System</b>	Logical system associated with the subscriber.
<b>Routing Instance</b>	Routing instance associated with the subscriber.
<b>Interface Type</b>	Whether the subscriber interface is <b>Static</b> or <b>Dynamic</b> .
<b>Interface Set</b>	Internally generated name of the dynamic ACI interface set used by the subscriber session.
<b>Interface Set Type</b>	Interface type of the ACI interface set: <b>Dynamic</b> . This is the only ACI interface set type currently supported.
<b>Interface Set Session ID</b>	Identifier of the dynamic ACI interface set entry in the session database.
<b>Underlying Interface</b>	Name of the underlying interface for the subscriber session.
<b>Dynamic Profile Name</b>	Dynamic profile used for the subscriber.
<b>Dynamic Profile Version</b>	Version number of the dynamic profile used for the subscriber.
<b>MAC Address</b>	MAC address associated with the subscriber.
<b>State</b>	Current state of the subscriber session ( <b>Init</b> , <b>Configured</b> , <b>Active</b> , <b>Terminating</b> , <b>Tunneled</b> ).
<b>L2TP State</b>	Current state of the L2TP session, <b>Tunneled</b> or <b>Tunnel-switched</b> . When the value is <b>Tunnel-switched</b> , two entries are displayed for the subscriber; the first entry is at the LNS interface on the LTS and the second entry is at the LAC interface on the LTS.
<b>Tunnel switch Profile Name</b>	Name of the L2TP tunnel switch profile that initiates tunnel switching.
<b>Local IP Address</b>	IP address of the local gateway (LAC).
<b>Remote IP Address</b>	IP address of the remote peer (LNS).
<b>VLAN Id</b>	VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i> .
<b>Stacked VLAN Id</b>	Stacked VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i> .
<b>RADIUS Accounting ID</b>	RADIUS accounting ID associated with the subscriber.
<b>Agent Circuit ID</b>	Option 82 agent circuit ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format.
<b>Agent Remote ID</b>	Option 82 agent remote ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format.
<b>DHCP Relay IP Address</b>	IP address used by the DHCP relay agent.

Table 13: show subscribers Output Fields (*continued*)

Field Name	Field Description
<b>ATM VPI</b>	(MX Series routers with MPCs and ATM MICs with SFP only) ATM virtual path identifier (VPI) on the subscriber's physical interface.
<b>ATM VCI</b>	(MX Series routers with MPCs and ATM MICs with SFP only) ATM virtual circuit identifier (VCI) for each VPI configured on the subscriber interface.
<b>Login Time</b>	Date and time at which the subscriber logged in.
<b>Effective shaping-rate</b>	Actual downstream traffic shaping rate for the subscriber, in kilobits per second.
<b>IPv4 rpf-check Fail Filter Name</b>	Name of the filter applied by the dynamic profile to IPv4 packets that fail the RPF check.
<b>IPv6 rpf-check Fail Filter Name</b>	Name of the filter applied by the dynamic profile to IPv6 packets that fail the RPF check.
<b>DHCP Options</b>	len = number of hex values in the message. The hex values specify the type, length, value (TLV) for DHCP options, as defined in RFC 2132.
<b>Session ID</b>	ID number for a subscriber service session.
<b>Underlying Session ID</b>	For DHCPv6 subscribers on a PPPoE network, displays the session ID of the underlying PPPoE interface.
<b>Service Sessions</b>	Number of service sessions (that is, a service activated using RADIUS CoA) associated with the subscribers.
<b>Service Session Name</b>	Service session profile name.
<b>Session Timeout (seconds)</b>	Number of seconds of access provided to the subscriber before the session is automatically terminated.
<b>Idle Timeout (seconds)</b>	Number of seconds subscriber can be idle before the session is automatically terminated.
<b>IPv6 Delegated Address Pool</b>	Name of the pool used for DHCPv6 prefix delegation.
<b>IPv6 Delegated Network Prefix Length</b>	Length of the prefix configured for the IPv6 delegated address pool.
<b>IPv6 Interface Address</b>	Address assigned by the Framed-Ipv6-Prefix AAA attribute.
<b>IPv6 Framed Interface Id</b>	Interface ID assigned by the Framed-Interface-Id AAA attribute.
<b>ADF IPv4 Input Filter Name</b>	Name assigned to the Ascend-Data-Filter (ADF) interface IPv4 input filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.

Table 13: show subscribers Output Fields (*continued*)

Field Name	Field Description
<b>ADF IPv4 Output Filter Name</b>	Name assigned to the Ascend-Data-Filter (ADF) interface IPv4 output filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.
<b>ADF IPv6 Input Filter Name</b>	Name assigned to the Ascend-Data-Filter (ADF) interface IPv6 input filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.
<b>ADF IPv6 Output Filter Name</b>	Name assigned to the Ascend-Data-Filter (ADF) interface IPv6 output filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.
<b>IPv4 Input Filter Name</b>	Name assigned to the IPv4 input filter (client or service session).
<b>IPv4 Output Filter Name</b>	Name assigned to the IPv4 output filter (client or service session).
<b>IPv6 Input Filter Name</b>	Name assigned to the IPv6 input filter (client or service session).
<b>IPv6 Output Filter Name</b>	Name assigned to the IPv6 output filter (client or service session).
<b>IFL Input Filter Name</b>	Name assigned to the logical interface input filter (client or service session).
<b>IFL Output Filter Name</b>	Name assigned to the logical interface output filter (client or service session).

## Sample Output

### show subscribers (IPv4)

```

user@host> show subscribers
Interface          IP Address/VLAN ID  User Name          LS:RI
ge-1/3/0.1073741824 100                 WHOLESALE-CLIENT default:default
demux0.1073741824   100.0.0.10         RETAILER1-CLIENT test1:retailer1
demux0.1073741825   101.0.0.3          RETAILER2-CLIENT test1:retailer2
demux0.1073741826   102.0.0.3

```

### show subscribers (IPv6)

```

user@host> show subscribers
Interface          IP Address/VLAN ID  User Name          LS:RI
ge-1/0/0.0         2001::c0:0:0:0/74  WHOLESALE-CLIENT default:default
*                  2002::1/128        subscriber-25      default:default

```

### show subscribers (IPv4 and IPv6 Dual Stack)

```

user@host> show subscribers
Interface          IP Address/VLAN ID  User Name
LS:RI
demux0.1073741834  0x8100.1002 0x8100.1
default:default
demux0.1073741835  0x8100.1001 0x8100.1
default:default
pp0.1073741836     61.1.1.1      dualstackuser1@ISP1.com

```

```

default:ASP-1
*                2041:1:1::/48
*                2061:1:1:1::/64
pp0.1073741837   23.1.1.3                dualstackuser2@ISP1.com
default:ASP-1
*                2001:1:2:5::/64

```

### show subscribers (LNS on MX Series Routers)

```

user@host> show subscribers
Interface      IP Address/VLAN ID  User Name      LS:RI
si-4/0/0.1     192.168.4.1        xyz@example.com default:default

```

### show subscribers (L2TP Switched Tunnels)

```

user@host> show subscribers
Interface      IP Address/VLAN ID  User Name      LS:RI
si-2/1/0.1073741842 Tunnel-switched    ap@lts.com     default:default

si-2/1/0.1073741843 Tunnel-switched    ap@lts.com     default:default

```

### show subscribers client-type dhcp detail

```

user@host> show subscribers client-type dhcp detail
Type: DHCP
IP Address: 100.20.9.7
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:95:00:00:98
State: Active
Radius Accounting ID: jnpr :2304
Login Time: 2009-08-25 14:43:52 PDT

Type: DHCP
IP Address: 100.20.10.7
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744383
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:94:00:01:f3
State: Active
Radius Accounting ID: jnpr :2560
Login Time: 2009-08-25 14:43:56 PDT

```

### show subscribers count

```

user@host> show subscribers count
Total Subscribers: 188, Active Subscribers: 188

```

### show subscribers address detail (IPv6)

```

user@host> show subscribers address 100.16.12.137 detail

```

```
Type: PPPoE
User Name: pppoeTerV6User1Svc
IP Address: 100.16.12.137
IP Netmask: 255.0.0.0
IPv6 User Prefix: 1016:0:0:c88::/64
Logical System: default
Routing Instance: default
Interface: pp0.1073745151
Interface type: Dynamic
Underlying Interface: demux0.8201
Dynamic Profile Name: pppoe-client-profile
MAC Address: 00:0d:02:01:00:01
Session Timeout (seconds): 31622400
Idle Timeout (seconds): 86400
State: Active
Radius Accounting ID: jnpr demux0.8201:6544
Session ID: 6544
Agent Circuit ID: if13720
Agent Remote ID: if13720
Login Time: 2012-05-21 13:37:27 PDT
Service Sessions: 1
```

#### show subscribers detail (IPv4)

```
user@host> show subscribers detail
Type: DHCP
IP Address: 100.20.9.7
IP Netmask: 255.255.0.0
Primary DNS Address: 192.168.17.1
Secondary DNS Address: 192.168.17.2
Primary WINS Address: 192.168.22.1
Secondary WINS Address: 192.168.22.2
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:95:00:00:98
State: Active
Radius Accounting ID: jnpr :2304
Session Timeout (seconds): 3600
Idle Timeout (seconds): 600
Login Time: 2009-08-25 14:43:52 PDT
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 08 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 36 2f
33 2d 37 2d 30 37 05 01 06 0f 21 2c
Service Sessions: 2
```

#### show subscribers detail (IPv6)

```
user@host> show subscribers detail
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2002:db2:ffff:1::/64
Logical System: default
Routing Instance: default
Interface: ge-3/1/3.2
Interface type: Static
MAC Address: 00:51:ff:ff:00:03
State: Active
```

```

Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00
00 00

```

#### show subscribers detail (IPv6 Static Demux Interface)

```

user@host> show subscribers detail
Type: STATIC-INTERFACE
User Name: demux0.1@jnpr.net
IPv6 Prefix: 1:2:3:4:5:6:7:aa/128
Logical System: default
Routing Instance: default
Interface: demux0.1
Interface type: Static
Dynamic Profile Name: junos-default-profile
State: Active
Radius Accounting ID: 185
Login Time: 2010-05-18 14:33:56 EDT

```

#### show subscribers detail (L2TP LNS Subscribers on MX Series Routers)

```

user@host> show subscribers detail
Type: L2TP
User Name: user1@jnpr.net
IP Address: 10.1.32.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST

```

#### show subscribers detail (L2TP Switched Tunnels)

```

user@host> show subscribers detail
Type: L2TP
User Name: ap@example.com
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741842
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 10.50.1.1
Remote IP Address: 192.168.20.3
Radius Accounting ID: 21
Session ID: 21
Login Time: 2013-01-18 03:01:11 PST

Type: L2TP
User Name: ap@example.com

```

```
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741843
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 10.30.1.1
Remote IP Address: 172.20.1.10
Session ID: 22
Login Time: 2013-01-18 03:01:14 PST
```

#### show subscribers detail (Tunneled Subscriber)

```
user@host> show subscribers detail
Type: PPPoE
User Name: user1@example.com
Logical System: default
Routing Instance: default
Interface: pp0.1
State: Active, Tunneled
Radius Accounting ID: 512
```

#### show subscribers detail (IPv4 and IPv6 Dual Stack)

```
user@host> show subscribers detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlanProfile
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.1001
VLAN Id: 0x8100.1
Login Time: 2011-11-30 00:18:04 PST
```

```
Type: PPPoE
User Name: dualstackuser1@ISP1.com
IP Address: 61.1.1.1
IPv6 Prefix: 2041:1:1::/48
IPv6 User Prefix: 2061:1:1:1::/64
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST
```

```
Type: DHCP
IPv6 Prefix: 2041:1:1::/48
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Static
```



```

MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: jnpr :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00

```

#### show subscribers detail (ACI Interface Set Session)

```

user@host> show subscribers detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0
Interface Set: aci-1001-ge-1/0/0.2800
Interface Set Session ID: 0
Underlying Interface: ge-1/0/0.2800
Dynamic Profile Name: aci-vlan-set-profile-2
Dynamic Profile Version: 1
State: Active
Session ID: 1
Agent Circuit ID: aci-ppp-dhcp-20
Login Time: 2012-05-26 01:54:08 PDT

```

#### show subscribers detail (PPPoE Subscriber Session with ACI Interface Set)

```

user@host> show subscribers detail
Type: PPPoE
User Name: ppphint2
IP Address: 10.10.1.5
Logical System: default
Routing Instance: default
Interface: pp0.1073741825
Interface type: Dynamic
Interface Set: aci-1001-demux0.1073741824
Interface Set Type: Dynamic
Interface Set Session ID: 2
Underlying Interface: demux0.1073741824
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:64:39:01:02
State: Active
Radius Accounting ID: 3
Session ID: 3
Agent Circuit ID: aci-ppp-dhcp-dvlan-50
Login Time: 2012-03-07 13:46:53 PST

```

#### show subscribers extensive

```

user@host> show subscribers extensive
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2002:db2:ffff:1::/64
Logical System: default
Routing Instance: default
Interface: ge-3/1/3.2
Interface type: Static

```

```
MAC Address: 00:51:ff:ff:00:03
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00
00 00
IPv6 Address Pool: pd_pool
IPv6 Network Prefix Length: 48
```

#### show subscribers extensive (RPF Check Fail Filter)

```
user@host> show subscribers extensive
...
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ae0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-prof
State: Active
Session ID: 9
VLAN Id: 100
Login Time: 2011-08-26 08:17:00 PDT
IPv4 rpf-check Fail Filter Name: rpf-allow-dhcp
IPv6 rpf-check Fail Filter Name: rpf-allow-dhcpv6
...
```

#### show subscribers extensive (L2TP LNS Subscribers on MX Series Routers)

```
user@host> show subscribers extensive
Type: L2TP
User Name: user1@jnpr.net
IP Address: 10.1.32.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST
IPv4 Input Filter Name: classify-si-5/2/0.1073749824-in
IPv4 Output Filter Name: classify-si-5/2/0.1073749824-out
```

#### show subscribers extensive (IPv4 and IPv6 Dual Stack)

```
user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlanProfile
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.1001
```

```

VLAN Id: 0x8100.1
Login Time: 2011-11-30 00:18:04 PST

Type: PPPoE
User Name: dualstackuser1@ISP1.com
IP Address: 61.1.1.1
IPv6 Prefix: 2041:1:1::/48
IPv6 User Prefix: 2061:1:1:1::/64
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST
IPv6 Delegated Network Prefix Length: 48
IPv6 Interface Address: 2061:1:1:1::1/64
IPv6 Framed Interface Id: 1:1:2:2
IPv4 Input Filter Name: FILTER-IN-pp0.1073741825-in
IPv4 Output Filter Name: FILTER-OUT-pp0.1073741825-out
IPv6 Input Filter Name: FILTER-IN6-pp0.1073741825-in
IPv6 Output Filter Name: FILTER-OUT6-pp0.1073741825-out

Type: DHCP
IPv6 Prefix: 2041:1:1::/48
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Static
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: jnpr :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
IPv6 Delegated Network Prefix Length: 48

```

### show subscribers extensive (Effective Shaping-Rate)

```

user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741837
Interface type: Dynamic
Interface Set: ifset-1
Underlying Interface: ae1
Dynamic Profile Name: svlan-dhcp-test
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.201
VLAN Id: 0x8100.201
Login Time: 2011-11-30 00:18:04 PST

```

Effective shaping-rate: 31000000k

...

#### show subscribers aci-interface-set-name detail (Subscriber Sessions Using Specified ACI Interface Set)

```
user@host> show subscribers aci-interface-set-name aci-1003-ge-1/0/0.4001 detail
```

Type: VLAN  
Logical System: default  
Routing Instance: default  
Interface: ge-1/0/0.  
Underlying Interface: ge-1/0/0.4001  
Dynamic Profile Name: aci-vlan-set-profile  
Dynamic Profile Version: 1  
State: Active  
Session ID: 13  
Agent Circuit ID: aci-ppp-vlan-10  
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE  
User Name: ppphint2  
IP Address: 10.10.1.7  
Logical System: default  
Routing Instance: default  
Interface: pp0.1073741834  
Interface type: Dynamic  
**Interface Set: aci-1003-ge-1/0/0.4001**  
**Interface Set Type: Dynamic**  
**Interface Set Session ID: 13**  
Underlying Interface: ge-1/0/0.4001  
Dynamic Profile Name: aci-vlan-pppoe-profile  
Dynamic Profile Version: 1  
MAC Address: 00:00:65:26:01:02  
State: Active  
Radius Accounting ID: 14  
Session ID: 14  
Agent Circuit ID: aci-ppp-vlan-10  
Login Time: 2012-03-12 10:41:57 PDT

#### show subscribers agent-circuit-identifier detail (Subscriber Sessions Using Specified ACI Substring)

```
user@host> show subscribers agent-circuit-identifier aci-ppp-vlan detail
```

Type: VLAN  
Logical System: default  
Routing Instance: default  
Interface: ge-1/0/0.  
Underlying Interface: ge-1/0/0.4001  
Dynamic Profile Name: aci-vlan-set-profile  
Dynamic Profile Version: 1  
State: Active  
Session ID: 13  
**Agent Circuit ID: aci-ppp-vlan-10**  
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE  
User Name: ppphint2  
IP Address: 10.10.1.7  
Logical System: default  
Routing Instance: default  
Interface: pp0.1073741834  
Interface type: Dynamic  
**Interface Set: aci-1003-ge-1/0/0.4001**

```

Interface Set Type: Dynamic
Interface Set Session ID: 13
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:65:26:01:02
State: Active
Radius Accounting ID: 14
Session ID: 14
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:57 PDT

```

### show subscribers interface extensive

```

user@host> show subscribers interface demux0.1073741826 extensive
Type: VLAN
User Name: test1@test.com
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Dynamic
Dynamic Profile Name: profile-vdemux-relay-23qos
MAC Address: 00:00:6e:56:01:04
State: Active
Radius Accounting ID: 12
Session ID: 12
Stacked VLAN Id: 0x8100.1500
VLAN Id: 0x8100.2902
Login Time: 2011-10-20 16:21:59 EST

Type: DHCP
User Name: test1@test.com
IP Address: 172.16.200.6
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Static
MAC Address: 00:00:6e:56:01:04
State: Active
Radius Accounting ID: 21
Session ID: 21
Login Time: 2011-10-20 16:24:33 EST
Service Sessions: 2

Service Session ID: 25
Service Session Name: SUB-QOS
State: Active

Service Session ID: 26
Service Session Name: service-cb-content
State: Active
IPv4 Input Filter Name: content-cb-in-demux0.1073741826-in
IPv4 Output Filter Name: content-cb-out-demux0.1073741826-out

```

### show subscribers logical-system terse

```

user@host> show subscribers logical-system test1 terse

```

Interface	IP Address/VLAN ID	User Name	LS:RI
demux0.1073741825	101.0.0.3	RETAILER1-CLIENT	test1:retailer1
demux0.1073741826	102.0.0.3	RETAILER2-CLIENT	test1:retailer2

#### show subscribers physical-interface count

```
user@host> show subscribers physical-interface ge-1/0/0 count
Total subscribers: 3998, Active Subscribers: 3998
```

#### show subscribers routing-instance inst1 count

```
user@host> show subscribers routing-instance inst1 count
Total Subscribers: 188, Active Subscribers: 183
```

#### show subscribers stacked-vlan-id detail

```
user@host> show subscribers stacked-vlan-id 101 detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers stacked-vlan-id vlan-id detail (Combined Output)

```
user@host> show subscribers stacked-vlan-id 101 vlan-id 100 detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers stacked-vlan-id vlan-id interface detail (Combined Output for a Specific Interface)

```
user@host> show subscribers stacked-vlan-id 101 vlan-id 100 interface ge-1/2/0.* detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers user-name detail

```
user@host> show subscribers user-name larry1 detail
Type: DHCP
User Name: larry1
IP Address: 100.0.0.37
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.1
Interface type: Static
Dynamic Profile Name: foo
```

```

MAC Address: 00:10:94:00:00:01
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-11-07 08:25:59 PST
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 01 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 32 2f
37 2d 30 2d 30 37 05 01 06 0f 21 2c

```

#### show subscribers vlan-id

```

user@host> show subscribers vlan-id 100
Interface          IP Address          User Name
ge-1/0/0.1073741824
ge-1/2/0.1073741825

```

#### show subscribers vlan-id detail

```

user@host> show subscribers vlan-id 100 detail
Type: VLAN
Interface: ge-1/0/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-prof-tpid
State: Active
VLAN Id: 100
Login Time: 2009-03-11 06:48:54 PDT

Type: VLAN
Interface: ge-1/2/0.1073741825
Interface type: Dynamic
Dynamic Profile Name: vlan-prof-tpid
State: Active
VLAN Id: 100
Login Time: 2009-03-11 06:48:54 PDT

```


#### show subscribers vpi vci extensive (PPPoE-over-ATM Subscriber Session)

```

user@host> show subscribers vpi 40 vci 50 extensive
Type: PPPoE
User Name: testuser
IP Address: 100.0.0.2
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: pp0.0
Interface type: Static
MAC Address: 00:00:65:23:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
ATM VPI: 40
ATM VCI: 50
Login Time: 2012-12-03 07:49:26 PST
IP Address Pool: pool_1
IPv6 Framed Interface Id: 200:65ff:fe23:102

```

## show subscribers summary

<b>Syntax</b>	<pre>show subscribers summary &lt; detail   extensive   terse&gt; &lt;count&gt; physical-interface <i>physical-interface-name</i> &lt;all   logical-system <i>logical-system</i> pic   port   routing-instance <i>routing-instance</i>  slot&gt;</pre>
<b>Release Information</b>	Command introduced in Junos OS Release 10.2.
<b>Description</b>	Display summary information for subscribers.
<b>Options</b>	<p><b>detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>count</b>—(Optional) Display the count of total subscribers and active subscribers for any specified option.</p> <p><b>logical-system</b>—(Optional) Display subscribers whose logical system matches the specified logical system.</p> <p><b>physical-interface-name</b>—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers whose physical interface matches the specified physical interface, by subscriber state, client type and LS:RI.</p> <p><b>pic</b>—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by PIC number and the total number of subscribers.</p> <p><b>port</b>—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by port number and the total number of subscribers.</p> <p><b>routing-instance</b>—(Optional) Display subscribers whose routing instance matches the specified routing instance.</p> <p><b>slot</b>—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by FPC slot number and the total number of subscribers.</p>
	<div>  <p><b>NOTE:</b> Due to display limitations, logical system and routing instance output values are truncated when necessary.</p> </div>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><a href="#">show subscribers on page 150</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show subscribers summary on page 170</a> <a href="#">show subscribers summary all on page 170</a> <a href="#">show subscribers summary physical-interface on page 170</a> <a href="#">show subscribers summary physical-interface pic on page 171</a>



[show subscribers summary physical-interface port on page 171](#)  
[show subscribers summary physical-interface slot on page 171](#)  
[show subscribers summary pic on page 171](#)  
[show subscribers summary pic \(Aggregated Ethernet Interfaces\) on page 172](#)  
[show subscribers summary port on page 172](#)  
[show subscribers summary slot on page 172](#)  
[show subscribers summary terse on page 172](#)

**Output Fields** Table 14 on page 169 lists the output fields for the **show subscribers** command. Output fields are listed in the approximate order in which they appear.

**Table 14: show subscribers Output Fields**

Field Name	Field Description
<b>Subscribers by State</b>	<p>Number of subscribers summarized by state. The summary information includes the following:</p> <ul style="list-style-type: none"> <li>• Init—Number of subscriber currently in the initialization state.</li> <li>• Configured—Number of configured subscribers.</li> <li>• Active—Number of active subscribers.</li> <li>• Terminating—Number of subscribers currently terminating.</li> <li>• Terminated—Number of terminated subscribers.</li> <li>• Total—Total number of subscribers for all states.</li> </ul>
<b>Subscribers by Client Type</b>	<p>Number of subscribers summarized by client type. Client types can include DHCP, L2TP, PPP, PPPOE, STATIC-INTERFACE, and VLAN. Also displays the total number of subscribers for all client types (Total).</p>
<b>Subscribers by LS:RI</b>	<p>Number of subscribers summarized by logical system:routing instance (LS:RI) combination. Also displays the total number of subscribers for all LS:RI combinations (Total).</p>
<b>Interface</b>	<p>Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface.</p> <p>The * character indicates a continuation of addresses for the same session.</p> <p>For aggregated Ethernet interfaces, the output of the <b>summary (pic   port   slot)</b> options prefixes the interface name with <b>ae0:</b>.</p>
<b>Count</b>	<p>Count of subscribers displayed for each PIC, port, or slot when those options are specified with the <b>summary</b> option. For an aggregated Ethernet configuration, the total subscriber count does not equal the sum of the individual PIC, port, or slot counts, because each subscriber can be in more than one aggregated Ethernet link.</p>
<b>Total Subscribers</b>	<p>Total number of subscribers for all physical interfaces, all PICS, all ports, or all LS:RI slots.</p>
<b>IP Address/VLAN ID</b>	<p>Subscriber IP address or VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i></p>
<b>User Name</b>	<p>Name of subscriber.</p>
<b>LS:RI</b>	<p>Logical system and routing instance associated with the subscriber.</p>

## Sample Output

### show subscribers summary

```
user@host> show subscribers summary
```

#### Subscribers by State

Init	3
Configured	2
Active	183
Terminating	2
Terminated	1

TOTAL	191
-------	-----

#### Subscribers by Client Type

DHCP	107
PPP	76
VLAN	8

TOTAL	191
-------	-----

### show subscribers summary all

```
user@host> show subscribers summary all
```

#### Subscribers by State

Init	3
Configured	2
Active	183
Terminating	2
Terminated	1

TOTAL	191
-------	-----

#### Subscribers by Client Type

DHCP	107
PPP	76
VLAN	8

TOTAL	191
-------	-----

#### Subscribers by LS:RI

default:default	1
default:ri1	28
default:ri2	16
ls1:default	22
ls1:riA	38
ls1:riB	44
logsysX:routinstY	42

TOTAL	191
-------	-----

### show subscribers summary physical-interface

```
user@host> show subscribers summary physical-interface ge-1/0/0
```

#### Subscribers by State

Active:	3998
Total:	3998

#### Subscribers by Client Type

DHCP:	3998
-------	------

Total: 3998

Subscribers by LS:RI  
 default:default: 3998  
 Total: 3998

#### show subscribers summary physical-interface pic

```
user@host> show subscribers summary physical-interface ge-0/2/0 pic
Subscribers by State
Active: 4825
Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary physical-interface port

```
user@host> show subscribers summary physical-interface ge-0/3/0 port
Subscribers by State
Active: 4825
Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary physical-interface slot

```
user@host> show subscribers summary physical-interface ge-2/0/0 slot
Subscribers by State
Active: 4825
Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary pic

```
user@host> show subscribers summary pic
Interface      Count
ge-1/0         1000
ge-1/3         1000

Total Subscribers: 2000
```

**show subscribers summary pic (Aggregated Ethernet Interfaces)**

```
user@host> show subscribers summary pic
Interface          Count
ae0: ge-1/0        801
ae0: ge-1/3        801

Total Subscribers: 801
```

**show subscribers summary port**

```
user@host> show subscribers summary port
Interface          Count
ge-1               2000

Total Subscribers: 2000
```

**show subscribers summary slot**

```
user@host> show subscribers summary slot
Interface          Count
ge-1               2000

Total Subscribers: 2000
```

**show subscribers summary terse**

```
user@host> show subscribers summary terse
Interface          IP Address/VLAN ID  User Name          LS:RI
ge-1/3/0.1073741824  100                WHOLESALE-CLIENT  default:default
demux0.1073741824    100.0.0.10         RETAILER1-CLIENT  test1:retailer1
demux0.1073741825    101.0.0.3          RETAILER2-CLIENT  test1:retailer2
demux0.1073741826    102.0.0.3          RETAILER2-CLIENT  test1:retailer2
```

## PART 4

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