JUNIPER NETWORKS

# Junos® OS

## Interfaces Feature Guide for Subscriber Management

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



*Junos® OS Interfaces Feature Guide for Subscriber Management*
14.1


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# Table of Contents


About the Documentation . . . . . xiii
Documentation and Release Notes . . . . . xiii
Supported Platforms . . . . . xiii
Using the Examples in This Manual . . . . . xiii
Merging a Full Example . . . . . xiv
Merging a Snippet . . . . . xiv
Documentation Conventions . . . . . xv
Documentation Feedback . . . . . xvii
Requesting Technical Support . . . . . xvii
Self-Help Online Tools and Resources . . . . . xvii
Opening a Case with JTAC . . . . . xviii

Part 1 Overview

Chapter 1 **VLAN and Demux Subscriber Interfaces in Subscriber Access Networks . . . . . 3**

Subscriber Interface Overview . . . . . 3
Statically Identifying Subscribers . . . . . 3
Dynamically Identifying Subscribers . . . . . 4
Static Subscriber Interfaces and VLAN Overview . . . . . 4
Subscriber Interfaces and Demultiplexing Overview . . . . . 5
Interface Sets of Static Demux Interfaces . . . . . 5
Dynamic Demultiplexing Interfaces . . . . . 5
Guidelines for Configuring Demux Interfaces for Subscriber Access . . . . . 6
IP Demux Interfaces over Static or Dynamic VLAN Demux Interfaces . . . . . 7
MAC Address Validation for Subscriber Interfaces Overview . . . . . 7
Supported Types of Subscriber Interfaces . . . . . 8
Trusted Addresses . . . . . 8
Types of MAC Address Validation . . . . . 8

Chapter 2 **Subscriber Interfaces over Aggregated Ethernet . . . . . 11**

Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview . . . . . 11
Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static or Dynamic VLAN Subscriber Interface . . . . . 11
Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview . . . . . 12
Options for Aggregated Ethernet Logical Interfaces That Support Demux Subscriber Interfaces . . . . . 12
Hardware Requirements with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet . . . . . 13

Features Supported with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet . . . 13
Distribution of Demux Subscribers in an Aggregated Ethernet Interface . . . 14
Distribution Models . . . 14
Sample Targeted Distribution Topology . . . 15
Redundancy and Redistribution Mechanisms . . . 15
Considerations and Best Practices . . . 16

Part 2 Configuration

Chapter 3 Configuration Tasks for VLAN and Demux Subscriber Interfaces in Dynamic Profiles . . . 21

Configuring Static Subscriber Interfaces in Dynamic Profiles . . . 21
Configuring a Subscriber Interface with a Static VLAN Interface . . . 22
Configuring Static Subscriber Interfaces Using IP Demux Interfaces . . . 22
Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces . . . 23
Associating Dynamic Profiles with Statically Created Interfaces . . . 24
Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces . . . 25
Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces . . . 26
Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles . . . 27
Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles . . . 28
Configuring MAC Address Validation for Subscriber Interfaces . . . 29
Configuring MAC Address Validation for Static Subscriber Interfaces . . . 30
Configuring MAC Address Validation for Dynamic Subscriber Interfaces . . . 31
Verifying Configuration and Status of Dynamic Subscribers and Associated Sessions, Services, and Firewall Filters . . . 32

Chapter 4 VLAN and Demux Subscriber Interfaces in Dynamic Profiles Examples . . 35

Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units) . . . 35
Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface . . . 36
Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation) . . . 36
Example: Configuring a Static Subscriber Interface with a Loopback . . . 36
Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces . . . 37
Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Dynamic VLANs . . . 39
Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Static VLANs . . . 42
Example: Configuring a Dynamic IP Demux Interface with Dual Stacking . . . 43
Example: Configuring IPv4 Static VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server . . . 47

Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server . . . 49
Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces . . . 51
Example: Concurrent Configuration of Dynamic DHCP IP Demux and PPPoE Demux Interfaces over the Same VLAN Demux Interface . . . 57

Chapter 5 Configuration Tasks for Subscriber Interfaces over Aggregated Ethernet . . . 67

Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet . . . 68
Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet . . . 69
Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet . . . 70
Configuring the PPPoE Family for an Underlying Interface . . . 72
Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces . . . 74
Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface . . . 75
Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface . . . 75
Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface . . . 76
Configuring Manual Rebalancing of Subscribers on an Aggregated Ethernet Interface . . . 76
Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces . . . 76
Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface . . . 77

Chapter 6 Subscriber Interfaces over Aggregated Ethernet Examples . . . 79

Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet . . . 79
Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet . . . 82
Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet . . . 84
Example: Configuring IPv4 Static VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server . . . 87
Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server . . . 90
Example: Configuring IPv6 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server . . . 93
Example: Configuring IPv4 Dynamic Stacked VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server . . . 96
Example: Separating Targeted Multicast Traffic for Demux Subscribers on Aggregated Ethernet Interfaces . . . 99
Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet . . . 109

 

Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet . . . . . 114
Example: Configuring a Dynamic PPPoE Subscriber Interface on a Dynamic Underlying VLAN Demux Interface over Aggregated Ethernet . . . . . 120

Chapter 7 Configuration Statements . . . . . 127

[edit dynamic-profiles] Hierarchy Level . . . . . 128
access-concentrator . . . . . 136
address . . . . . 137
demux0 (Dynamic Interface) . . . . . 138
demux-options (Dynamic Interface) . . . . . 139
demux-source (Dynamic IP Demux Interface) . . . . . 140
direct-connect . . . . . 141
duplicate-protection (Dynamic PPPoE) . . . . . 142
dynamic-profile (Dynamic PPPoE) . . . . . 143
encapsulation (Dynamic Interfaces) . . . . . 144
enhanced-mode . . . . . 147
family (Dynamic Standard Interface) . . . . . 149
family (Dynamic Demux Interface) . . . . . 151
filter (Dynamic Firewalls) . . . . . 152
inner-tag-protocol-id (Dynamic VLANs) . . . . . 153
inner-vlan-id (Dynamic VLANs) . . . . . 154
input-vlan-map (Dynamic Interfaces) . . . . . 155
interfaces (Static and Dynamic Subscribers) . . . . . 156
logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces) . . . . . 160
mac-validate . . . . . 161
mac-validate (Dynamic IP Demux Interface) . . . . . 162
max-sessions (Dynamic PPPoE) . . . . . 163
mode (Dynamic Profiles) . . . . . 164
nd-override-preferred-src . . . . . 165
output-vlan-map (Dynamic Interfaces) . . . . . 165
pop (Dynamic VLANs) . . . . . 166
precedence . . . . . 167
proxy-arp . . . . . 168
push (Dynamic VLANs) . . . . . 168
rebalance-periodic (Aggregated Ethernet Subscriber Interfaces) . . . . . 169
rpf-check (Dynamic Profiles) . . . . . 169
service-name-table . . . . . 170
swap (Dynamic VLANs) . . . . . 171
tag-protocol-id (Dynamic VLANs) . . . . . 171
targeted-distribution (Dynamic Demux Interfaces over Aggregated Ethernet) . . . . . 172
targeted-distribution (Static Interfaces over Aggregated Ethernet) . . . . . 172
underlying-interface (demux0) . . . . . 173
unit (Dynamic Profiles Standard Interface) . . . . . 174
unit (Dynamic Demux Interface) . . . . . 177
unnumbered-address (Dynamic Profiles) . . . . . 179
vlan-id (Dynamic Profiles) . . . . . 181

vlan-id (Dynamic VLANs) . . . . . 182
vlan-tagging . . . . . 183
vlan-tags . . . . . 184

Part 3 Administration

Chapter 8 Operational Commands . . . . . 187

request interface rebalance (Aggregated Ethernet for Subscriber Management) . . . . . 188

Chapter 9 Monitoring Commands . . . . . 189

show interfaces (10-Gigabit Ethernet) . . . . . 190
show interfaces (PPPoE) . . . . . 215
show interfaces demux0 (Demux Interfaces) . . . . . 226
show interfaces (Gigabit Ethernet) . . . . . 235
show interfaces targeting (Aggregated Ethernet for Subscriber Management) . . . . . 258

Part 4 Troubleshooting

Chapter 10 Acquiring Troubleshooting Information . . . . . 263

Collecting Subscriber Access Logs Before Contacting Juniper Technical Support . . . . . 263

Part 5 Index

Index . . . . . 269

 

# List of Figures


Part 1 Overview

Chapter 1 VLAN and Demux Subscriber Interfaces in Subscriber Access Networks . . . . . 3

Figure 1: VLAN Subscriber Interfaces . . . . . 5
Figure 2: IP Demux Subscriber Interface . . . . . 5

Chapter 2 Subscriber Interfaces over Aggregated Ethernet . . . . . 11

Figure 3: Targeted Subscriber Links . . . . . 15

Part 2 Configuration

Chapter 6 Subscriber Interfaces over Aggregated Ethernet Examples . . . . . 79

Figure 4: Multicast Traffic Separation Using OIF Mapping . . . . . 99

# List of Tables


About the Documentation . . . . . xiii

Table 1: Notice Icons . . . . . xv
Table 2: Text and Syntax Conventions . . . . . xv

Part 1 Overview

Chapter 1 VLAN and Demux Subscriber Interfaces in Subscriber Access Networks . . . . . 3

Table 3: Comparison of MAC Address Validation Modes . . . . . 9

Chapter 2 Subscriber Interfaces over Aggregated Ethernet . . . . . 11

Table 4: Features Supported with Static or Dynamic Demux Subscriber Interfaces . . . . . 14

Part 3 Administration

Chapter 9 Monitoring Commands . . . . . 189

Table 5: show interfaces Gigabit Ethernet Output Fields . . . . . 191
Table 6: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type . . 205
Table 7: show interfaces (PPPoE) Output Fields . . . . . 215
Table 8: Demux show interfaces Output Fields . . . . . 226
Table 9: show interfaces Gigabit Ethernet Output Fields . . . . . 236
Table 10: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type . . . . . 249
Table 11: show interfaces targeting Output Fields . . . . . 258

# About the Documentation


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


## Documentation and Release Notes

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

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

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## Supported Platforms

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

- MX Series

## Using the Examples in This Manual

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

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

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

## Documentation Conventions

Table 1 on page xv 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. |
|  | Tip | Indicates helpful information. |
|  | Best practice | Alerts you to a recommended use or implementation. |

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

### Table 2: Text and Syntax Conventions

| Convention | Description | Examples |
|---|---|---|
| **Bold text like this** | Represents text that you type. | To enter configuration mode, type the **configure** command:<br><br>user@host> **configure** |

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

| Convention | Description | Examples |
|---|---|---|
| `Fixed-width text like this` | Represents output that appears on the terminal screen. | `user@host>` **show chassis alarms**<br>`No alarms currently active` |
| *Italic text like this* | • Introduces or emphasizes important new terms.<br>• Identifies guide names.<br>• Identifies RFC and Internet draft titles. | • A policy *term* is a named structure that defines match conditions and actions.<br>• *Junos OS CLI User Guide*<br>• RFC 1997, *BGP Communities Attribute* |
| *Italic text like this* | Represents variables (options for which you substitute a value) in commands or configuration statements. | Configure the machine's domain name:<br>[edit]<br>root@# **set system domain-name** *domain-name* |
| **Text like this** | Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components. | • To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level.<br>• The console port is labeled **CONSOLE**. |
| < > (angle brackets) | Encloses optional keywords or variables. | **stub <default-metric** *metric***>;** |
| \| (pipe symbol) | Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity. | **broadcast \| multicast**<br>**(*string1* \| *string2* \| *string3*)** |
| # (pound sign) | Indicates a comment specified on the same line as the configuration statement to which it applies. | **rsvp { # Required for dynamic MPLS only** |
| [ ] (square brackets) | Encloses a variable for which you can substitute one or more values. | **community name members [** ***community-ids*** **]** |
| Indention and braces ( { } ) | Identifies a level in the configuration hierarchy. | [edit]<br>routing-options {<br>  static {<br>  route default {<br>  nexthop *address*;<br>  retain;<br>  }<br>  }<br>} |
| ; (semicolon) | Identifies a leaf statement at a configuration hierarchy level. | |
| GUI Conventions | | |
| **Bold text like this** | Represents graphical user interface (GUI) items you click or select. | • In the Logical Interfaces box, select **All Interfaces**.<br>• To cancel the configuration, click **Cancel**. |

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

| Convention | Description | Examples |
|---|---|---|
| > (bold right angle bracket) | Separates levels in a hierarchy of menu selections. | In the configuration editor hierarchy, select **Protocols>Ospf**. |

## Documentation Feedback

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

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

## Requesting Technical Support

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

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

### Self-Help Online Tools and Resources

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

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

- Search technical bulletins for relevant hardware and software notifications: http://kb.juniper.net/InfoCenter/
- 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


- VLAN and Demux Subscriber Interfaces in Subscriber Access Networks on page 3
- Subscriber Interfaces over Aggregated Ethernet on page 11

CHAPTER 1

# VLAN and Demux Subscriber Interfaces in Subscriber Access Networks


- Subscriber Interface Overview on page 3
- Static Subscriber Interfaces and VLAN Overview on page 4
- Subscriber Interfaces and Demultiplexing Overview on page 5
- IP Demux Interfaces over Static or Dynamic VLAN Demux Interfaces on page 7
- MAC Address Validation for Subscriber Interfaces Overview on page 7


## Subscriber Interface Overview

In this release, you can identify subscribers statically or dynamically.

To identify subscribers statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you create variables for demux interfaces that are dynamically created by DHCP when subscribers log in.

### Statically Identifying Subscribers

Before you can configure static subscriber interfaces in a dynamic profile, you must first configure the logical interfaces on the router to which you expect clients to connect. After you have created the static interfaces, you can modify them by using dynamic profiles to apply configuration parameters.

You can also configure subscribers by creating sets of static IP demux interfaces that are not referenced in a dynamic profile.

When configuring the interfaces stanza within a dynamic profile, you use variables to specify the interface name and the logical unit value. When a DHCP subscriber sends a DHCP request to the interface, the dynamic profile replaces the **interface-name** and **unit** variables with the actual interface name and logical unit number of the interface that received the DHCP request. After this association is made, the router configures the interface with any CoS or protocol (that is, IGMP) configuration within the dynamic profile, or applies any input or output filter configuration that you have associated with that dynamic profile.

```
[edit dynamic-profiles]
interfaces interface-name {
```

```
unit logical-unit-number {
  family family {
    address address;
    filter {
      input filter-name;
      output filter-name;
    }
  unnumbered-address interface-name <preferred-source-address address>;
  vlan-id;
  }
  vlan-tagging;
}
```

## Dynamically Identifying Subscribers

You can configure demux interfaces to represent a subscriber interface in a dynamic profile. When a subscriber logs in using a DHCP access method, the demux interface is dynamically created.

You specify variables for the unit number, the name of the underlying interface, and the IP address in the dynamic profile. These variables are replaced with the values that are supplied by DHCP when the subscriber logs in.

**Related Documentation**

- Static Subscriber Interfaces and VLAN Overview on page 4
- Subscriber Interfaces and Demultiplexing Overview on page 5

# Static Subscriber Interfaces and VLAN Overview

This topic describes the topology for configuring subscriber interfaces over static VLAN interfaces in the current release.

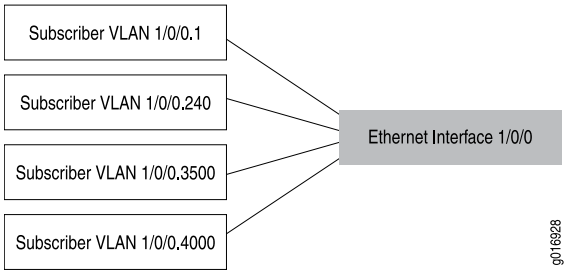
In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

- GE—Gigabit Ethernet
- XE—10-Gigabit Ethernet
- AE—Aggregated Ethernet

We recommend that you configure each subscriber on a statically created VLAN.

Figure 1 on page 5 shows an example of subscriber interfaces on an individual VLAN.

Figure 1: VLAN Subscriber Interfaces




You can further separate VLANs on subscriber interfaces by configuring a VLAN interface as the underlying interface for a set of IP demux interfaces.

**Related Documentation**

- Configuring a Subscriber Interface with a Static VLAN Interface on page 22
- Subscriber Interfaces and Demultiplexing Overview on page 5

## Subscriber Interfaces and Demultiplexing Overview

You can create logical subscriber interfaces using static or dynamic demultiplexing interfaces. In addition, you can use either IP demultiplexing interfaces or VLAN demultiplexing interfaces when creating logical subscriber interfaces.

Demultiplexing (demux) interfaces are logical interfaces that share a common, underlying logical interface (in the case of IP demux) or underlying physical interface (in the case of VLAN demux). You can use these interfaces to identify specific subscribers or to separate individual circuits by IP address (IP demux) or VLAN ID (VLAN demux).

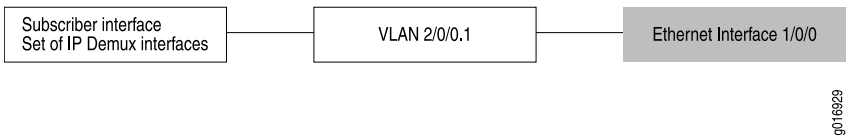
The subscriber interfaces can provide different levels of services for individual subscribers in an access network. For example, you can apply CoS parameters for each subscriber.

### Interface Sets of Static Demux Interfaces

You can group static demux interfaces to create individual subscriber interfaces using interface sets. Interface sets enable you to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service.

Figure 2 on page 5 shows a subscriber interface configured using a set of IP demux interfaces with an underlying VLAN interface.

Figure 2: IP Demux Subscriber Interface




### Dynamic Demultiplexing Interfaces

You can configure demux interfaces to represent a dynamic subscriber interface in a dynamic profile.

Demux interfaces are dynamically created by a DHCP access method when the underlying interface for the demux interface is configured for the access method. The DHCP access model creates the demux interface with the subscriber's assigned IP address (for IP demux interfaces) or VLAN ID (for VLAN demux interfaces).

To configure an IP demux interface in the dynamic profile, you specify variables for the unit number, the name of the underlying interface, and the IP address. To configure a VLAN demux interface in the dynamic profile, you specify variables for the unit number, the name of the underlying interface, and the VLAN ID. These variables are replaced with the values that are supplied by DHCP when the subscriber logs in.

## Guidelines for Configuring Demux Interfaces for Subscriber Access

When you configure static or dynamic demux interfaces for subscriber access, consider the following guidelines:

- You can only configure interface sets of static demux interfaces and dynamic demux interfaces on MX Series 3D Universal Edge Routers. Hierarchical and per-unit scheduling is supported for dynamically created demux interfaces on the EQ DPC.
- You can configure IPv4 and IPv6 addressing for static and dynamic demux interfaces.
- You can configure only one **demux0** interface per chassis.
- For IP demux interfaces, you can define logical demux interfaces on top of the **demux0** interface (for example, **demux0.1**, **demux0.2**, and so on).
- Demux interfaces currently support only Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet underlying interfaces.
- You must associate IP demux interfaces with an underlying logical interface.
- You must associate VLAN demux interfaces with an underlying device (physical interface).
- You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the **aggregate-clients** option when attaching a dynamic profile to a demux interface for DHCP.

**Related Documentation**

- Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 22
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 25
- Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces on page 26
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- *CoS and Static IP Demux Interface Set Overview*

- *Demultiplexing Interface Overview*

## IP Demux Interfaces over Static or Dynamic VLAN Demux Interfaces

You can configure a router with IP demux interfaces over VLAN demux interfaces. Just as IP demux interfaces demultiplex their underlying VLAN demux interfaces based on IP address, VLAN demux interfaces demultiplex their underlying aggregate Ethernet or Ethernet interfaces based on VLAN ID.

When configuring IP demux interfaces over VLAN demux interfaces, keep the following in mind:

- Only single and dual VLAN tag options are supported as VLAN selectors.
- Both inet and inet6 families are supported.
- All firewall and CoS features are supported.
- Both static and dynamic VLAN demux interface creation is supported.
- Only MPCs are supported.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 69
- *Configuring VLAN Dynamic Profiles*
- Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces on page 51
- Example: Concurrent Configuration of Dynamic DHCP IP Demux and PPPoE Demux Interfaces over the Same VLAN Demux Interface on page 57
- *Aggregated Ethernet Interfaces Overview*

## MAC Address Validation for Subscriber Interfaces Overview

MAC address validation enables the router to validate that received packets contain a trusted IP source and an Ethernet MAC source address.

Configuring MAC address validation can provide additional validation when subscribers access billable services. MAC address validation provides additional security by enabling the router to drop packets that do not match, such as packets with spoofed addresses.

When subscribers log in, they are automatically assigned IP addresses by DHCP. With MAC address validation enabled, the router compares the IP source and MAC source addresses against trusted addresses, and forwards or drops the packets according to the match and the validation mode.

## Supported Types of Subscriber Interfaces

MAC address validation is supported on statically or dynamically created Ethernet interfaces and demux interfaces on MX Series 3D Universal Edge Routers as follows:

- When the router is configured for a normal (non-enhanced) network services mode, MAC address validation is supported on both DPCs and MPCs. The router can be populated completely with one or the other type of line card, or have a mix of both types. Normal network services mode is the default.
- When the router is configured for Enhanced IP Network Services mode or Enhanced Ethernet Network Services mode, MAC address validation is supported only on MPCs. If the router has both DPCs and MPCs, or only DPCs, you cannot configure the chassis to be in enhanced mode.

MAC address validation is optimized for scaling when the router is in enhanced network services modes. Enhanced network services modes affect other features, such as multicast and firewall filters, so you must take that in to consideration when deciding whether to configure enhanced mode. For more information about the enhanced network service modes, see *Network Services Mode Overview*.

In normal network services mode, you can use the **show interfaces statistics** ***interface-name*** command to display a per-interface count of the packets that failed validation and were dropped. In enhanced network services mode, this command does not count the dropped packets; you must contact Juniper Networks Customer Support for assistance in collecting this data.

## Trusted Addresses

A trusted address tuple is a 32–bit IP address and a 48–bit MAC address. Prefixes and ranges are not supported.

The IP source address and the MAC source address used for validation must be from a trusted source.

All static ARP addresses configured through the CLI are trusted addresses; dynamic ARP addresses are not considered trusted addresses.

Addresses dynamically created through an extended DHCP local server or extended DHCP relay are also trusted addresses. When a DHCP server and client negotiate an IP address, the resulting IP address and MAC address tuple is trusted. Each DHCP subscriber can generate more than one address tuple.

Each MAC address can have more than one IP address, which can result in more than one valid tuple. Each IP address must map to one MAC address.

## Types of MAC Address Validation

You can configure either of two types or modes of MAC address validation, loose or strict. The behavior of the two modes varies depending on how well the incoming packets match the trusted address tuples. The modes differ only when the IP source address

alone does not match any trusted IP address. Table 3 on page 9 compares the behavior of the two modes. Dropped packets are considered to be spoofed.

Table 3: Comparison of MAC Address Validation Modes

| Incoming Packet Addresses Match Trusted Address Tuple | Loose Mode Action | Strict Mode Action |
|---|---|---|
| • IP source address matches<br>and<br>• MAC source address matches | Forwards packet | Forwards packet |
| • IP source address matches<br>but<br>• MAC source address does not match | Drops packet | Drops packet |
| • IP source address does not match<br>and<br>• MAC source address either matches or does not match | Forwards packet | Drops packet |

Configuring strict mode is a more conservative strategy because it requires both received source addresses to match trusted addresses.

When you configure MAC address validation for IP demux interfaces in a dynamic profile and specify either loose or strict validation, the resulting behavior is always loose validation. To enable strict behavior for a dynamic IP demux interface, you must configure strict validation for both the IP demux interface and the underlying interface.

**Related Documentation**

- Configuring MAC Address Validation for Subscriber Interfaces on page 29

CHAPTER 2

# Subscriber Interfaces over Aggregated Ethernet


- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 11
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14


## Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview

You can configure a subscriber interface represented by a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. You must configure the aggregated Ethernet logical interface on Enhanced Queuing Dense Port Concentrators (EQ DPCs) or MPC/MIC interfaces in MX Series 3D Universal Edge Routers.

A static or dynamic VLAN subscriber interface over aggregated Ethernet can also support one-to-one active/backup link redundancy, depending on how you configure the underlying aggregated Ethernet interface.

To configure a static or dynamic VLAN subscriber interface over aggregated Ethernet, make sure you understand the following concepts.


- Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static or Dynamic VLAN Subscriber Interface on page 11


### Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static or Dynamic VLAN Subscriber Interface

The following guidelines for configuring an aggregated Ethernet logical interface also apply to configuring a static or dynamic VLAN subscriber interface stacked on a two-link aggregated Ethernet logical interface:

- If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode, which requires that the two underlying physical interfaces be designated as primary and backup links.

- In addition, if you need to support one-to-one active/backup link redundancy at the DPC or MPC level, configure the aggregated Ethernet interface on physical interfaces that reside on different EQ DPCs or MPCs.

NOTE: One-to-one active/backup DPC redundancy is also supported with firewall filters and policy filters for static non-VLAN interfaces configured on an aggregated Ethernet logical interfaces, provided LACP is not active.

**Related Documentation**

- Static Subscriber Interfaces and VLAN Overview on page 4
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 68
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 79
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *CoS for Subscriber Access Overview*

## Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview

You can configure a subscriber interface using a static or dynamic demux interface stacked on an aggregated Ethernet logical interface. Subscriber interfaces on static or dynamic demux interfaces can be used to identify specific subscribers (authenticated users) in an access network or to separate individual circuits. A subscriber interface on a static or dynamic demux interface over aggregated Ethernet can support one-to-one active/backup link redundancy or traffic load balancing, depending on how you configure the underlying aggregated Ethernet interface.

To configure a static or dynamic demux subscriber interface over aggregated Ethernet, make sure you understand the following concepts:

- Options for Aggregated Ethernet Logical Interfaces That Support Demux Subscriber Interfaces on page 12
- Hardware Requirements with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet on page 13
- Features Supported with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet on page 13

### Options for Aggregated Ethernet Logical Interfaces That Support Demux Subscriber Interfaces

Traffic forwarding through a demux logical interface is dependent on the configuration of the underlying interface. Using an aggregated Ethernet interface as the underlying interface for a static or dynamic demux subscriber interface provides you with the following options:

- **1:1 Active/Backup Link Redundancy**—If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode,

which requires that two underlying physical interfaces be designated as primary and backup links. In addition, if you need to support one-to-one active/backup link redundancy at the line card level, configure the aggregated Ethernet interface on physical interfaces that reside either on different EQ DPCs or on different MPCs. When using LACP link protection, you can configure only two member links to an aggregated Ethernet interface: one active and one standby.

- **Load Balancing**—You can configure load balancing instead of 1:1 active/backup link redundancy. The Junos OS implementation of the IEEE 802.3ad standard balances traffic across the member links within an aggregated Ethernet bundle based on the Layer 3 information carried in the packet.

  By default, the system supports hash-based distribution in load balancing scenarios. In this model, traffic for a logical interface can be distributed over multiple links in the aggregated Ethernet interface. If distribution flows are not even, egress CoS scheduling can be inaccurate. In addition, scheduler resources are required on every link of the aggregated Ethernet interface.

  Targeted distribution enables you to target the egress traffic for IP and VLAN demux subscribers on a single member link, using a single scheduler resource. The system distributes the subscriber interfaces equally among the member links.

## Hardware Requirements with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet

IP demux subscriber interfaces over aggregated Ethernet interfaces are supported on EQ DPCs on MX Series routers.

VLAN demux subscriber interfaces over aggregated Ethernet interfaces are supported on MX Series routers that only have MPCs installed. If the router has other line cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.

## Features Supported with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet

Table 4 on page 14 lists key subscriber access features supported with static or dynamic demux subscriber interfaces, organized by type of underlying interface:

- Aggregated Ethernet
- Non-aggregated Ethernet (Gigabit Ethernet, Fast Ethernet, or 10-Gigabit Ethernet)

There are no feature limitations specific to demultiplexing. Instead, demux interfaces over aggregated Ethernet are subject to the same scaling and configuration limitations inherent to aggregated Ethernet logical interfaces.

Table 4: Features Supported with Static or Dynamic Demux Subscriber Interfaces

| Feature | Static or Dynamic Demux Subscriber Interface | |
|---|---|---|
| | Aggregated Ethernet Underlying Interface | Non-aggregated Underlying Logical Interface |
| Protocol family support | IPv4, IPv6, and PPPoE | IPv4, IPv6, and PPPoE |
| Per-subscriber firewall filtering and statistics | Supported | Supported |
| Hierarchical CoS | Supported | Supported |
| Per-subscriber CoS parameters within the **[edit dynamic-profiles *profile-name* class-of-service]** hierarchy | Supported | Supported |
| Per-subscriber IGMP configuration within the **[edit dynamic-profiles *profile-name* protocols]** hierarchy<br><br>NOTE: IP demux interfaces must use OIF mapping. See *Example: Configuring Multicast with Subscriber VLANs* for additional information. | Yes | Yes |

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 69
- Configuring the PPPoE Family for an Underlying Interface on page 72
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 82
- *Aggregated Ethernet Interfaces Overview*

## Distribution of Demux Subscribers in an Aggregated Ethernet Interface

This topic describes the distribution options available for demux subscriber interfaces over aggregated Ethernet.

### Distribution Models

By default, the system supports hash-based distribution for all subscriber interface types in an aggregated Ethernet bundle configured without link protection. In this model, traffic for a logical interface can be distributed over multiple links in the bundle. This model is desirable when there are many flows through the logical interface and you need to load balance those flows.

Note that if the distribution flows are not even, egress CoS scheduling can be inaccurate. In addition, scheduler resources are required on every link of the aggregated Ethernet interface. For example, if subscriber traffic is allocated 10 MB for a triple-play service over

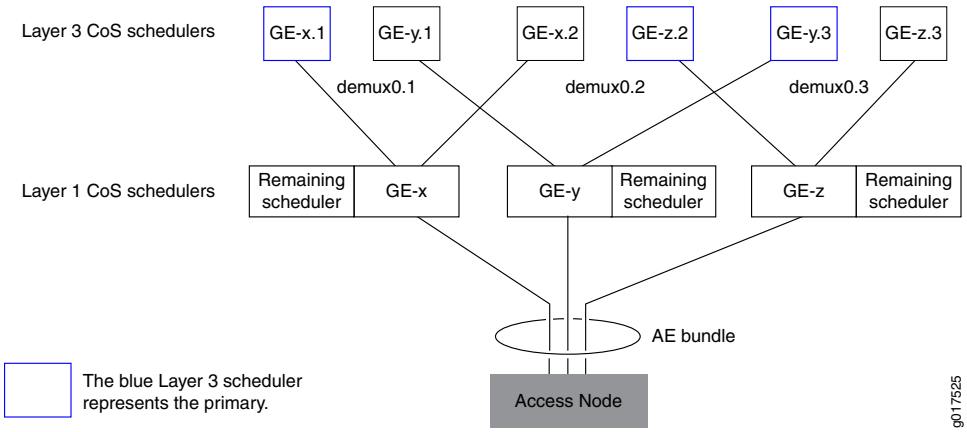
four links in a bundle, each of the links could receive 2.5 MB of traffic. High-density services such as video could be limited by the bandwidth on one of the links.

Targeted distribution enables you to target the egress traffic for an IP or VLAN demux subscriber on a single member link, using a single scheduler resource. To achieve load balancing over the member links, the system distributes the subscriber interfaces equally among the links. This enables the subscriber that is allocated 10 MB to be accurately scheduled as the traffic flows through.

## Sample Targeted Distribution Topology

Figure 3 on page 15 displays a sample targeted distribution of subscriber traffic across links in an aggregated Ethernet interface. A primary and backup link is allocated for each subscriber.

### Figure 3: Targeted Subscriber Links




For example, if link **GE-x** went down, subscriber 1 can begin forwarding over the backup, which is link **Ge-y**. When link **GE-y** comes back up, subscriber 1 switches back to its primary link, **GE-x**.

In the event that both **GE-x** and **GE-y** go down, subscriber 3 starts forwarding through its backup, **GE-z**. Subscriber 1 will have lost its primary and backup links, and will also begin forwarding out the **GE-z** link. A new level 3 scheduler is assigned for this subscriber on link **GE-z**. If there is a momentary lapse between the time that a new scheduler is allocated and forwarding switches to **GE-z**, the traffic will be forwarding through to the remaining scheduler. Subscriber 2 continues to forward through its primarily link, **GE-z**.

## Redundancy and Redistribution Mechanisms

Two types of redundancy are available in the targeted distribution model: link redundancy and module redundancy.

By default, an aggregated Ethernet interface is enabled with link redundancy. Backup links for a subscriber are chosen based on the link with the least number of subscribers, which provides redundancy if a link fails.

The module redundancy option enables you to provide redundancy if a module or a link fails. Backup links for a subscriber are chosen on a different DPC or MPC from the primary

link, based on the link with the least number of subscribers among the links on different modules. You can enable this for the aggregated Ethernet interface.

When links are removed, affected subscribers are redistributed among the active remaining backup links. When links are added to the system, no automatic redistribution occurs. New subscribers are assigned to the links with the fewest subscribers (which are typically the new links).

## Considerations and Best Practices

Keep the following guidelines in mind when configuring targeted distribution for demux subscribers:

- You can manage subscribers with both hash-based and targeted distribution models in the same network. For example, you can allocate subscribers with interface types such as PPPoE with hash-based distribution, and enable demux subscribers with targeted distribution.
- We recommend that you configure module redundancy to protect against module failures. When module redundancy is enabled, you can ensure an even distribution of subscribers if you allocate no more than 50 percent of the links on a single DPC or MPC.
- During normal network operations, the system maintains an even balance of subscribers among the links in a bundle, even as subscribers log in and out. However, if the distribution of a bundle becomes uneven (for example, when a link goes down and new subscribers are logging in), you can perform a manual rebalance of the bundle. In addition, you can configure periodic rebalancing of the bundle with a specific time interval.
- When you anticipate that a link will be down for an extended time, and you want to ensure that backup links are provisioned for all subscribers, we recommend that you remove the failed link from the bundle. This forces the affected subscribers to redistribute to other links.
- We recommend that you apply a remaining traffic-control profile to the logical interface to ensure that minimal scheduling parameters are applied to the remaining subscriber traffic. This provides scheduling for subscribers that do not have schedulers allocated because they have not been configured or they have been over-provisioned, or because of scheduler transitions on multiple link failures.
- If you perform a cold restart on the router when it is forwarding active subscribers, the subscriber interfaces with targeted distribution are assigned to the first links that become available when the system is initializing so forwarding can begin. To rebalance the system following a cold restart, perform a manual rebalance of the bundle. In addition, we recommend that you configure Graceful Routing Engine switchover (GRES) on the router to enable nonstop forwarding during switchover, and avoid performing cold restarts.
- To ensure appropriate and predictable targeted distribution, you must configure chassis network services to use **enhanced-ip** mode.
- Unless specifically separated, multicast traffic egresses in parallel with unicast traffic, sharing the CoS hierarchy and aggregated Ethernet flow distribution.

**Related Documentation**

- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74
- Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 75
- Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface on page 75
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12

PART 2

# Configuration


- Configuration Tasks for VLAN and Demux Subscriber Interfaces in Dynamic Profiles on page 21
- VLAN and Demux Subscriber Interfaces in Dynamic Profiles Examples on page 35
- Configuration Tasks for Subscriber Interfaces over Aggregated Ethernet on page 67
- Subscriber Interfaces over Aggregated Ethernet Examples on page 79
- Configuration Statements on page 127

CHAPTER 3

# Configuration Tasks for VLAN and Demux Subscriber Interfaces in Dynamic Profiles


- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21
- Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 25
- Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces on page 26
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- Configuring MAC Address Validation for Subscriber Interfaces on page 29
- Verifying Configuration and Status of Dynamic Subscribers and Associated Sessions, Services, and Firewall Filters on page 32


## Configuring Static Subscriber Interfaces in Dynamic Profiles

In this release, you can use dynamic profiles to configure statically created logical interfaces. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the static interfaces, making them easier to manage.

To configure static interfaces, you must first configure the interfaces on the router to which you expect subscribers to connect.

The subscriber access feature supports the following statically-created interface types in dynamic profiles:

- GE—Gigabit Ethernet
- XE—10-Gigabit Ethernet
- AE—Aggregated Ethernet

This topic contains the following sections:


- Configuring a Subscriber Interface with a Static VLAN Interface on page 22
- Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 22

- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Associating Dynamic Profiles with Statically Created Interfaces on page 24


## Configuring a Subscriber Interface with a Static VLAN Interface

This topic describes how to configure a subscriber interface with a static VLAN interface.

After you configure the static VLAN interface, you can reference it in a dynamic profile.

To configure a subscriber interface over a VLAN:

1. Configure the static VLAN interface and enable VLAN tagging.

```
[edit interfaces]
  ge-5/0/0 {
    vlan-tagging;
  }
```

2. Configure the units and assign the VLAN IDs.

```
unit 1 {
  proxy-arp;
  vlan-id 1;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
  }
}
unit 2 {
  proxy-arp;
  vlan-id 2;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
  }
}
```

3. Associate the static subscriber interface in a dynamic profile.

   See "Associating Dynamic Profiles with Statically Created Interfaces" on page 24.

## Configuring Static Subscriber Interfaces Using IP Demux Interfaces

You can configure a subscriber interface using a statically created IP demux interface. This interface can be referenced in a dynamic profile.

To configure a static IP demux subscriber interface:

1. Configure the IP demux interface on a physical device represented by a logical unit number. The logical interface resides on a physical device.

   See *Configuring an IP Demultiplexing Interface*.

2. Configure the underlying interface on which the IP demux interface is running.

   See *Configuring an IP Demux Underlying Interface*

3. Specify the underlying interface on which the IP demux interface is running.

   See *Specifying the Demux Underlying Interface*.

4. Specify how ingress IPv4 traffic is to be demultiplexed based on packet destination or source addresses.

   See *Configuring IP Demux Prefixes*.

5. Associate the static subscriber interface in a dynamic profile.

   See "Associating Dynamic Profiles with Statically Created Interfaces" on page 24.

NOTE: **VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (family inet) and the Internet Protocol version 6 (IPv6) suite (family inet6).**

## Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces

You can configure a subscriber interface using a statically created VLAN demux interface. This interface can be referenced in a dynamic profile.

To configure a static VLAN demux subscriber interface:

1. Configure the VLAN demux interface.

   See *Configuring a VLAN Demultiplexing Interface*.

2. Configure the underlying interface on which the VLAN demux interface is running.

   See *Configuring a VLAN Demux Underlying Interface*

3. Specify the underlying interface on which the VLAN demux interface is running.

   See *Specifying the Demux Underlying Interface*.

4. Specify how ingress IP traffic is to be demultiplexed based on the VLAN ID.

   See *Associating VLAN IDs to VLAN Demux Interfaces*.

5. Associate the static subscriber interface in a dynamic profile.

   See "Associating Dynamic Profiles with Statically Created Interfaces" on page 24.

NOTE: **VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (family inet) and the Internet Protocol version 6 (IPv6) suite (family inet6).**

**VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only MPCs installed. If the router has other cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.**

## Associating Dynamic Profiles with Statically Created Interfaces

When configuring the interfaces stanza within a dynamic profile, you use variables to specify the interface name and the logical unit value. When a DHCP subscriber sends a DHCP request to the interface, the dynamic profile replaces the interface name variable and logical unit name variable with the actual interface name and logical unit number of the interface that received the DHCP request.

NOTE: Configuration of the interface name variable and logical interface name variable at the **[edit dynamic-profiles *profile-name* interfaces]** hierarchy level is required for a dynamic profile to function.

To configure the interface for a dynamic profile, specify the interface name variable and include the **unit** statement and associated logical interface name variable:

1. Access the profile.

   ```
   [edit]
   user@host# edit dynamic-profiles basic-profile
   ```

2. Specify the interface name variable.

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set interfaces $junos-interface-ifd-name
   ```

3. Specify the logical interface name variable with the **unit** statement.

   When referencing an existing interface, specify the **$junos-underlying-interface-unit** variable used by the router to match the unit value of the receiving interface:

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set unit $junos-underlying-interface-unit
   ```

   When creating dynamic interfaces, specify the **$junos-interface-unit** variable used by the router to generate a unit value for the interface:

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set unit $junos-interface-unit
   ```

**Related Documentation**

- Static Subscriber Interfaces and VLAN Overview on page 4
- *Configuring Logical System Interface Properties*
- *Configuring VLAN Dynamic Profiles*
- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*

## Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces

You can create logical subscriber interfaces from IP demux interfaces. IP demultiplexing (demux) interfaces are logical interfaces that share a common, underlying logical interface. IP demux interfaces can be used to identify specific subscribers or to separate individual circuits.

You can group individual subscriber interfaces using interface sets to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service. Interface sets can be defined as a list of logical interfaces (unit 0, unit 1, and so on).

To configure a group of static IP demux interfaces:

1. Configure the interface set.

```
interfaces {
  interface-set demux-set {
    interface demux0 {
      unit 0;
      unit 1;
      }
    }
  }
```

2. Define the units of the interface set.

```
demux0 {
  unit 0 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      demux-source {
        1.1.1.0/24;
      }
      address 1.1.1.1/24;
    }
  }
  unit 1 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      demux-source {
        1.1.2.0/24;
      }
      address 1.1.2.1/24;
    }
  }
}
```

**Related Documentation**

- *Configuring CoS on a Set of Static IP Demux Interfaces*
- Subscriber Interfaces and Demultiplexing Overview on page 5

- *[edit interfaces] Hierarchy Level*

## Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces

You can create logical subscriber interfaces from VLAN demux interfaces. VLAN demultiplexing (demux) interfaces are logical interfaces that share a common, underlying physical interface. VLAN demux interfaces can be used to identify specific subscribers or to separate individual circuits.

You can group individual subscriber interfaces using interface sets to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service. Interface sets can be defined as a list of logical interfaces (unit 0, unit 1, and so on).

To configure a group of static VLAN demux interfaces:

1. Configure the interface set.

```
interfaces {
  interface-set demux-set {
    interface demux0 {
      unit 0;
      unit 1;
      }
    }
  }
```

2. Define the units of the interface set.

```
demux0 {
  unit 0 {
    vlan-id 10;
    demux-options {
      underlying-interface ge-2/0/1;
    }
    family inet {
      address 1.1.1.1/24;
    }
  }
  unit 1 {
    vlan-id 20;
    demux-options {
      underlying-interface ge-2/0/1;
    }
    family inet {
      address 1.1.2.1/24;
    }
  }
}
```

**Related Documentation**

- *Configuring CoS on a Set of Static IP Demux Interfaces*
- Subscriber Interfaces and Demultiplexing Overview on page 5
- *[edit interfaces] Hierarchy Level*

## Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles

You can configure dynamic subscriber interfaces using IP demux interfaces.

To enable the dynamic demux interface to be created by DHCP, you configure the demux options in a dynamic profile. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the dynamic interfaces, making them easier to manage.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

To configure dynamic subscriber interfaces:

1. Specify that you want to configure the **demux0** interface in the dynamic profile.

   ```
   user@host#  edit dynamic-profiles business-profile interfaces demux0
   ```

2. Configure the unit for the **demux0** interface.

   a. Configure the variable for the unit number of the **demux0** interface.

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

      ```
      [edit dynamic-profiles business-profile interfaces demux0]
      user@host# edit unit $junos-interface-unit
      ```

   b. Configure the variable for the underlying interface of the demux interfaces and specify the **$junos-underlying-interface** variable.

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

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        "$junos-interface-unit"]
      user@host# set demux-options underlying-interface $junos-underlying-interface
      ```

3. Configure the family for the demux interfaces.

   a. Specify that you want to configure the family.

      For IPv4:

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        "$junos-interface-unit"]
      user@host# edit family inet
      ```

      For IPv6:

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        "$junos-interface-unit"]
      user@host# edit family inet6
      ```

b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host#  set unnumbered-address lo0.0
```

c. Configure the variable for the IP address of the demux interface.

The variable is dynamically replaced with the IP address that DHCP supplies when the subscriber logs in. For IPv4, use **$junos-subscriber-ip-address**, For IPv6, use **$junos-subscriber-ipv6-address**. For IPv6 multiple address support, use **$junos-subscriber-ipv6-multi-address**.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host# set demux-source $junos-subscriber-ip-address
```

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 31
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 37

## Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles

You can configure dynamic subscriber interfaces using VLAN demux interfaces.

To enable the dynamic demux interface to be created by DHCP, you configure the demux options in a dynamic profile. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the dynamic interfaces, making them easier to manage.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

To configure dynamic subscriber interfaces:

1. Specify that you want to configure the **demux0** interface in the dynamic profile.

```
user@host#  edit dynamic-profiles business-profile interfaces demux0
```

2. Configure the unit for the **demux0** interface.

   a. Configure the variable for the unit number of the **demux0** interface.

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

```
[edit dynamic-profiles business-profile interfaces demux0]
user@host# edit unit $junos-interface-unit
```

b. Configure the variable for the underlying interface of the demux interfaces by specifying the **$junos-interface-ifd-name** variable.

The variable is dynamically replaced with the underlying device name that DHCP supplies when the subscriber logs in.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-interface-ifd-name
```

c. Configure the variable for the VLAN ID.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set vlan-id $junos-vlan-id
```

3. Configure the family for the demux interfaces.

a. Specify that you want to configure the family.

For IPv4:

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

For IPv6:

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet6
```

b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host#  set unnumbered-address lo0.0
```

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 31
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*
- Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces on page 51

## Configuring MAC Address Validation for Subscriber Interfaces

This topic describes how to configure MAC address validation for subscriber interfaces in dynamic profiles on MX Series routers.

The subscriber interfaces can be statically created and associated with a dynamic profile (for example, VLAN interfaces) or dynamically created in the dynamic profile (such as demux interfaces).

By default, MAC address validation is disabled.

This topic contains the following sections:


- Configuring MAC Address Validation for Static Subscriber Interfaces on page 30
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 31


## Configuring MAC Address Validation for Static Subscriber Interfaces

This topic describes how to configure MAC address validation for static subscriber interfaces in dynamic profiles on MX Series routers.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

- (Optional) Configure an enhanced network services mode.

  See *Configuring Junos OS to Run a Specific Network Services Mode in MX Series Routers*.

To configure MAC address validation on static subscriber interfaces:

1. Configure the static VLAN interface.

   ```
   [edit interfaces]
   user@host# set interface-name unit logical-unit-number family inet
   ```

2. Configure the type of MAC address validation for the interface.

   - To configure loose validation:

     ```
     [edit interfaces interface-name unit logical-unit-number family inet]
     user@host# set mac-validate loose
     ```

   - To configure strict validation:

     ```
     [edit interfaces interface-name unit logical-unit-number family inet]
     user@host# set mac-validate strict
     ```

For example, to configure loose validation on interface fe-0/0/0.0, configure the following:

```
[edit interfaces fe-0/0/0 unit 0 family inet]
user@host# set mac-validate loose
```

After you configure MAC address validation:

- Associate the static VLAN interface with the dynamic profile.

  See "Associating Dynamic Profiles with Statically Created Interfaces" on page 24.

## Configuring MAC Address Validation for Dynamic Subscriber Interfaces

This topic describes how to configure MAC address validation for subscriber interfaces created on demux interfaces in dynamic profiles on MX Series routers.

When you configure MAC address validation for demux interfaces in a dynamic profile and specify either **loose** or **strict** validation, the resulting behavior is always loose validation. To enable strict behavior for a dynamic IP demux interface, besides configuring either **loose** or **strict** mode on the IP demux interface, you must also configure strict validation on the underlying interface.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

- Configure the dynamic IP demux interface.

  See "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 27.

- (Optional) Configure an enhanced network services mode.

  See *Configuring Junos OS to Run a Specific Network Services Mode in MX Series Routers*.

To configure loose MAC address validation for a dynamic subscriber interface:

- Configure loose validation for the demux interface.

  ```
  [edit dynamic-profiles profile-name interfaces demux0 unit "$junos-interface-unit"
    family inet]
  user@host# set mac-validate loose
  ```

  For loose validation, you do not need to configure MAC address validation on the underlying interface.

To configure strict MAC address validation for a dynamic subscriber interface:

1. Configure validation for the demux interface.

   ```
   [edit dynamic-profiles profile-name interfaces demux0 unit "$junos-interface-unit"
     family inet]
   user@host# set mac-validate validation-mode
   ```

   NOTE: Remember, although you must configure validation on the IP demux interface, it does not matter which mode you specify because the behavior is always loose.

2. Configure strict validation for the underlying interface.

   [edit interfaces *interface-name* unit *logical-unit-number* family inet]
   user@host# **set** mac-validate **strict**

   The underlying interface in this case is statically configured—for example, ge-1/0/0.1—and assigned to a DHCP configuration group that is associated with the dynamic profile. In a more complicated configuration, the underlying interface itself can be configured by a dynamic profile; in that case the validation is configured in the profile that creates the underlying interface.

**Related Documentation**

- MAC Address Validation for Subscriber Interfaces Overview on page 7
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 37

## Verifying Configuration and Status of Dynamic Subscribers and Associated Sessions, Services, and Firewall Filters

**Purpose** Verify configuration and status of dynamic subscribers, sessions, services, and firewall filters.

You can display information about subscribers in different ways, depending on the options you use with the **show subscriber** command. You can use details from one set of output with another command to display more detailed information of interest.

**Action**

- To display basic information for all subscribers:

```
user@host> show subscribers
Interface IP Address/VLAN ID User Name LS:RI
demux0.1073741824 0x8100.1500 0x8100.2900 test1@test.com default:testnet
demux0.1073741825 0x8100.1500 0x8100.2901 test1@test.com default:testnet
demux0.1073741826 0x8100.1500 0x8100.2902 test1@test.com default:testnet
demux0.1073741827 0x8100.1500 0x8100.2903 test1@test.com default:testnet
demux0.1073741826 172.16.200.6 test1@test.com default:testnet
demux0.1073741827 172.16.200.7 test1@test.com default:testnet
demux0.1073741824 172.16.200.8 test1@test.com default:testnet
demux0.1073741825 172.16.200.9 test1@test.com default:testnet
demux0.1073741828 0x8100.1500 0x8100.2910 test1@test.com default:default
demux0.1073741828 20.20.0.2 test1@test.com default:default
```

- To display more detailed information about a particular subscriber interface:

```
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
```

- To display traffic information for firewall filters.

```
user@host> show firewall
...
Filter: content-cb-in-demux0.1073741826-in
Counters:
Name     Bytes  Packets
__junos-dyn-service-counter  84336      1004

Filter: content-cb-out-demux0.1073741826-out
Counters:
Name     Bytes   Packets
__junos-dyn-service-counter      0       0
...
```

Instead of issuing successive commands to track the details for one subscriber interface, you can choose to display detailed information for all subscribers. However, the more subscribers you have, the more tedious it becomes to look through all the results for particular items of interest.

- To display detailed information for all subscribers:

  user@host> **show subscribers detail**

  user@host> **show subscribers extensive**

**Meaning** The output examples in this section show increasingly detailed information about dynamically created subscriber interfaces, including how many there are, what they are, and their characteristics; how many service sessions are active and what they are; whether firewall filters are attached to the sessions and what those filters are; and how much, if any, traffic is being filtered.

In the sample output shown here, the **show subscriber** command lists all the subscriber logical interfaces, including demux0.1073741826. You then display details about that interface and its associated subscribers with the **show subscribers interface demux0.1073741826 extensive** command. The Service Session Name fields for service sessions 25 and 26 in that output show two services are active on the interface, SUB-QOS and service-cb-content. The IPv4 Input Filter Name and the IPv4 Output Filter Name fields show that two filters have been applied to the service-cb-content session: content-cb-in-demux0.1073741826-in and content-cb-out-demux0.1073741826-out. You then use the **show firewalls** command to list the filters and see how much, if any, traffic is being filtered.

**Related Documentation**

- CLI Explorer
- CLI Explorer

CHAPTER 4

# VLAN and Demux Subscriber Interfaces in Dynamic Profiles Examples


- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units) on page 35
- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface on page 36
- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation) on page 36
- Example: Configuring a Static Subscriber Interface with a Loopback on page 36
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 37
- Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Dynamic VLANs on page 39
- Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Static VLANs on page 42
- Example: Configuring a Dynamic IP Demux Interface with Dual Stacking on page 43
- Example: Configuring IPv4 Static VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 47
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 49
- Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces on page 51
- Example: Concurrent Configuration of Dynamic DHCP IP Demux and PPPoE Demux Interfaces over the Same VLAN Demux Interface on page 57


## Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units)

```
[edit interfaces]
ge-5/0/0 {
   vlan-tagging;
   unit 1 {
      proxy-arp;
      vlan-id 1;
      family inet {
```

```
        unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
      }
    }
    unit 2 {
      proxy-arp;
      vlan-id 2;
      family inet {
        unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
      }
    }
  }
```

**Related Documentation**

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21

## Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface

```
[edit interfaces]
ge-5/2/0 {
  vlan-tagging;
  unit 1 {
    vlan-id 1;
    family inet {
      address 192.2.1.1/24;
    }
  }
}
```

**Related Documentation**

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21

## Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation)

```
[edit interfaces]
ge-5/1/9 {
  vlan-tagging;
  gigether-options {
    no-auto-negotiation;
  }
  unit 2004 {
    vlan-id 2004;
    family inet {
      address 222.0.0.1/22;
    }
  }
}
```

**Related Documentation**

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21

## Example: Configuring a Static Subscriber Interface with a Loopback

```
lo0 {
```

```
    unit 0 {
      family inet {
        address 192.1.1.1/32;
      }
    }
  }
```

**Related Documentation**

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21

## Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces

This example shows how to configure dynamic subscriber interfaces on IP demux interfaces. DHCP dynamically creates the demux interface when a subscriber logs in.

To configure subscribers on dynamic IP demux interfaces:

1. Configure the static VLAN as the underlying interface.

```
interfaces {
  ge-0/3/0 {
    vlan-tagging;
    unit 0 {
      vlan-id 0;
      demux-source inet;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 90.1.1.1/24;
      }
    }
  }
}
```

2. Configure the creation of demux interfaces in the dynamic profile.

```
dynamic-profiles {
  subscriber-profile {
    interfaces {
      demux0 {
        "$junos-interface-ifd-name" {
          unit "$junos-interface-unit" {
            demux-options {
              underlying-interface "$junos-underlying-interface";
            }
            family inet {
              demux-source {
                $junos-subscriber-ip-address;
              }
              filter {
                input ingressFilter;
```

```
                output egressFilter;
              }
              mac-validate loose;
            }
          }
        }
      }
    }
  }
```

3. Configure the access method to dynamically create the demux interface.

   DHCP relay is the access method used in this example.

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
    server-group {
      router {
        100.20.42.1;
      }
      dynamic-profile subscriber-profile;
      active-server-group erx;
      group one {
        interface ge-0/0/2.0 upto ge-0/0/2.4000;
        interface-client-limit 200
      }
    }
  }
```

4. Configure the interface for DHCP.

```
interfaces {
  traceoptions {
    flag all;
  }
  ge-0/0/2 {
    unit 0 {
      demux-source inet;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 100.20.32.2/32;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Dynamic VLANs

In this example, the network administrator configures IPv6 addressing for a dynamic IP demux interface over a group of dynamic VLANs.

```
dynamic-profiles {
  vlan-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-source inet6;
          family inet6 {
            unnumbered-address lo0.0 preferred-source-address ::100.20.32.2;
          }
        }
      }
    }
  }
  svlan-profile {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-interface-unit {
          demux-source inet6;
          vlan-tags outer $junos-stacked-vlan-id inner $junos-vlan-id;
          family inet6 {
            unnumbered-address lo0.0 preferred-source-address ::100.20.32.2;
          }
        }
      }
    }
  }
  dhcp-demux-prof {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet6 {
            demux-source {
              $junos-subscriber-ipv6-address;
            }
            unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
          }
        }
      }
    }
```

```
}
all-profile {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
      }
    }
  }
}
}
}
services {
  dhcp-local-server {
    traceoptions {
      file dhcp size 1g;
      flag all;
    }
      dhcpv6 {
        authentication {
          password delpref;
          username-include {
            user-prefix localpool;
          }
        }
        group one {
          authentication {
            password delpref;
            username-include {
              user-prefix localpool;
            }
          }
          dynamic-profile dhcp-demux-prof use-primary all-profile;
          interface ge-0/0/3.0;
        }
      }
      group v6 {
        authentication {
          password delpref;
          username-include {
            user-prefix localpool;
          }
        }
        dynamic-profile dynamic-profile dhcp-demux-prof use-primary all-profile;
        interface ge-1/2/0.0;
      }
    }
  }
}
interfaces {
  ge-1/0/0 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile vlan-profile {
          accept inet6;
          ranges {
```

```
                any;
              }
            }
          }
        }
      }
      ge-1/2/0 {
        flexible-vlan-tagging;
        auto-configure {
          vlan-ranges {
            dynamic-profile vlan-profile {
              accept inet6;
              ranges {
                any;
              }
            }
          }
          stacked-vlan-ranges {
            dynamic-profile svlan-profile {
              accept inet6;
              ranges {
                any,any;
              }
            }
          }
        }
      }
      lo0 {
        unit 0 {
          family inet {
            address 100.20.32.2/32;
          }
          family inet6 {
            address ::100.20.32.2/128;
          }
        }
      }
    }
    access {
      address-assignment {
        pool v6 {
          family inet6 {
            network 100.20.0.0/16;
            range limited {
              low 100.20.0.10;
              high 100.20.128.250;
            }
            dhcp-attributes {
              maximum-lease-time 84600;
            }
          }
        }
      }
    }
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27

## Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Static VLANs

In this example, the network administrator configures IPv6 addressing for a dynamic IP demux interface over a group of static VLANs.

```
[edit]
dynamic-profiles {
  dhcp-demux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet6 {
            address 2001::1/64;
            demux-source {
              $junos-subscriber-ipv6-address;
            }
          }
        }
      }
    }
  }
}
system {
  services {
    dhcp-local-server {
      dhcpv6 {
        dynamic-profile dhcp-demux-prof;
        group vlan {
          interface ge-1/0/0.100;
        }
      }
    }
  }
}
interfaces {
  ge-1/0/0 {
    vlan-tagging;
    unit 100 {
      demux-source inet6;
      vlan-id 100;
      family inet6 {
        address 2001::1/64;
      }
    }
  }
}
```

```
access {
  address-assignment {
    pool dhcp {
      family inet6 {
        prefix 2001:0000:0000:0000::/64;
        range limits prefix-length 74;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27

## Example: Configuring a Dynamic IP Demux Interface with Dual Stacking

In this example, the network administrator configures IPv4 and IPv6 addressing for a dynamic IP demux interface with a group of underlying static VLANs.

```
[edit]
dynamic-profiles {
  dhcp-demux-prof {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet {
            demux-source {
              $junos-subscriber-ip-address;
            }
            unnumbered-address lo0.0 preferred-source-address 3.1.1.1;
          }
          family inet6 {
            demux-source {
              $junos-subscriber-ipv6-address;
            }
            unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
          }
        }
      }
    }
  }
  all-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit";
      }
    }
  }
}
services {
  dhcp-local-server {
```

```
    traceoptions {
      file dhcp size 1g;
      flag all;
    }
    dhcpv6 {
      authentication {
        password delpref;
        username-include {
          user-prefix localpool;
        }
      }
      group groupv6 {
        authentication {
          password delpref;
          username-include {
            user-prefix localpool;
          }
        }
        dynamic-profile dhcp-demux-prof use-primary all-profile;
        interface ge-0/0/3.0;
      }
    }
    group groupv4 {
      authentication {
        password delprefv4;
        username-include {
          user-prefix localpoolv4;
        }
      }
      dynamic-profile dhcp-demux-prof;
      interface ge-0/0/2.0;
    }
  }
  processes {
    general-authentication-service {
      traceoptions {
        file auth;
        flag all;
      }
    }
  }
  interfaces {
    ge-0/0/0 {
      unit 0 {
        proxy-arp;
        family inet6 {
          address 4ffe::1:1/48;
        }
      }
    }
    ge-0/0/1 {
      vlan-tagging;
      gigether-options {
        no-auto-negotiation;
      }
      unit 10 {
```

```
        vlan-id 10;
        family inet {
          address 100.10.0.2/24;
        }
      }
    }
    ge-0/0/2 {
      unit 0 {
        demux-source inet;
        proxy-arp;
        family inet {
          unnumbered-address lo0.0 preferred-source-address 3.1.1.1;
        }
      }
    }
    ge-0/0/3 {
      unit 0 {
        demux-source inet6;
        proxy-arp;
        family inet6 {
          unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
        }
      }
    }
    lo0 {
      unit 0 {
        family inet {
          address 3.1.1.1/32;
        }
        family inet6 {
          address 2001:db8:ffff:1::1/128;
        }
      }
    }
  }
  access {
    radius-server {
      100.10.0.1 {
        port 1812;
        secret "$9$xs5-dsgoGDjqgo"; ## SECRET-DATA
      }
    }
    profile wash-test {
      accounting-order radius;
      authentication-order radius;
      radius {
        authentication-server 100.10.0.1;
        accounting-server 100.10.0.1;
      }
      accounting {
        order radius;
        accounting-stop-on-failure;
        accounting-stop-on-access-deny;
        update-interval 10;
        statistics time;
      }
```

```
    }
    address-assignment {
      pool v4ville {
        family inet {
          network 3.1.1.0/24;
          range testv4 {
            low 3.1.1.3;
            high 3.1.1.50;
          }
        }
      }
      pool v6ville {
        family inet6 {
          prefix 2001:db8:ffff::/48;
          range test {
            low 2001:db8:ffff:1::2/128;
            high 2001:db8:ffff:1::ffff/128;
          }
        }
      }
    }
  }
}
[edit]
dynamic-profiles {
  dhcp-demux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet {
            demux-source {
              $junos-subscriber-ip-address;
            }
            unnumbered-address ge-0/0/0.0 preferred-source-address 1.1.1.2;
          }
          family inet6 {
            demux-source {
              $junos-subscriber-ipv6-address;
            }
            unnumbered-address ge-0/0/3.0 preferred-source-address ::22.22.22.2;
          }
        }
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27

## Example: Configuring IPv4 Static VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure a static IPv4 VLAN demux interface with gigabit Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the gigabit Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on VLAN demux interfaces:

1. Enable VLAN tagging on the underlying interface that you plan to use for the VLAN demux interfaces.

```
interfaces {
  ge-5/0/0 {
    vlan-tagging;
  }
}
```

2. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

3. Define the demux interface.

```
interfaces {
  demux0 {
    unit 102 {
      proxy-arp;
      vlan-id 103;
      demux-options {
        underlying-interface ge-5/0/0;
      }
      family inet {
        unnumbered-address lo0.0 preferred-source-address 173.16.1.1;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
```

```
        }
      }
    }
  }
}
```

5. Configure the access method used to dynamically create the subscriber interfaces.

   The following stanza specifies the gigabit Ethernet interface (**ge-5/0/0.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ge-5/0/0.0;
      }
    }
  }
}
```

   Instead of using the gigabit Ethernet interface, you can alternatively specify the specific demux interface (**demux0.102**) as the device to use with the subscriber interfaces as follows:

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0.102;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 VLAN demux interfaces with gigabit Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying gigabit Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ge-5/0/0 {
    hierarchical-scheduler;
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            103-103;
          }
        }
      }
    }
  }
}
```

2. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

3. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

4. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet {
            filter {
              input rate_limit;
              output rate_limit;
            }
            unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
          }
        }
      }
    }
  }
}
```

5. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the gigabit Ethernet interface (**ge-5/0/0.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ge-5/0/0.0;
      }
    }
  }
}
```

Instead of using the gigabit Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit numbers are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
```

```
                authentication {
                  password test;
                  username-include {
                    user-prefix igmp-user1;
                  }
                }
                dynamic-profile user-profile;
                interface demux0;
              }
            }
          }
        }
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces

This example describes how to configure dynamic IP demux interfaces over dynamic VLAN demux interfaces. You can also configure dynamic IP demux interfaces over static VLAN interfaces. For information on how to configure static VLAN interfaces, see "Configuring a Subscriber Interface with a Static VLAN Interface" on page 22.


- Requirements on page 51
- Overview on page 51
- Configuration on page 51
- Verification on page 56


### Requirements

Before you begin, make sure to configure either DHCP Relay or DHCP Local Server. For information about configuring either of these components, see *Extended DHCP Relay Agent Overview* or *Extended DHCP Local Server Overview*.

### Overview

You can create a subscriber interface using an IP demux interface stacked on a static or dynamic VLAN demux interface. IP demux interfaces are used to uniquely identify subscribers in an access network based on their IP address

### Configuration


- Preparing a Subscriber Access Interface on page 52
- Preparing the Loopback Interface on page 53
- Configuring a Dynamic Profile to Dynamically Create Single-Tagged VLANs on page 54
- Configuring a Dynamic Profile to Dynamically Create IP Demux Interfaces on page 55

## Preparing a Subscriber Access Interface

**CLI Quick Configuration**

To quickly configure the aggregated Ethernet interface over which subscribers access the router:

```
[edit]
set chassis aggregated-devices ethernet device-count 1
set interfaces ge-5/0/9 gigether-options 802.3ad ae0
set interfaces ge-5/1/9 gigether-options 802.3ad ae0
set interfaces ae0 flexible-vlan-tagging
set interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux accept
  inet
set interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux ranges
  ranges 500-1000
set interfaces ae0 aggregated-ether-options lacp active
set interfaces ae0 aggregated-ether-options lacp link-protection
```

**Step-by-Step Procedure**

You must configure an interface over which clients initially access the router. We recommend that you specify the same VLAN tagging for the interface that you expect from incoming clients. This example uses flexible VLAN tagging to simultaneously support transmission of 802.1Q VLAN single-tag and dual-tag frames on logical interfaces on the same Ethernet port.

If you want it to automatically create dynamic VLANs, the interface must include the VLAN range type (single or stacked) and contain any specific ranges you want the VLANs to use.

To configure an interface for subscriber access:

1. Configure the number of aggregated Ethernet interfaces on the router.

   ```
   [edit]
   user@host# set chassis aggregated-devices ethernet device-count 1
   ```

2. Access the physical interface over which you want subscribers to initially access the router.

   ```
   [edit]
   user@host# edit interfaces ge-5/0/9
   ```

3. Specify the aggregated Ethernet interface to which the physical interface belongs.

   ```
   [edit interfaces ge-5/0/9]
   user@host# set gigether-options 802.3ad ae0
   ```

4. Repeat Step 2 and Step 3 for each interface you want to assign to the aggregated Ethernet bundle.

   ```
   [edit]
   user@host# set interfaces ge-5/1/9 gigether-options 802.3ad ae0
   ```

5. Access the aggregated Ethernet interface.

   ```
   [edit]
   user@host# edit interfaces ae0
   ```

6. Specify the VLAN tagging that you want the aggregated Ethernet interfaces to use.

```
[edit interfaces ae0]
user@host# set vlan-tagging
```

7. Edit the **auto-configure** stanza to automatically configure VLANs.

```
[edit interfaces ae0]
user@host# edit auto-configure
```

8. Edit the **vlan-ranges** stanza for single-tagged VLANs.

```
[edit interfaces ae0 auto-configure]
user@host# edit vlan-ranges
```

9. Specify the dynamic VLAN profile that you want the interface to use for dynamically creating single-tagged VLANs.

```
[edit interfaces ae0 auto-configure vlan-ranges]
user@host# edit dynamic-profile Auto-VLAN-Demux
```

10. Specify what VLAN Ethernet packet type the VLAN profile accepts.

```
[edit interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux]
user@host# set accept inet
```

11. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 500 and an upper VLAN ID limit of 1000.

```
[edit interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux]
user@host# set ranges 500-1000
```

12. (Optional) Activate the transmission of LACP packets on the aggregated Ethernet interfaces.

```
[edit interfaces ae0]
user@host# set aggregated-ether-options lacp active
```

13. Specify that the aggregated Ethernet interfaces use link protection.

```
[edit interfaces ae0]
user@host# set aggregated-ether-options lacp link-protection
```

### Preparing the Loopback Interface

**CLI Quick Configuration**

To quickly configure the required loopback interface for this example:

```
[edit]
set interfaces lo0.0 unit 0 family inet address 100.100.100.1/32
```

**Step-by-Step Procedure**

You must configure a loopback interface for use as the unnumbered address and preferred source address for dynamically created interfaces.

To configure the required loopback interface for this example:

1. Configure a loopback interface.

```
[edit]
user@host# edit interfaces lo0.0
```

2. Specify that the loopback interface accept inet packets.

```
[edit interfaces lo0 unit 0]
```

```
user@host# edit family inet
```

3. Specify the IP address for the loopback interface.

```
[edit interfaces lo0 unit 0 family inet]
user@host# set address 100.100.100.1/32
```

### Configuring a Dynamic Profile to Dynamically Create Single-Tagged VLANs

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create single-tagged VLANs in the example:

```
[edit]
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  demux-source inet
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  proxy-arp
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  vlan-id $junos-vlan-id
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  demux options underlying-interface $junos-interface-ifd-name
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  family inet unnumbered-address lo0.0 preferred source-address 100.100.100.1
```

**Step-by-Step Procedure**

For dynamic IP demux interfaces to reside on a dynamic VLAN demux interface, the VLAN interface must first exist.

To configure a dynamic profile that automatically creates VLAN interfaces:

1. Create a dynamic profile for automatically creating single-tagged VLAN interfaces.

```
[edit]
user@host# edit dynamic-profiles Auto-VLAN-Demux
```

2. Specify that the dynamic VLAN profile use the demux interface.

```
[edit dynamic-profiles “Auto-VLAN-Demux”]
user@host# edit interfaces demux0
```

3. Specify that the dynamic profile apply the demux interface unit value to the dynamic VLANs.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0]
user@host# edit unit $junos-interface-unit
```

4. (Optional) Specify that the demux source accepts only IPv4 (inet) packets.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  “$junos-interface-unit”]
user@host# set demux-source inet
```

5. (Optional) Specify that each dynamically created interface respond to any ARP request, as long as an active route exists to the target address of the ARP request.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  “$junos-interface-unit”]
user@host# set proxy-arp
```

6. Specify that VLAN IDs are dynamically created.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set vlan-id $junos-vlan-id
```

7. Specify the logical underlying interface for the dynamic VLANs.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-interface-ifd-name
```

8. Specify that the VLAN demux interface can accept inet family packets for IPoE/DHCP subscribers.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

9. Specify the loopback address as the unnumbered address and preferred source address for the inet family.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

### Configuring a Dynamic Profile to Dynamically Create IP Demux Interfaces

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create IP demux interfaces in the example:

```
[edit]
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  proxy-arp
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  demux-options underlying-interface $junos-underlying-interface
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  family inet demux-source $junos-subscriber-ip-address
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  family inet unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

**Step-by-Step Procedure**

To configure a dynamic profile that automatically creates IP demux interfaces:

1. Create a dynamic profile for dynamically creating IP demux interfaces.

```
[edit]
user@host# edit dynamic-profiles DHCP-IP-Demux
```

2. Specify that the dynamic profile use the demux0 interface.

```
[edit dynamic-profiles DHCP-IP-Demux]
user@host# edit interfaces demux0
```

3. Specify that the dynamic profile apply the interface unit value to the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0]
user@host# edit unit $junos-interface-unit
```

4. (Optional) Configure the router to respond to any ARP request, as long as the router has an active route to the target address of the ARP request.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set proxy-arp
```

5. Specify the logical underlying interface for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-underlying-interface
```

6. Specify the protocol family information for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

7. Specify the demux source address is obtained from the incoming subscriber IP address.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit "$junos-interface-unit"
  family inet]
user@host# set demux-source $junos-subscriber-ip-address
```

8. Specify the loopback interface as the unnumbered address and the demux interface IP address as the preferred source address for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit "$junos-interface-unit"
  family inet]
user@host# set unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

## Verification


- Subscriber Verification on page 56
- Interface Verification on page 56


### Subscriber Verification

**Purpose** View subscriber information on the router.

**Action**

- To display dynamic subscriber information:

  ```
  user@host# show subscribers detail
  ```

### Interface Verification

**Purpose** View interface-specific information on the router.

**Action**

- To display interface-specific output:

  ```
  user@host# show interfaces interface-name
  ```

**Related Documentation**

- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*
- *Configuring Predefined Dynamic Variables in Dynamic Profiles*

- *Dynamic 802.1Q VLAN Overview*
- *Configuring VLAN Dynamic Profiles*
- *Demultiplexing Interface Overview*

## Example: Concurrent Configuration of Dynamic DHCP IP Demux and PPPoE Demux Interfaces over the Same VLAN Demux Interface

This example shows how to configure both dynamic DHCP IP demux and PPPoE demux interfaces over the same dynamic VLAN demux interface. The example provides an IPv4 configuration. However, you can also configure concurrent IP over Ethernet/DHCP and PPPoE interfaces over the same VLAN interface using IPv6 addressing.

NOTE: You can also configure dynamic IP over Ethernet/DHCP and PPPoE interfaces concurrently over the same static VLAN interface. For information on how to configure static VLAN interfaces, see "Configuring a Subscriber Interface with a Static VLAN Interface" on page 22.


- Requirements on page 57
- Overview on page 57
- Configuration on page 57
- Verification on page 66


### Requirements

Before you begin, make sure to configure either DHCP Relay or DHCP Local Server. For information about configuring either of these components, see *Extended DHCP Relay Agent Overview* or *Extended DHCP Local Server Overview*.

### Overview

With the introduction of the **family pppoe** statement, PPPoE is no longer treated as an exclusive encapsulation configuration and you can configure VLAN interfaces with multiple protocol interface stacks. For example, you can configure IP over Ethernet/DHCP and PPPoE interfaces concurrently over a single VLAN interface.

### Configuration


- Preparing a Subscriber Access Interface on page 58
- Preparing the Loopback Interface on page 60
- Configuring a Dynamic Profile to Create Dynamic Single-Tagged VLANs on page 60
- Configuring a Dynamic Profile to Create Dynamic Dual-Tagged VLANs on page 62
- Configuring a Dynamic Profile to Create Dynamic IP Demux Interfaces on page 64
- Configuring a Dynamic Profile to Create Dynamic PPPoE Interfaces on page 65

## Preparing a Subscriber Access Interface

**CLI Quick Configuration**

To quickly configure the aggregated Ethernet interface over which subscribers access the router:

```
[edit]
set chassis aggregated-devices ethernet device-count 1
set interfaces ge-5/0/9 gigether-options 802.3ad ae0
set interfaces ge-5/1/9 gigether-options 802.3ad ae0
set interfaces ae0 flexible-vlan-tagging
set interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux accept
  any
set interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux ranges
  ranges 1000-1500
set interfaces ae0 auto-configure stacked-vlan-ranges dynamic-profile
  Auto-Stacked-VLAN-Demux accept any
set interfaces ae0 auto-configure stacked-vlan-ranges dynamic-profile
  Auto-Stacked-VLAN-Demux ranges 1501-2000,any
set interfaces ae0 aggregated-ether-options lacp active
set interfaces ae0 aggregated-ether-options lacp link-protection
```

**Step-by-Step Procedure**

When configuring multiple protocol interface stacks concurrently over the same VLAN interface, you must configure physical interfaces over which DHCP or PPPoE clients initially access the router. We recommend that you specify the same VLAN tagging for the interface that you expect from incoming clients. This example uses flexible VLAN tagging to simultaneously support transmission of 802.1Q VLAN single-tag and dual-tag frames on logical interfaces on the same Ethernet port.

To automatically create dynamic VLANs, the interface must also include the VLAN range type (single or stacked), dynamic profile reference, and any specific ranges you want the VLANs to use.

To configure a physical interface for subscriber access:

1. Access the physical interface over which you want subscribers to initially access the router.

   ```
   [edit]
   user@host# edit interfaces ge-5/0/9
   ```

2. Specify the aggregated Ethernet interface to which the physical interface belongs.

   ```
   [edit interfaces ge-5/0/9]
   user@host# set gigether-options 802.3ad ae0
   ```

3. Repeat Step 1 and Step 2for each interface you want to assign to the aggregated Ethernet bundle.

   ```
   [edit]
   user@host# set interfaces ge-5/1/9 gigether-options 802.3ad ae0
   ```

4. Access the aggregated Ethernet interface.

   ```
   [edit]
   user@host# edit interfaces ae0
   ```

5. Specify the VLAN tagging that you want the aggregated Ethernet interfaces to use.

```
[edit interfaces ae0]
user@host# set flexible-vlan-tagging
```

6. Edit the **auto-configure** stanza to automatically configure VLANs.

```
[edit interfaces ae0]
user@host# edit auto-configure
```

7. Edit the **vlan-ranges** stanza for single-tagged VLANs.

```
[edit interfaces ae0 auto-configure]
user@host# edit vlan-ranges
```

8. Specify the dynamic VLAN profile that you want the interface to use for dynamically creating single-tagged VLANs.

```
[edit interfaces ae0 auto-configure vlan-ranges]
user@host# edit dynamic-profile Auto-VLAN-Demux
```

9. Specify what VLAN Ethernet packet type the VLAN profile accepts.

```
[edit interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux]
user@host# set accept any
```

10. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 1000 and an upper VLAN ID limit of 1500.

```
[edit interfaces ae0 auto-configure vlan-ranges dynamic-profile Auto-VLAN-Demux]
user@host# set ranges 1000-1500
```

11. Edit the **stacked-vlan-ranges** stanza for the dual-tagged VLANs.

```
[edit interfaces ae0 auto-configure]
user@host# edit stacked-vlan-ranges
```

12. Specify the dynamic VLAN profile that you want the interface to use for dynamically creating dual-tagged VLANs.

```
[edit interfaces ae0 auto-configure stacked-vlan-ranges]
user@host# edit dynamic-profile Auto-Stacked-VLAN-Demux
```

13. Specify what VLAN Ethernet packet type the stacked VLAN profile accepts.

```
[edit interfaces ae0 auto-configure stacked-vlan-ranges dynamic-profile
  Auto-Stacked-VLAN-Demux]
user@host# set accept any
```

14. Specify the outer and inner stacked VLAN ranges that you want the dynamic profile to use. The following example specifies an outer stacked VLAN ID range from 1501 through 2000 (to avoid overlapping VLAN IDs with single-tag VLANs) and an inner stacked VLAN ID range of any (enabling a range from 1 through 4094 for the inner stacked VLAN ID).

```
[edit interfaces ge-5/0/9 auto-configure stacked-vlan-ranges dynamic-profile
  Auto-Stacked-VLAN-Demux]
user@host# set ranges 1501-2000,any
```

15. (Optional) Activate the transmission of LACP packets on the aggregated Ethernet interfaces.

```
[edit interfaces ae0]
user@host# set aggregated-ether-options lacp active
```

16. Specify that the aggregated Ethernet interfaces use link protection.

```
[edit interfaces ae0]
user@host# set aggregated-ether-options link-protection
```

### Preparing the Loopback Interface

**CLI Quick Configuration**

To quickly configure the required loopback interface for this example:

```
[edit]
set interfaces lo0.0 unit 0 family inet address 100.100.100.1/32
```

**Step-by-Step Procedure**

You must configure a loopback interface for use as the unnumbered address and preferred source address for dynamically created interfaces.

To configure the required loopback interface for this example:

1. Configure a loopback interface.

```
[edit]
user@host# edit interfaces lo0.0
```

2. Specify that the loopback interface accept inet packets.

```
[edit interfaces lo0 unit 0]
user@host# edit family inet
```

3. Specify the IP address for the loopback interface.

```
[edit interfaces lo0 unit 0 family inet]
user@host# set address 100.100.100.1/32
```

### Configuring a Dynamic Profile to Create Dynamic Single-Tagged VLANs

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create single-tagged VLANs in the example:

```
[edit]
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  demux-source inet
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  proxy-arp
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  vlan-id $junos-vlan-id
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  demux options underlying-interface $junos-interface-ifd-name
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  family inet unnumbered-address lo0.0 preferred source-address 100.100.100.1
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  family pppoe duplicate-protection
set dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit $junos-interface-unit
  family pppoe dynamic-profile PPP-Base-PAP
```

**Step-by-Step Procedure**

For both dynamic DHCP IP demux and dynamic PPPoE interfaces to reside concurrently on a single-tagged VLAN interface, the VLAN interface must first exist.

To configure a dynamic profile that automatically creates VLAN interfaces:

1. Create a dynamic profile for automatically creating VLAN interfaces.

   ```
   [edit]
   user@host# edit dynamic-profiles Auto-VLAN-Demux
   ```

2. Specify that the dynamic VLAN profile use the demux interface.

   ```
   [edit dynamic-profiles “Auto-VLAN-Demux”]
   user@host# edit interfaces demux0
   ```

3. Specify that the dynamic profile apply the demux interface unit value to the dynamic VLANs.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0]
   user@host# edit unit $junos-interface-unit
   ```

4. Specify that the demux source accept IPv4 (inet) packets.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit”]
   user@host# set demux-source inet
   ```

5. (Optional) Specify that each dynamically created interface respond to any ARP request, as long as an active route exists to the target address of the ARP request.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit”]
   user@host# set proxy-arp
   ```

6. Specify that VLAN IDs are dynamically created.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit”]
   user@host# set vlan-id $junos-vlan-id
   ```

7. Specify the logical underlying interface for the dynamic VLANs.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit”]
   user@host# set demux-options underlying-interface $junos-interface-ifd-name
   ```

8. Specify that the VLAN demux interface can accept inet family packets for IP over Ethernet/DHCP subscribers.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit”]
   user@host# edit family inet
   ```

9. Specify the loopback address as the unnumbered address and preferred source address for the inet family.

   ```
   [edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
     “$junos-interface-unit” family inet]
   user@host# set unnumbered-address lo0.0 preferred-source-address 100.100.100.1
   ```

10. Specify that the VLAN demux interface can accept pppoe family packets for PPPoE subscribers.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family pppoe
```

11. Prevent multiple PPPoE sessions from being created for the same PPPoE subscriber on the same VLAN interface.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family pppoe]
user@host# set duplicate-protection
```

12. Apply the dynamic PPP interface profile to any dynamic PPP interfaces.

```
[edit dynamic-profiles Auto-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family pppoe]
user@host# set dynamic-profile PPP-Base-PAP
```

### Configuring a Dynamic Profile to Create Dynamic Dual-Tagged VLANs

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create stacked/dual-tagged VLANs in the example:

```
[edit]
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit demux-source inet
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit proxy-arp
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit vlan-tags outer $junos-stacked-vlan-id
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit vlan-tags inner $junos-vlan-id
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit demux options underlying-interface $junos-interface-ifd-name
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit family inet unnumbered-address lo0.0 preferred source-address
  100.100.100.1
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit family pppoe duplicate-protection
set dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  $junos-interface-unit family pppoe dynamic-profile PPP-Base-PAP
```

**Step-by-Step Procedure**

For both dynamic DHCP IP demux and dynamic PPPoE interfaces to reside concurrently on a VLAN interface, the VLAN interface must first exist.

To configure a dynamic profile that automatically creates stacked/dual-tagged VLAN interfaces:

1. Create a dynamic profile for automatically creating VLAN interfaces.

```
[edit]
user@host# edit dynamic-profiles Auto-Stacked-VLAN-Demux
```

2. Specify that the dynamic VLAN profile use the demux interface.

```
[edit dynamic-profiles "Auto-Stacked-VLAN-Demux"]
user@host# edit interfaces demux0
```

3. Specify that the dynamic profile apply the demux interface unit value to the dynamic VLANs.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0]
user@host# edit unit $junos-interface-unit
```

4. Specify that the demux source accept IPv4 (inet) packets.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-source inet
```

5. (Optional) Specify that each dynamically created interface respond to any ARP request, as long as an active route exists to the target address of the ARP request.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set proxy-arp
```

6. Specify that the outer VLAN ID is dynamically created.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set vlan-id -tags outer $junos-stacked-vlan-id
```

7. Specify that the inner VLAN ID is dynamically created.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set vlan-id -tags inner $junos-vlan-id
```

8. Specify the logical underlying interface for the dynamic VLANs.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-interface-ifd-name
```

9. Specify that the VLAN demux interface can accept inet family packets for IP over Ethernet/DHCP subscribers.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

10. Specify the loopback address as the unnumbered address and preferred source address for the inet family.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

11. Specify that the VLAN demux interface can accept pppoe family packets for PPPoE subscribers.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family pppoe
```

12. Prevent the activation of another dynamic PPPoE logical interface on the same demux underlying interface.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family pppoe]
user@host# set duplicate-protection
```

13. Apply the dynamic PPP interface profile to any dynamic PPP interfaces.

```
[edit dynamic-profiles Auto-Stacked-VLAN-Demux interfaces demux0 unit
  "$junos-interface-unit" family pppoe]
user@host# set dynamic-profile PPP-Base-PAP
```

## Configuring a Dynamic Profile to Create Dynamic IP Demux Interfaces

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create DHCP IP demux interfaces in the example:

```
[edit]
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  proxy-arp
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  demux-options underlying-interface $junos-underlying-interface
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  family inet demux-source $junos-subscriber-ip-address
set dynamic-profiles DHCP-IP-Demux interfaces demux0 unit $junos-interface-unit
  family inet unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

**Step-by-Step Procedure**

To configure a dynamic profile that automatically creates IP demux interfaces:

1. Create a dynamic profile for dynamically creating IP demux interfaces.

```
[edit]
user@host# edit dynamic-profiles DHCP-IP-Demux
```

2. Specify that the dynamic profile use the demux0 interface.

```
[edit dynamic-profiles DHCP-IP-Demux]
user@host# edit interfaces demux0
```

3. Specify that the dynamic profile apply the interface unit value to the dynamic PPPoE interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0]
user@host# edit unit $junos-interface-unit
```

4. (Optional) Configure the router to respond to any ARP request, as long as the router has an active route to the target address of the ARP request.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set proxy-arp
```

5. Specify the logical underlying interface for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-underlying-interface
```

6. Specify the protocol family information for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit
  "$junos-interface-unit"]
```

```
user@host# edit family inet
```

7. Specify the demux source address is obtained from the incoming subscriber IP address.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit "$junos-interface-unit"
  family inet]
user@host# set demux-source $junos-subscriber-ip-address
```

8. Specify the loopback interface as the unnumbered address and the demux interface IP address as the preferred source address for the dynamic IP demux interfaces.

```
[edit dynamic-profiles DHCP-IP-Demux interfaces demux0 unit "$junos-interface-unit"
  family inet]
user@host# set unnumbered-address lo0.0 preferred-source-address 100.100.100.1
```

### Configuring a Dynamic Profile to Create Dynamic PPPoE Interfaces

**CLI Quick Configuration**

To quickly configure the dynamic profile used to dynamically create PPPoE interfaces in the example:

```
[edit]
set dynamic-profiles PPP-Base-PAP interfaces pp0 unit $junos-interface-unit ppp-options
  pap
set dynamic-profiles PPP-Base-PAP interfaces pp0 unit $junos-interface-unit
  pppoe-options underlying-interface $junos-underlying-interface server
set dynamic-profiles PPP-Base-PAP interfaces pp0 unit $junos-interface-unit
  no-keepalives
set dynamic-profiles PPP-Base-PAP interfaces pp0 unit $junos-interface-unit family inet
  unnumbered-address lo0.0
```

**Step-by-Step Procedure**

1. Create a dynamic profile for automatically creating PPPoE interfaces.

```
[edit]
user@host# edit dynamic-profiles PPP-Base-PAP
```

2. Specify that the dynamic PPPoE profile use the pp0 interface.

```
[edit dynamic-profiles PPP-Base-PAP]
user@host# edit interfaces pp0
```

3. Specify that the dynamic profile apply the interface unit value to the dynamic PPPoE interfaces.

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

4. Specify that dynamically created PPPoE interfaces use PAP authentication.

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

5. Specify the logical underlying interface for the dynamic PPPoE interfaces.

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

6. Specify that the router act as a PPPoE server.

```
[edit dynamic-profiles PPP-Base-PAP interfaces pp0 unit "$junos-interface-unit"]
```

```
user@host# set pppoe-options server
```

7. (Optional) Disable the sending of keepalive messages on the dynamic PPPoE interfaces.

```
[edit dynamic-profiles PPP-Base-PAP interfaces pp0 unit “$junos-interface-unit”]
user@host# set no-keepalives
```

8. Specify the protocol family information for the dynamic PPPoE interfaces.

```
[edit dynamic-profiles PPP-Base-PAP interfaces pp0 unit “$junos-interface-unit”]
user@host# edit family inet
```

9. Specify the loopback interface as the unnumbered address for the dynamic PPPoE interfaces.

```
[edit dynamic-profiles PPP-Base-PAP interfaces pp0 unit “$junos-interface-unit”]
user@host# set unnumbered-address lo0.0
```

## Verification


- Subscriber Verification on page 66
- Interface Verification on page 66


### Subscriber Verification

**Purpose** View subscriber information on the router.

**Action**

- To display dynamic subscriber information:

```
user@host# show subscribers detail
```

### Interface Verification

**Purpose** View interface-specific information on the router.

**Action**

- To display interface-specific output:

```
user@host# show interfaces interface-name
```

**Related Documentation**

- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*
- *Configuring Predefined Dynamic Variables in Dynamic Profiles*
- *Dynamic 802.1Q VLAN Overview*
- *Configuring VLAN Dynamic Profiles*
- *Demultiplexing Interface Overview*
- Configuring the PPPoE Family for an Underlying Interface on page 72

CHAPTER 5

# Configuration Tasks for Subscriber Interfaces over Aggregated Ethernet


- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 68
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 69
- Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet on page 70
- Configuring the PPPoE Family for an Underlying Interface on page 72
- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74
- Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 75
- Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface on page 75
- Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 76
- Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 77

## Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet

You can configure a subscriber link represented by a static virtual LAN (VLAN) stacked on an aggregated Ethernet logical interface.

You can configure subscriber management services such as firewall filters and CoS for this subscriber interface.

To configure a subscriber interface using a static VLAN interface over an aggregated Ethernet logical interface:

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See *Configuring the Number of Aggregated Ethernet Interfaces on the Device*.

   b. Configure the aggregated Ethernet interface.

      See *Configuring an Aggregated Ethernet Interface*.

   c. (Optional) Configure LACP.

      See *Configuring Aggregated Ethernet LACP*.

   d. (Optional) Configure the minimum number of links.

      See *Configuring Aggregated Ethernet Minimum Links*.

   e. (Optional) Configure the link speed.

      See *Configuring Aggregated Ethernet Link Speed*.

   f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

      See *Configuring Aggregated Ethernet Link Protection*.

   NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see *Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links*.

2. Configure the static or dynamic VLAN interface.
   - For static VLAN interfaces, see "Configuring a Subscriber Interface with a Static VLAN Interface" on page 22.
   - For dynamic VLAN interfaces, see *Configuring VLAN Dynamic Profiles* and *Configuring VLAN Interfaces to Use Dynamic Profiles*.
3. Configure subscriber management services on the subscriber interface.

- For firewall filters, see *Dynamically Attaching Statically Created Filters for Any Interface Type* or *Dynamically Attaching Statically Created Filters for a Specific Interface Family Type*.
- For hierarchical CoS, see *Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links*.

**Related Documentation**

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 11
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 79
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *CoS for Subscriber Access Overview*

## Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet

You can configure a subscriber interface using a static or dynamic IP demultiplexing (demux) logical interface stacked on an aggregated Ethernet logical interface. Optionally, you can configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See *Configuring the Number of Aggregated Ethernet Interfaces on the Device*.

   b. Configure the aggregated Ethernet interface.

      See *Configuring an Aggregated Ethernet Interface*.

   c. (Optional) Configure LACP.

      See *Configuring Aggregated Ethernet LACP*.

   d. (Optional) Configure the minimum number of links.

      See *Configuring Aggregated Ethernet Minimum Links*.

   e. (Optional) Configure the link speed.

      See *Configuring Aggregated Ethernet Link Speed*.

   f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

      For general instructions, see *Configuring Aggregated Ethernet Link Protection*.

NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see *Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links*.

2. Configure the aggregated Ethernet logical interface as the underlying interface to support the static or dynamic IP demux subscriber interface.

   The aggregated Ethernet interface needs to support demultiplexing of incoming traffic to the Ethernet links based on IPv4 destination or source addresses in the incoming packets. In addition, you must configure the IP address of each link.

   See *Configuring an IP Demux Underlying Interface*.

3. Configure the static or dynamic IP demux interface.

   - For static subscriber interfaces, see "Configuring Static Subscriber Interfaces Using IP Demux Interfaces" on page 22.
   - For dynamic subscriber interfaces, see "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 27.

   NOTE: IP demux interfaces currently support only the Internet Protocol version 4 (IPv4) suite (**family inet**).

4. (Optional) Configure subscriber management services on the subscriber interface.

   - For firewall filters, see *Dynamically Attaching Statically Created Filters for Any Interface Type* or *Dynamically Attaching Statically Created Filters for a Specific Interface Family Type*.
   - For hierarchical CoS, see *Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links*.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 82
- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74

## Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet

You can configure a subscriber interface using a static or dynamic VLAN demultiplexing (demux) logical interface stacked on an aggregated Ethernet physical interface.

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See *Configuring the Number of Aggregated Ethernet Interfaces on the Device*.

   b. Configure the aggregated Ethernet interface.

      See *Configuring an Aggregated Ethernet Interface*.

   c. (Optional) Configure LACP.

      See *Configuring Aggregated Ethernet LACP*.

   d. (Optional) Configure the minimum number of links.

      See *Configuring Aggregated Ethernet Minimum Links*.

   e. (Optional) Configure the link speed.

      See *Configuring Aggregated Ethernet Link Speed*.

   f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

      For general instructions, see *Configuring Aggregated Ethernet Link Protection*.

2. Configure the aggregated Ethernet physical interface as the underlying interface to support the static or dynamic VLAN demux subscriber interface.

   The aggregated Ethernet interface needs to support demultiplexing of incoming traffic to the Ethernet links based on the VLAN ID in the incoming packets.

   See *Configuring a VLAN Demux Underlying Interface*.

3. Configure the static or dynamic VLAN demux interface.
   - For static subscriber interfaces, see "Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces" on page 23.
   - For dynamic subscriber interfaces, see "Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles" on page 28.

   NOTE: **VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (family inet) and the Internet Protocol version 6 (IPv6) suite (family inet6).**

   **VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only MPCs installed. If the router has other cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.**

4. (Optional) Configure subscriber management services on the subscriber interface.

- For firewall filters, see *Dynamically Attaching Statically Created Filters for Any Interface Type* or *Dynamically Attaching Statically Created Filters for a Specific Interface Family Type*.
- For hierarchical CoS, see *Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links*.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- *Associating VLAN IDs to VLAN Demux Interfaces*
- Example: Configuring IPv4 Static VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 47
- Example: Configuring IPv4 Static VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 87
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 49
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 90

## Configuring the PPPoE Family for an Underlying Interface

You can configure the PPPoE family on an underlying interface as an alternative to configuring PPPoE encapsulation on that interface. You cannot configure both on the same interface. You can configure the same attributes for the PPPoE family as you can for an interface configured with **pppoe-underlying-options**.

Before you begin, configure the underlying interface. When you want to configure PPPoE on an aggregated Ethernet bundle, you must configure the PPPoE family over a VLAN demux interface as an intermediate underlying option. The VLAN demux interface can be static or dynamic.

The following topics describe how to configure basic static and dynamic interfaces:

- Configuring a Subscriber Interface with a Static VLAN Interface on page 22
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28

To configure the PPPoE family over an underlying interface:

1. Specify the PPPoE family.

   [edit interfaces demux0 unit *logical-unit-number*]
   user@host# **set family pppoe**

2. (Optional) Configure an alternative access concentrator name to be used instead of the system name in PPPoE control packets for the dynamic PPPoE subscriber interface.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# **set** access-concentrator ***name***

3. (Optional) Configure duplicate protection to prevent the activation of another dynamic PPPoE logical interface on the same underlying interface when a dynamic PPPoE logical interface for a client with the same MAC address is already active on that interface.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# **set** duplicate-protection

4. (Optional) Attach a dynamic profile to determine the properties of the dynamic PPPoE logical interface when it is created.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# **set** dynamic-profile ***profile-name***

5. (Optional) Configure the maximum number of concurrent PPPoE sessions that the router can activate on the underlying interface in either of the following ways:

   - To configure the maximum number of concurrent PPPoE sessions on a per-interface basis, from 1 through the platform-specific default for your router, use the **max-sessions** statement:

     [edit interfaces demux0 unit *logical-unit-number* family pppoe]
     user@host# **set** max-sessions ***number***

   - To configure the maximum number of concurrent PPPoE sessions on a per-subscriber basis, use the value returned by RADIUS in the Max-Clients-Per-Interface Juniper Networks vendor-specific attribute (VSA) [26-143]. By default, the PPPoE maximum session value returned by RADIUS in the Max-Clients-Per-Interface VSA takes precedence over the PPPoE maximum session value configured with the **max-sessions** statement.

6. (Optional) Configure the router to ignore the value returned by RADIUS in the Max-Clients-Per-Interface VSA and restore the PPPoE maximum session value on the underlying interface to the value configured in the CLI with the **max-sessions** statement.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# **set max-sessions-vsa-ignore**

7. (Optional) Enable PPPoE subscriber session lockout on the PPPoE underlying interface in either of the following ways:

   - To configure PPPoE subscriber session lockout with the default lockout period:

     [edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]
     user@host# **set short-cycle-protection**

   - To configure PPPoE subscriber session lockout with a nondefault lockout period:

     [edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]
     user@host# **set short-cycle-protection lockout-time-min** ***minimum-seconds***
     **lockout-time-max** ***maximum-seconds***

BEST PRACTICE: When you configure PPPoE subscriber session lockout, we recommend that you also enable duplicate protection to ensure that the MAC source address for each PPPoE session is unique on the underlying interface.

8. (Optional) Specify the service name table assigned to the underlying interface.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# set service-name-table ***table-name***

9. (Optional) Specify that DSL Forum VSAs received on the interface are ignored; use when the CPE device is directly connected to the router.

   [edit interfaces demux0 unit *logical-unit-number* family pppoe]
   user@host# set direct-connect

**Related Documentation**

- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- *Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces*
- *Configuring Lockout of PPPoE Subscriber Sessions*
- Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 109
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 114
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Dynamic Underlying VLAN Demux Interface over Aggregated Ethernet on page 120

## Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces

By default, the system supports hash-based distribution of subscriber traffic in aggregated Ethernet bundles. You can configure the system to target the egress traffic for a subscriber on a single member link, using a single scheduler resource. The system distributes the subscriber interfaces equally among the member links.

To configure targeted distribution:

1. Edit the chassis hierarchy level.

   [edit]
   user@host#**edit chassis**

2. Enable chassis network services for **enhanced-ip** mode.

   [edit chassis]
   user@host#**set network-services enhanced-ip**

3. Access the logical interface.

   [edit]

```
user@host#edit interfaces demux0 unit logical-unit-number
```

4. Enable targeted distribution for the interface.

```
[edit interfaces demux0 unit logical-unit-number]
user@host#set targeted-distribution
```

**Related Documentation**

- *Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface*
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14

## Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface

By default, an aggregated Ethernet bundle with targeted distribution is enabled with link redundancy. Backup links for a subscriber are chosen based on the link with the fewest subscribers, which provides redundancy if a link fails.

We recommend that you configure the module redundancy option to provide redundancy if a module or a link fails. Backup links for a subscriber are chosen on a different DPC or MPC from the primary link, based on the link with the fewest subscribers among the links on different modules.

To configure module redundancy for an aggregated Ethernet bundle:

1. Access the aggregated Ethernet bundle for which you want to configure module redundancy.

```
edit
user@host# edit interfaces aex aggregated-ether-options
```

2. Enable module redundancy for the bundle.

```
[edit interfaces aex aggregated-ether-options]
user@host# logical-interface-fpc-redundancy
```

**Related Documentation**

- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14

## Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface

In a targeted distribution model, the system allocates demux subscriber interfaces equally among the member links in the aggregated Ethernet interface. When links are removed, affected subscribers are redistributed among the active remaining backup links. When links are added to the system, no automatic redistribution occurs. New subscribers are assigned to the links with the fewest subscribers (which are typically the new links).

During normal network operations, the system maintains an even balance of traffic among the links in a bundle, even as subscribers log in and out. However, if the distribution of a bundle becomes uneven (for example, when a link goes down for a period of time

and new subscribers are logging in), you can perform a manual rebalance of the bundle. In addition, you can configure periodic rebalancing of the bundle with a specific interval.

- Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface on page 76
- Configuring Manual Rebalancing of Subscribers on an Aggregated Ethernet Interface on page 76

### Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface

If subscribers are frequently logging in and logging out of your network, you can configure the system to periodically rebalance the links based on a specific time and interval.

To configure periodic rebalancing:

1. Access the aggregated Ethernet interface for which you want to configure periodic rebalancing.

   edit
   user@host# **edit interfaces ae*number* aggregated-ether-options**

2. Configure the rebalancing parameters for the interface, including the time and the interval between rebalancing actions.

   [edit interfaces ae*number* aggregated-ether-options]
   user@host# rebalance-periodic **time *hour:minute* <interval *hours*>**

### Configuring Manual Rebalancing of Subscribers on an Aggregated Ethernet Interface

To manually rebalance the subscribers among the links in an aggregated Ethernet bundle with targeted distribution:

- Issue the **request interface rebalance** command:

  user@host# request interface rebalance **interface <*interface-name*>**

**Related Documentation**

- *Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface*
- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74
- Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 14

## Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces

By default, the system supports hash-based distribution of subscriber traffic in aggregated Ethernet bundles. You can configure the system to target the egress traffic for a subscriber on a single member link, using a single scheduler resource. The system distributes the subscriber interfaces equally among the member links.

To configure targeted distribution:

1. Edit the chassis hierarchy level.

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

2. Enable chassis network services for **enhanced-ip** mode.

```
[edit chassis]
user@host#set network-services enhanced-ip
```

3. Access the logical interface.

```
[edit]
user@host#edit interfaces pp0 unit logical-unit-number
```

4. Enable targeted distribution for the interface.

```
[edit interfaces pp0 unit logical-unit-number]
user@host#set targeted-distribution
```

**Related Documentation**

- *CoS for PPPoE Subscriber Interfaces Overview*
- Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 77

## Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface

**Purpose** View the distribution status of subscribers that are targeted to links in an aggregated Ethernet interface.

**Action**

- To display a summary of the distribution of links on the demux interface:

```
user@host> show interfaces pp0 extensive
```

- To display the targeted distribution on a specific aggregated Ethernet interface:

```
user@host> show interfaces targeting aex
```

**Related Documentation**

- *CoS for PPPoE Subscriber Interfaces Overview*
- Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 76

CHAPTER 6

# Subscriber Interfaces over Aggregated Ethernet Examples


- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 79
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 82
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 84
- Example: Configuring IPv4 Static VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 87
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 90
- Example: Configuring IPv6 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 93
- Example: Configuring IPv4 Dynamic Stacked VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 96
- Example: Separating Targeted Multicast Traffic for Demux Subscribers on Aggregated Ethernet Interfaces on page 99
- Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 109
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 114
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Dynamic Underlying VLAN Demux Interface over Aggregated Ethernet on page 120


## Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level, and per-subscriber static hierarchical

class-of-service (CoS) is configured by applying CoS parameters at the aggregated Ethernet logical interface.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router.

```
[edit]
chassis {
  aggregated-devices {
    ethernet {
      device-count 1;
    }
  }
}
```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN subscriber interface. In order to support hierarchical CoS, the physical ports must be on EQ DPCs in MX Series routers.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

```
[edit]
interfaces {
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
    ge-5/1/2 {
      gigether-options {
        802.3ad {
          ae0;
          backup;
        }
      }
    }
  }
}
```

3. Configure **ae0** to serve as the underlying interface for the static VLAN interface.

```
[edit]
interfaces {
  ae0 {
    hierarchical-scheduler;
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
      lacp {
        active;
```

```
        }
      }
    }
  }
```

4. Configure static traffic-shaping and scheduling parameters.

```
[edit]
class-of-service {
  forwarding-classes { # Associate queue numbers with class names
    queue 0 be;
    queue 1 e;
    queue 2 af;
    queue 3 nc;
  }
  schedulers { # Define output queue properties
    scheduler_be {
      transmit-rate percent 30;
      buffer-size percent 30;
    }
    scheduler_ef {
      transmit-rate percent 40;
      buffer-size percent 40;
    }
    scheduler_af {
      transmit-rate percent 25;
      buffer-size percent 25;
    }
    scheduler_nc {
      transmit-rate percent 5;
      buffer-size percent 5;
    }
  }
  scheduler-maps { # Associate queues with schedulers
    smap_2 {
      forwarding-class be scheduler_be;
      forwarding-class ef scheduler_ef;
      forwarding-class-af scheduler_af;
      forwarding-class-nc scheduler_nc;
    }
  }
}
```

5. Attach static CoS to the physical and logical interfaces of the aggregated Ethernet interface.

   In this example, three traffic control profiles are defined, but only two profiles are applied to the static VLAN subscriber interface over aggregated Ethernet:

   - The **tcp_for_ae_device_pir_500m** profile defines a shaping rate, and it is applied to both of the underlying physical interfaces (**ge-5/0/3** and **ge-5/1/2**).
   - The **tcp-for-ae_smap_video_pir_20m_delay_30m** profile defines a scheduler map, a shaping rate, and a delay buffer rate, and it is applied to one of the logical interfaces on the aggregated Ethernet bundle (**ae0.0**).

     [edit]

```
class-of-service {
  traffic-control-profiles { # Configure traffic shaping and scheduling profiles
    tcp_for_ae_device_pir_500m {
      shaping-rate 20m;
    }
    tcp_for_ae_smap_video_pir_20m_delay_30m {
      scheduler-map smap_video;
      shaping-rate 20m;
      delay-buffer-rate 30m;
    }
    tcp_for_ae_smap_video_cir_50m_delay_75m {
      scheduler-map smap_video;
      guaranteed-rate 50m;
      delay-buffer-rate 75m;
    }
  }
  interfaces { # Apply two traffic-control profiles to the LAG
    ae0 { # Two underlying physical interfaces on separate EQ DPCs
      output-traffic-control-profile tcp-for-ae_device_pir_500m;
      unit 0 { # One of the two logical interfaces on 'ae0'
        output-traffic-control-profile tcp-for-ae_smap_video_pir_20m_delay_30m;
      }
    }
  }
}
```

**Related Documentation**

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 11
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 68
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *CoS for Subscriber Access Overview*

## Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static IP demultiplexing (demux) interface stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router:

   ```
   [edit]
   chassis {
     aggregated-devices {
       ethernet {
         device-count 1;
   ```

```
    }
  }
}
```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static IP demux subscriber interface.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

```
[edit]
interfaces {
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
  }
  ge-5/1/2 {
    gigether-options {
      802.3ad {
        ae0;
        backup;
      }
    }
  }
}
```

3. Configure the aggregated Ethernet logical interface with link protection enabled, and specify the logical demultiplexing source family type for both the active and backup links.

```
[edit]
interfaces {
  ae0 {
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
    }
    unit 0 {
      demux-source inet {
      family inet {
        address 20.1.1.0/24;
      }
    }
    unit 1 {
      demux-source inet {
      family inet {
        address 20.1.1.1/24;
      }
    }
  }
}
```

4. Configure the IP demux interface over the aggregated Ethernet logical interface.

```
[edit]
interfaces {
  demux0 {
    unit 101 {
      demux-options {
        underlying-interface ae0.0;
      }
      family inet {
        demux-source 10.1.0.0/16;
        address 1.1.1.0/24;
      }
    }
    unit 101 {
      demux-options {
        underlying-interface ae0.1;
      }
      family inet {
        demux-source 10.1.0.1/16;
        address 1.1.1.1/24;
      }
    }
  }
}
```

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 69

## Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level, and per-subscriber static hierarchical class-of-service (CoS) is configured by applying CoS parameters at the aggregated Ethernet logical interface.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router.

```
[edit]
chassis {
  aggregated-devices {
    ethernet {
      device-count 1;
```

```
    }
  }
}
```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN subscriber interface. In order to support hierarchical CoS, the physical ports must be on EQ DPCs in MX Series routers.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

```
[edit]
interfaces {
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
    ge-5/1/2 {
      gigether-options {
        802.3ad {
          ae0;
          backup;
        }
      }
    }
  }
}
```

3. Configure **ae0** to serve as the underlying interface for the static VLAN interface.

```
[edit]
interfaces {
  ae0 {
    hierarchical-scheduler;
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
      lacp {
        active;
      }
    }
  }
}
```

4. Configure static traffic-shaping and scheduling parameters.

```
[edit]
class-of-service {
  forwarding-classes { # Associate queue numbers with class names
    queue 0 be;
    queue 1 e;
    queue 2 af;
    queue 3 nc;
```

```
    }
    schedulers { # Define output queue properties
      scheduler_be {
        transmit-rate percent 30;
        buffer-size percent 30;
      }
      scheduler_ef {
        transmit-rate percent 40;
        buffer-size percent 40;
      }
      scheduler_af {
        transmit-rate percent 25;
        buffer-size percent 25;
      }
      scheduler_nc {
        transmit-rate percent 5;
        buffer-size percent 5;
      }
    }
    scheduler-maps { # Associate queues with schedulers
      smap_2 {
        forwarding-class be scheduler_be;
        forwarding-class ef scheduler_ef;
        forwarding-class-af scheduler_af;
        forwarding-class-nc scheduler_nc;
      }
    }
  }
```

5. Attach static CoS to the physical and logical interfaces of the aggregated Ethernet interface.

   In this example, three traffic control profiles are defined, but only two profiles are applied to the static VLAN subscriber interface over aggregated Ethernet:

   - The **tcp_for_ae_device_pir_500m** profile defines a shaping rate, and it is applied to both of the underlying physical interfaces (**ge-5/0/3** and **ge-5/1/2**).
   - The **tcp-for-ae_smap_video_pir_20m_delay_30m** profile defines a scheduler map, a shaping rate, and a delay buffer rate, and it is applied to one of the logical interfaces on the aggregated Ethernet bundle (**ae0.0**).

   ```
   [edit]
   class-of-service {
     traffic-control-profiles { # Configure traffic shaping and scheduling profiles
       tcp_for_ae_device_pir_500m {
         shaping-rate 20m;
       }
       tcp_for_ae_smap_video_pir_20m_delay_30m {
         scheduler-map smap_video;
         shaping-rate 20m;
         delay-buffer-rate 30m;
       }
       tcp_for_ae_smap_video_cir_50m_delay_75m {
         scheduler-map smap_video;
         guaranteed-rate 50m;
   ```

```
        delay-buffer-rate 75m;
      }
    }
    interfaces { # Apply two traffic-control profiles to the LAG
      ae0 { # Two underlying physical interfaces on separate EQ DPCs
        output-traffic-control-profile tcp-for-ae_device_pir_500m;
        unit 0 { # One of the two logical interfaces on 'ae0'
          output-traffic-control-profile tcp-for-ae_smap_video_pir_20m_delay_30m;
        }
      }
    }
  }
```

**Related Documentation**

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 11
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 68
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *CoS for Subscriber Access Overview*

## Example: Configuring IPv4 Static VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure a static IPv4 VLAN demux interface with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on VLAN demux interfaces:

1. Enable hierarchical scheduling and VLAN tagging on the underlying interface that you plan to use for any VLAN demux interfaces.

```
interfaces {
  ae1 {
    hierarchical-scheduler;
    vlan-tagging;
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
  ge-5/2/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
}
```

3. Define the demux interface.

```
interfaces {
  demux0 {
    unit 102 {
      proxy-arp;
      vlan-id 103;
      demux-options {
        underlying-interface ae1;
      }
      family inet {
        unnumbered-address lo0.0 preferred-source-address 173.16.1.1;
      }
    }
  }
}
```

4. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

5. Configure a dynamic profile for initial subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    protocols {
      igmp {
        interface "$junos-interface-name" {
          version 3;
          immediate-leave;
```

```
            promiscuous-mode;
          }
        }
      }
    }
  }
```

6. Configure the access method used to dynamically create the subscriber interfaces.

   The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ae1.0;
      }
    }
  }
}
```

   Instead of using the aggregated Ethernet interface, you can alternatively specify the specific demux interface (**demux0.102**) as the device to use with the subscriber interfaces as follows:

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0.102;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

NOTE: VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only MPCs installed. If the router has other cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
```

```
    }
    ge-5/2/0 {
      gigether-options {
        802.3ad ae1;
      }
    }
  }
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet {
            filter {
              input rate_limit;
              output rate_limit;
            }
            unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
          }
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ae1.0;
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Configuring IPv6 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv6 VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

NOTE: VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only MPCs installed. If the router has other cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet6;
          ranges {
            any;
          }
        }
      }
    }
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
```

```
    }
    ge-5/2/0 {
      gigether-options {
        802.3ad ae1;
      }
    }
  }
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet6 {
        address 2009:174:1:1::1/128;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet6;
        }
      }
    }
  }
}
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet6 {
            filter {
              input v6_rate_limit;
              output v6_rate_limit;
            }
            unnumbered-address lo0.0 preferred-source-address 2009:174:1:1::1;
          }
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      dhcpv6 {
        group myV6DhcpGroup {
          authentication {
            password test;
            username-include {
              user-prefix igmp-user1;
            }
          }
          dynamic-profile user-profile;
          interface ae1.0;
        }
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      dhcpv6 {
        group myV6DhcpGroup {
          authentication {
            password test;
            username-include {
              user-prefix igmp-user1;
            }
          }
          dynamic-profile user-profile;
          interface demux0;
        }
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

## Example: Configuring IPv4 Dynamic Stacked VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 stacked VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

NOTE: VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only MPCs installed. If the router has other cards in addition to MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    flexible-vlan-tagging;
    auto-configure {
      stacked-vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
```

```
    }
    ge-5/2/0 {
      gigether-options {
        802.3ad ae1;
      }
    }
}
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-tags outer "$junos-stacked-vlan-id" inner "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet {
            filter {
              input rate_limit;
              output rate_limit;
            }
            unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
          }
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ae1.0;
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0;
      }
    }
  }
}
```

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*

# Example: Separating Targeted Multicast Traffic for Demux Subscribers on Aggregated Ethernet Interfaces

This example shows how to separate targeted multicast traffic from targeted unicast traffic and send that multicast traffic to a different interface through the use of OIF maps.


- Requirements on page 99
- Overview on page 99
- Configuration on page 99
- Verification on page 104


## Requirements

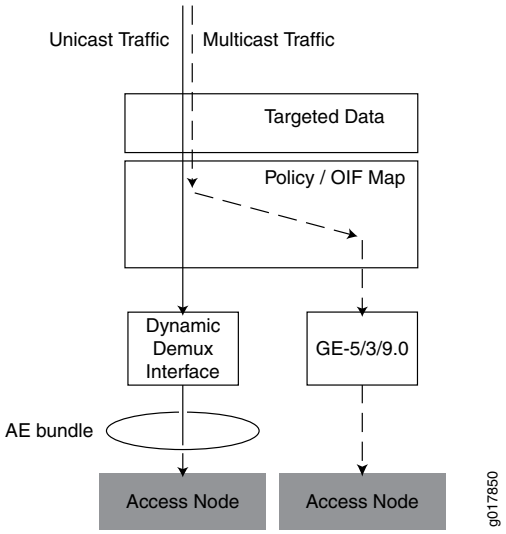
Before configuring this example, make sure to configure the distribution type for the interface. See "Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces" on page 74 for instructions.

## Overview

In this example, targeted traffic distribution is already configured on the router. Dynamically created interfaces each carry their unicast traffic but all multicast traffic is sent to the GE-5/3/9.0 interface.

Figure 4 on page 99 shows the sample network.

### Figure 4: Multicast Traffic Separation Using OIF Mapping




## Configuration


- Configure an OIF Map Policy on page 100
- Configure a DHCP VLAN Dynamic Profile on page 101
- Configure a VLAN Demux Dynamic Profile on page 102

**CLI Quick Configuration**

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

```
set policy-options policy-statement OIF-v4-all term oif539 from route-filter 224 .0.0.0/4
  orlonger
set policy-options policy-statement OIF-v4-all term oif539 then map-to-interface
  ge-5/3/9.0
set policy-options policy-statement OIF-v4-all term oif539 then accept
set dynamic-profiles dhcp-vlan-prof interfaces "$junos-interface-ifd-name" unit
  "$junos-underlying-interface-unit" family inet unnumbered-address lo0.0
set dynamic-profiles dhcp-vlan-prof interfaces "$junos-interface-ifd-name" unit
  "$junos-underlying-interface-unit" family inet unnumbered-address preferred-sour
  ce-address 100.20.0.2
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  vlan-id "$junos-vlan-id"
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  demux-options underlying-interface "$junos-interface-ifd-name"
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  targetted-distribution
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  family inet unnumbered-address lo0.0
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  family inet unnumbered-address preferred-source-address 100.20.0.2
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  version 2
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  promiscuous-mode
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  passive allow-receive
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  passive send-group-query
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  oif-map OIF-v4-all
```

## Configure an OIF Map Policy

**Step-by-Step Procedure**

The following example requires you to navigate various levels in the configuration hierarchy.

To configure the OIF map:

1. Access the router policy options:

   ```
   [edit]
   user@host#edit policy-options
   ```

2. Edit a policy statement.

   ```
   [edit policy-options]
   user@host edit policy-statement OIF-v4-all
   ```

3. Create a term for mapping incoming multicast traffic to a specific interface.

   ```
   [edit policy-options OIF-v4-all]
   user@host edit term oif539
   ```

4. Define the match condition for the term. In this case, the term matches any route prefix of 224/4 or longer (all multicast traffic).

```
[edit policy-options OIF-v4-all term oif539]
user@host set from route-filter 224/4 orlonger
```

5. Define the action for the term. In this case, when a match occurs, the term accepts the traffic and maps it to interface GE-5/3/9.0.

```
[edit policy-options OIF-v4-all term oif539]
user@host set then map-to-interface ge-5/3/9.0
user@host set then accept
```

**Results** Confirm your configuration by issuing the **show policy-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show policy-options
policy-statement OIF-v4-all {
  term oif539 {
    from {
      route-filter 224.0.0.0/4 orlonger;
    }
    then {
      map-to-interface ge-5/3/9.0;
      accept;
    }
  }
}
```

### Configure a DHCP VLAN Dynamic Profile

**Step-by-Step Procedure** The following example requires you to navigate various levels in the configuration hierarchy.

To configure a DHCP VLAN dynamic profile for client access:

1. Create a dynamic VLAN demux profile.

```
[edit]
user@host#edit dynamic-profiles dhcp-vlan-prof
```

2. Edit the dynamic profile interface.

```
[edit dynamic-profiles dhcp-vlan-prof]
user@host edit interfaces $junos-ifd-name
```

3. Edit the interface unit dynamic variable.

```
[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name]
user@host edit unit $junos-underlying-interface-unit
```

4. Edit the interface family.

```
[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name unit
  $junos-underlying-interface-unit]
```

```
user@host edit family inet
```

5. Define the loopback address.

```
[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name unit
  $junos-underlying-interface-unit ]
user@host set unnumbered-address lo0.0 preferred-source-address 100.20.0.2
```

**Results** Confirm your configuration by issuing the **show dynamic-profiles** command. If the output for the dhcp-vlan-prof dynamic profile does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
dhcp-vlan-prof {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
}
```

### Configure a VLAN Demux Dynamic Profile

**Step-by-Step Procedure** The following example requires you to navigate various levels in the configuration hierarchy.

To configure the OIF map:

1. Create a dynamic VLAN demux profile.

```
[edit]
user@host#edit dynamic-profiles demux-vlan-prof
```

2. Edit the dynamic profile demux0 interface.

```
[edit dynamic-profiles demux-vlan-prof]
user@host edit interfaces demux0
```

3. Edit the interface unit dynamic variable.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0]
user@host edit unit $junos-interface-unit
```

4. Specify the VLAN ID dynamic variable.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  “$junos-interface-unit”]
user@host set vlan-id $junos-vlan-id
```

5. Access the demux options.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  “$junos-interface-unit”]
```

```
user@host edit demux-options
```

6. Define the demux underlying interface.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  "$junos-interface-unit" demux-options]
user@host set underlying-interface $junos-interface-ifd-name
```

7. Specify that dynamically created VLANs are using targeted distribution.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  "$junos-interface-unit"]
user@host set targeted-distribution
```

8. Edit the interface family.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  "$junos-interface-unit"]
user@host edit family inet
```

9. Define the loopback address.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host set unnumbered-address lo0.0 preferred-source-address 100.20.0.2
```

10. Edit the dynamic profile IGMP protocol.

```
[edit dynamic-profiles demux-vlan-prof]
user@host edit protocols igmp
```

11. Enable IGMP on dynamically created interfaces.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp]
user@host edit interface $junos-interface-name
```

12. Specify the IGMP version that you want dynamically created interfaces to use.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
  $junos-interface-name]
user@host set version 2
```

13. Specify the OIF map that you want dynamically created IGMP interfaces to use.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
  $junos-interface-name]
user@host set oif-map OIF-v4-all
```

14. Specify that IGMP selectively sends and receives control traffic such as IGMP reports, queries, and leaves.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
  $junos-interface-name]
user@host set passive allow-receive send-group-query
```

15. Specify that the interface accepts IGMP reports from hosts on any subnetwork.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
  $junos-interface-name]
user@host set promiscuous-mode
```

**Results** Confirm your configuration by issuing the **show dynamic-profiles** commands. If the output for the dhcp-vlan-prof dynamic profile does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
demux-vlan-prof {
  interfaces {
    demux0 {
      unit "$junos-interface-unit" {
        vlan-id "$junos-vlan-id";
        demux-options {
          underlying-interface "$junos-interface-ifd-name";
        }
        targetted-distribution;
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
  protocols {
    igmp {
      interface "$junos-interface-name" {
        version 2;
        promiscuous-mode;
        passive allow-receive send-group-query;
        oif-map OIF-v4-all;
      }
    }
  }
}
...
```

## Verification

Confirm that the configuration is working properly.

- Locate the Multicast Group Member on page 104
- Ensure the Targeting Aggregated Ethernet Interface for the Subscriber is Functional on page 105
- View the Packets for the Targeted Interface on page 106

### Locate the Multicast Group Member

**Purpose** Locate the dynamic interface and ensure that it is associated with the appropriate IGMP group.

**Action**

```
user@host>show igmp group

Interface: demux0.1073741824, Groups: 1
    Group: 225.0.0.1
        Source: 0.0.0.0
        Last reported by: 100.20.0.10
        Timeout:      52 Type: Dynamic
Interface: local, Groups: 2
    Group: 224.0.0.2
        Source: 0.0.0.0
        Last reported by: Local
        Timeout:       0 Type: Dynamic
    Group: 224.0.0.22
        Source: 0.0.0.0
        Last reported by: Local
        Timeout:       0 Type: Dynamic
```

**Meaning** The first **Interface** field shows the dynamically created demux interface, **demux0.1073741824**, and the Group field immediately below the first Interface field shows the group, **225.0.0.1**, to which the subscriber belongs.

### Ensure the Targeting Aggregated Ethernet Interface for the Subscriber is Functional

**Purpose** Use the dynamic subscriber interface value to ensure that the targeting aggregated interface is functional.

**Action** `user@host>`**show interfaces demux0.1073741824 extensive**

```
Logical interface demux0.1073741824 (Index 810) (SNMP ifIndex 1613)
(Generation 170)
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ]  Encapsulation: ENET2
  Demux:
    Underlying interface: ae0 (Index 708)
  Link:
    ge-1/0/0
    ge-5/3/7
  Targeting summary:
    ge-1/0/0, backup, Physical link is Up
    ge-5/3/7, primary, Physical link is Up
  Traffic statistics:
   Input  bytes  :                  862
   Output bytes  :                 3160
   Input  packets:                    3
   Output packets:                   30
  Local statistics:
   Input  bytes  :                  862
   Output bytes  :                 3160
   Input  packets:                    3
   Output packets:                   30
  Transit statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Protocol inet, MTU: 1500, Generation: 212, Route table: 0
    Flags: Sendbcast-pkt-to-re, Unnumbered
    Donor interface: lo0.0 (Index 802)
    Preferred source address: 100.20.0.2
```

**Meaning** The **Targeting summary** field shows that the primary interface, **ge-5/3/7**, is up.

### View the Packets for the Targeted Interface

**Purpose** Verify that packet traffic sent to targeted interface GE-5/3/9 consists only of multicast packets.

**Action**

```
user@host>show interfaces ge-5/3/9 extensive
Physical interface: ge-5/3/9, Enabled, Physical link is Up
  Interface index: 704, SNMP ifIndex: 1605, Generation: 197
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled, Auto-negotiation: Enabled, Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:21:59:ab:85:2a, Hardware address: 00:21:59:ab:85:2a
  Last flapped   : 2012-09-26 17:32:24 EDT (6d 20:44 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :             97857650                 1320 bps
   Output bytes  :                    0                    0 bps
   Input  packets:               889615                    1 pps
   Output packets:                    0               889620 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Dropped traffic statistics due to STP State:
   Input  bytes  :                    0
   Output bytes  :                    0
   Input  packets:                    0
   Output packets:                    0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

    FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : None
  Active defects : None
  MAC statistics:                      Receive         Transmit
    Total octets                             0        113871616
    Total packets                            0           889620
    Unicast packets                          0                0
```

```
  Broadcast packets                       0                0
  Multicast packets                       0           889620
  CRC/Align errors                        0                0
  FIFO errors                             0                0
  MAC control frames                      0                0
  MAC pause frames                        0                0
  Oversized frames                        0
  Jabber frames                           0
  Fragment frames                         0
  VLAN tagged frames                      0
  Code violations                         0
  Total errors                            0                0
Filter statistics:
  Input packet count                      0
  Input packet rejects                    0
  Input DA rejects                        0
  Input SA rejects                        0
  Output packet count                                 889620
  Output packet pad count                                  0
  Output packet error count                                0
  CAM destination filters: 0, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete
  Link partner:
      Link mode: Full-duplex, Flow control: Symmetric, Remote fault: OK
  Local resolution:
      Flow control: None, Remote fault: Link OK
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)
CoS information:
  Direction : Output
  CoS transmit queue            Bandwidth              Buffer Priority   Limit

                          %            bps     %           usec
  0 best-effort         95      950000000    95              0      low    none

  3 network-control      5       50000000     5              0      low    none

Interface transmit statistics: Disabled

Logical interface ge-5/3/9.0 (Index 818) (SNMP ifIndex 1597) (Generation 149)
  Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :            97857650
   Input  packets:                   0
   Output packets:              889620
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                  0 bps
   Output bytes  :            97857650               1320 bps
   Input  packets:                   0                  0 pps
   Output packets:              889615                  1 pps
  Protocol aenet, AE bundle: ae4.0, Generation: 180, Route table: 0
```

**Meaning** The MAC statistics **Unicast packet** field shows that the interface is not transmitting any

unicast packet traffic and the **Multicast packet** field shows that the total number of packets being transmitted from the interface are multicast packets.

**Related Documentation**

- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74

## Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet

This example shows how you can configure static PPPoE subscriber interfaces over aggregated Ethernet bundles to provide subscriber link redundancy.


- Requirements on page 109
- Overview on page 109
- Configuration on page 109
- Verification on page 112


### Requirements

PPPoE over VLAN demux interfaces over aggregated Ethernet requires the following hardware and software:

- MX Series 3D Universal Edge Routers
- MPCs
- Junos OS Release 11.2 or later

No special configuration beyond device initialization is required before you can configure this feature.

### Overview

Aggregated Ethernet bundles enable link redundancy between the router and networking devices connected by Ethernet links. This example describes how to configure link redundancy for static PPPoE subscribers over aggregated Ethernet interface with an intermediate static VLAN demux interface. Sample tasks include configuring a two-member aggregated Ethernet bundle on **ae0**, configuring a static VLAN demux interface, **demux0.100**, that underlies the PPPoE subscriber interface, **pp0.100**, and configuring the PPPoE subscriber interface including characteristics of the PPPoE family.

This example does not show all possible configuration choices.

### Configuration

**CLI Quick Configuration**

To quickly configure link redundancy for static PPPoE subscribers over a static VLAN demux interface over aggregated Ethernet, copy the following commands, paste them in a text file, remove any line breaks, and then copy and paste the commands into the CLI.

[edit]

```
set chassis aggregated-devices ethernet device-count 1
set interfaces ge-5/0/3 gigether-options 802.3ad ae0
set interfaces ge-5/0/3 gigether-options 802.3ad primary
set interfaces ge-5/1/2 gigether-options 802.3ad ae0
set interfaces ge-5/1/2 gigether-options 802.3ad backup
set interfaces ae0 flexible-vlan-tagging
set interfaces ae0 aggregated-ether-options link-protection
edit interfaces demux0 unit 100
set vlan-id 100
set demux-options underlying-interface ae0
set family pppoe access-concentrator pppoe-server-1
set family pppoe duplicate-protection
set family pppoe max-sessions 16000
top
edit interfaces pp0 unit 100
set pppoe-options underlying-interface demux0.100
set pppoe-options server
set family inet unnumbered-address lo0.0
top
```

**Step-by-Step Procedure**

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

To configure link redundancy for static PPPoE subscribers over a static VLAN demux interface over aggregated Ethernet:

1. Define the number of aggregated Ethernet devices on the router.

   ```
   [edit chassis]
   user@host# set aggregated-devices ethernet device-count 1
   ```

2. Configure a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN demux subscriber interface. In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the MPC level, the LAG bundle attaches to ports from two different MPCs.

   ```
   [edit interfaces]
   user@host# set ge-5/0/3 gigether-options 802.3ad ae0
   user@host# set ge-5/0/3 gigether-options 802.3ad primary
   user@host# set ge-5/1/2 gigether-options 802.3ad ae0
   user@host# set ge-5/1/2 gigether-options 802.3ad backup
   ```

3. Enable link protection on the aggregated Ethernet logical interface and configure support for single and dual (stacked) VLAN tags.

   ```
   [edit interfaces]
   user@host# set ae0 aggregated-ether-options link-protection
   user@host# set ae0 flexible-vlan-tagging
   ```

4. Configure the VLAN demux interface over the aggregated Ethernet logical interface.

   ```
   [edit interfaces]
   user@host# set demux0 unit 100 vlan-id 100
   user@host# set demux0 unit 100 demux-options underlying-interface ae0
   ```

5. Configure the PPPoE family attributes on the VLAN demux interface.

```
[edit interfaces]
user@host# set demxu0 unit 100 family pppoe access-concentrator pppoe-server-1
user@host# set demux0 unit 100 family pppoe duplicate-protection
user@host# set demux0 unit 100 family pppoe max-sessions 16000
```

6. Configure the VLAN demux interface as the underlying interface on which the PPPoE logical interface is created.

```
[edit interfaces]
user@host# set pp0 unit 100 pppoe-options underlying-interface demux0.100
user@host# set pp0 unit 100 pppoe-options server
user@host# set pp0 unit 100 family inet unnumbered-address lo0.0
```

**Results** From configuration mode, confirm the aggregated device configuration by entering the **show chassis** command. Confirm the interface configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show chassis
aggregated-devices {
  ethernet {
    device-count 1;
  }
}
```

```
[edit]
user@host# show interfaces
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
  }
  ge-5/1/2 {
    gigether-options {
      802.3ad {
        ae0;
        backup;
      }
    }
  }
  ae0 {
    flexible-vlan-tagging;
    aggregated-ether-options {
      link-protection;
    }
  }
  demux0 {
    unit 100 {
      vlan-id 100;
      demux-options {
```

```
        underlying-interface ae0;
      }
      family pppoe {
        access-concentrator pppoe-server-1;
        duplicate-protection;
        max-sessions 16000;
      }
    }
  }
  pp0 {
    unit 100 {
      pppoe-options {
        underlying-interface demux0.100;
        server;
      }
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
```

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

## Verification

To confirm that the configuration is working properly, perform these tasks:

- Verifying the Aggregated Ethernet Interface Configuration on page 112
- Verifying the demux0 Interface Configuration on page 113
- Verifying the pp0 Interface Configuration on page 113

### Verifying the Aggregated Ethernet Interface Configuration

**Purpose** Verify that the interface values match your configuration, the link is up, and traffic is flowing.

**Action** From operational mode, enter the **show interfaces redundancy** command.

```
user@host> show interfaces redundancy
Interface  State           Last change  Primary      Secondary    Current status
ae0        On primary                   ge-5/0/3     ge-5/1/2     both up
```

From operational mode, enter the **show interfaces ae0** command.

```
user@host> show interfaces ae0
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 606
  Link-level type: Ethernet, MTU: 1522, Speed: 1Gbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled, Minimum links needed: 1, Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:1f:12:b8:ef:c0, Hardware address: 00:1f:12:b8:ef:c0
  Last flapped   : 2011-03-11 13:24:18 PST (2d 03:34 ago)
  Input rate     : 1984 bps (2 pps)
  Output rate    : 0 bps (0 pps)
```

```
  Logical interface ae0.32767 (Index 69) (SNMP ifIndex 709)
    Flags: SNMP-Traps 0x4004000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :        371259          2      46036116         1984
        Output:             0          0             0            0
    Protocol multiservice, MTU: Unlimited
      Flags: Is-Primary
```

**Meaning** The **show interfaces redundancy** output shows the redundant link configuration and that both link interfaces are up. The **show interfaces ae0** output shows that the aggregated Ethernet interface is up and that traffic is being received on the logical interface.

### Verifying the demux0 Interface Configuration

**Purpose** Verify that the VLAN demux interface displays the configured PPPoE family attributes and the member links in the aggregated Ethernet bundle.

**Action** From operational mode, enter the **show interfaces demux0** command.

```
user@host> show interfaces demux0.100
Logical interface demux0.100 (Index 76) (SNMP ifIndex 61160)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]
    Encapsulation: ENET2
    Demux:
      Underlying interface: ae0 (Index 199)
    Link:
      ge-5/0/3
      ge-5/1/2
    Input packets : 2
    Output packets: 18575
    Protocol pppoe
      Dynamic Profile: none,
      Service Name Table: None,
      Max Sessions: 16000, Duplicate Protection: On,
      AC Name: pppoe-server-1
```

Alternatively, you can enter **show pppoe underlying-interfaces detail** to display the state and PPPoE family configuration for all configured underlying interfaces.

**Meaning** The output shows the name of the underlying interface, the member links of the aggregated bundle, and the PPPoE family configuration. The output shows packet counts when traffic is present on the logical interface.

### Verifying the pp0 Interface Configuration

**Purpose** Verify that the interface values match your configuration.

**Action** From operational mode, enter the **show interfaces pp0** command.

```
user@host> show interfaces pp0.100
  Logical interface pp0.100 (Index 71) (SNMP ifIndex 710)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 1,
```

```
    Session AC name: pppoe-server-1, Remote MAC address: 00:90:1a:00:18:34,
    Underlying interface: demux0.100 (Index 70)
  Link:
    ge-5/0/3.32767
    ge-5/1/2.32767
  Input packets : 18572
  Output packets: 18572
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 0 (never), Output: 18566 (00:00:02 ago)
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: Sendbcast-pkt-to-re
    Addresses, Flags: Is-Primary
      Local: 45.63.24.1
```

**Meaning** This output shows information about the PPPoE logical interface created on the underlying VLAN demux interface. The output includes the PPPoE family and aggregated Ethernet redundant link information, and shows input and output traffic for the PPPoE interface.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Configuring the PPPoE Family for an Underlying Interface on page 72

## Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet

This example shows how you can configure dynamic PPPoE subscriber interfaces over aggregated Ethernet bundles to provide subscriber link redundancy.


- Requirements on page 114
- Overview on page 115
- Configuration on page 115
- Verification on page 118


### Requirements

PPPoE over VLAN demux interfaces over aggregated Ethernet requires the following hardware and software:

- MX Series 3D Universal Edge Routers
- MPCs
- Junos OS Release 11.2 or later

No special configuration beyond device initialization is required before you can configure this feature.

## Overview

Aggregated Ethernet bundles enable link redundancy between the router and networking devices connected by Ethernet links. This example describes how to configure link redundancy for dynamic PPPoE subscribers over aggregated Ethernet interface, **ae0**, with an intermediate static VLAN demux interface, **demux0.100**. Sample tasks include configuring a two-member aggregated Ethernet bundle, configuring a static VLAN demux interface that underlies the PPPoE subscriber interface, and configuring the dynamic profile that establishes the dynamic PPPoE subscriber interfaces.

The dynamic PPPoE profile (**pppoe-profile**) creates the PPPoE subscriber interface. It also configures the router to act as a PPPoE server and enables the local address to be derived from the specified address without assigning an explicit IP address to the interface. The **pppoe-profile** dynamic profile is assigned to the static, intermediate VLAN demux interface (**demux0.100**), which is configured with the PPPoE family (**family pppoe**) attributes. This dynamic profile includes the following predefined variables:

- **$junos-interface-unit**—Represents the logical unit number of the dynamic PPPoE logical interface. This predefined variable is dynamically replaced with the unit number supplied by the router when the subscriber logs in.
- **$junos-underlying-interface**—Represents the name of the underlying Ethernet interface. This predefined variable is dynamically replaced with the interface name supplied by the router when the subscriber logs in.

This example does not show all possible configuration choices.

## Configuration

**CLI Quick Configuration**

To quickly configure link redundancy for dynamic PPPoE subscribers over a static VLAN demux interface over aggregated Ethernet, copy the following commands, paste them in a text file, remove any line breaks, and then copy and paste the commands into the CLI.

```
[edit]
set chassis aggregated-devices ethernet device-count 1
set interfaces ge-5/0/3 gigether-options 802.3ad ae0
set interfaces ge-5/0/3 gigether-options 802.3ad primary
set interfaces ge-5/1/2 gigether-options 802.3ad ae0
set interfaces ge-5/1/2 gigether-options 802.3ad backup
set interfaces ae0 flexible-vlan-tagging
set interfaces ae0 aggregated-ether-options link-protection
set interfaces demux0 unit 100 vlan-id 100
set interfaces demux0 unit 100 demux-options underlying-interface ae0
set interfaces demux0 unit 100 family pppoe access-concentrator pppoe-server-1
set interfaces demux0 unit 100 family pppoe duplicate-protection
set interfaces demux0 unit 100 family pppoe dynamic-profile pppoe-profile
edit dynamic-profiles pppoe-profile
edit interfaces pp0 unit $junos-interface-unit
set pppoe-options underlying-interface $junos-underlying-interface
set pppoe-options server
```

```
set family inet unnumbered-address lo0.0
top
```

**Step-by-Step Procedure**

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

To configure link redundancy for dynamic PPPoE subscribers over a static VLAN demux interface over aggregated Ethernet:

1. Define the number of aggregated Ethernet devices on the router.

   ```
   [edit chassis]
   user@host# set aggregated-devices ethernet device-count 1
   ```

2. Configure a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN demux subscriber interface. In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the MPC level, the LAG bundle attaches to ports from two different MPCs.

   ```
   [edit interfaces]
   user@host# set ge-5/0/3 gigether-options 802.3ad ae0
   user@host# set ge-5/0/3 gigether-options 802.3ad primary
   user@host# set ge-5/1/2 gigether-options 802.3ad ae0
   user@host# set ge-5/1/2 gigether-options 802.3ad backup
   ```

3. Enable link protection on the aggregated Ethernet logical interface and configure support for single and dual (stacked) VLAN tags.

   ```
   [edit interfaces]
   user@host# set ae0 aggregated-ether-options link-protection
   user@host# set ae0 flexible-vlan-tagging
   ```

4. Configure the VLAN demux interface over the aggregated Ethernet logical interface.

   ```
   [edit interfaces]
   user@host# set demux0 unit 100 vlan-id 100
   user@host# set demux0 unit 100 demux-options underlying-interface ae0
   ```

5. Configure the PPPoE family attributes on the VLAN demux interface, including the dynamic profile.

   ```
   [edit interfaces]
   user@host# set demux0 unit 100 family pppoe access-concentrator pppoe-server-1
   user@host# set demux0 unit 100 family pppoe duplicate-protection
   user@host# set demux0 unit 100 family pppoe dynamic-profile pppoe-profile
   ```

6. Configure the dynamic profile that creates the PPPoE subscriber interfaces.

   ```
   [edit dynamic-profiles pppoe-profile]
   user@host# edit interfaces pp0 unit $junos-interface-unit
   [edit dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"]
   user@host# set pppoe-options underlying-interface $junos-underlying-interface
   user@host# set pppoe-options server
   user@host# set family inet unnumbered-address lo0.0
   ```

**Results** From configuration mode, confirm the aggregated device configuration by entering the **show chassis** command. Confirm the interface configuration by entering the **show interfaces** command. Confirm the dynamic profile configuration by entering the **show dynamic-profiles** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show chassis
aggregated-devices {
  ethernet {
    device-count 1;
  }
}
```

```
[edit]
user@host# show interfaces
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
  }
  ge-5/1/2 {
    gigether-options {
      802.3ad {
        ae0;
        backup;
      }
    }
  }
  ae0 {
    flexible-vlan-tagging;
    aggregated-ether-options {
      link-protection;
    }
  }
  demux0 {
    unit 100 {
      vlan-id 100;
      demux-options {
        underlying-interface ae0;
      }
      family pppoe {
        access-concentrator pppoe-server-1
        duplicate-protection;
        dynamic-profile pppoe-profile;
      }
    }
  }
```

```
[edit]
user@host# show dynamic-profiles
pppoe-profile {
  interfaces {
```

```
    pp0 {
      unit $junos-interface-unit {
        pppoe-options {
          underlying-interface $junos-underlying-interface;
          server;
        }
        family inet {
          unnumbered-address lo0.0;
        }
      }
    }
  }
}
```

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

## Verification

To confirm that the configuration is working properly, perform these tasks:

- Verifying the Aggregated Ethernet Interface Configuration on page 118
- Verifying the demux0 Interface Configuration on page 119

### Verifying the Aggregated Ethernet Interface Configuration

**Purpose** Verify that the interface values match your configuration, the link is up, and traffic is flowing.

**Action** From operational mode, enter the **show interfaces redundancy** command.

```
user@host> show interfaces redundancy
Interface  State           Last change  Primary      Secondary    Current status
ae0        On primary                   ge-5/0/3     ge-5/1/2     both up
```

From operational mode, enter the **show interfaces ae0** command.

```
user@host> show interfaces ae0
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 606
  Link-level type: Ethernet, MTU: 1522, Speed: 1Gbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled, Minimum links needed: 1, Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:1f:12:b8:ef:c0, Hardware address: 00:1f:12:b8:ef:c0
  Last flapped   : 2011-03-11 13:24:18 PST (2d 03:34 ago)
  Input rate     : 1984 bps (2 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface ae0.32767 (Index 69) (SNMP ifIndex 709)
    Flags: SNMP-Traps 0x4004000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :        371259          2      46036116         1984
        Output:             0          0             0            0
    Protocol multiservice, MTU: Unlimited
      Flags: Is-Primary
```

**Meaning** The **show interfaces redundancy** output shows the redundant link configuration and that both link interfaces are up. The **show interfaces ae0** output shows that the aggregated Ethernet interface is up and that traffic is being received on the logical interface.

### Verifying the demux0 Interface Configuration

**Purpose** Verify that the VLAN demux interface displays the configured PPPoE family attributes and the member links in the aggregated Ethernet bundle.

**Action** From operational mode, enter the **show interfaces demux0** command.

```
user@host> show interfaces demux0.100
Logical interface demux0.100 (Index 76) (SNMP ifIndex 61160)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]
    Encapsulation: ENET2
    Demux:
      Underlying interface: ae0 (Index 199)
    Link:
      ge-5/0/3
      ge-5/1/2
    Input packets : 2
    Output packets: 18575
    Protocol pppoe
      Dynamic Profile: pppoe-profile,
      Service Name Table: None,
      Max Sessions: 16000, Duplicate Protection: On,
      AC Name: pppoe-server-1
```

Alternatively, you can enter **show pppoe underlying-interfaces detail** to display the state and PPPoE family configuration for all configured underlying interfaces. The output also provides information about PPPoE negotiation on a per-VLAN basis.

**Meaning** The output shows the name of the underlying interface, the member links of the aggregated bundle, and the PPPoE family configuration. The output shows packet counts when traffic is present on the logical interface.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Configuring a Basic PPPoE Dynamic Profile*

# Example: Configuring a Dynamic PPPoE Subscriber Interface on a Dynamic Underlying VLAN Demux Interface over Aggregated Ethernet

This example shows how you can configure dynamic PPPoE subscriber interfaces over aggregated Ethernet bundles to provide subscriber link redundancy.


- Requirements on page 120
- Overview on page 120
- Configuration on page 121
- Verification on page 125


## Requirements

PPPoE over VLAN demux interfaces over aggregated Ethernet requires the following hardware and software:

- MX Series 3D Universal Edge Routers
- MPCs
- Junos OS Release 11.2 or later

No special configuration beyond device initialization is required before you can configure this feature.

## Overview

Aggregated Ethernet bundles enable link redundancy between the router and networking devices connected by Ethernet links. This example describes how to configure link redundancy for dynamic PPPoE subscribers over aggregated Ethernet with an intermediate dynamic VLAN demux interface. Sample tasks include configuring a two-member aggregated Ethernet bundle, configuring dynamic profiles that establish the dynamic VLAN demux interface that underlies the PPPoE subscriber interface, and configuring the dynamic profile that establishes the dynamic PPPoE subscriber interfaces.

In this example, two different dynamic profiles are configured to instantiate either VLAN (**vlan-profile**) or S-VLAN (**svlan-profile**) demux interfaces. These profiles define PPPoE family options and include the dynamic PPPoE profile (**pppoe-profile**) that creates the PPPoE subscriber interface. Junos OS predefined variables are used in each profile to represent the interfaces and VLAN identifiers that are dynamically created. These dynamic profiles include the following predefined variables:

- **$junos-interface-unit**—Represents the logical unit number of the dynamic VLAN demux interface. This predefined variable is dynamically replaced with the unit number supplied by the router when the subscriber logs in.
- **$junos-interface-ifd-name**—Represents the underlying logical interface on which the PPPoE subscriber interface is created. This predefined variable is dynamically replaced with the name of the underlying interface supplied by the router when the subscriber logs in.

- **$junos-vlan-id**—Represents the VLAN identifier. This predefined variable is dynamically replaced with a VLAN ID when the subscriber logs in. The VLAN ID is allocated within the VLAN range specified in the aggregated Ethernet configuration. In the case of the S-VLAN demux, **$junos-vlan-id** represents the inner VLAN identifier.
- **$junos-stacked-vlan-id**—Represents the outer VLAN identifier for the stacked VLAN. This predefined variable is dynamically replaced with a VLAN ID when the subscriber logs in. The VLAN ID is allocated within the VLAN range specified in the aggregated Ethernet configuration. This variable is not used for the VLAN demux configuration.

The dynamic PPPoE profile (**pppoe-profile**) creates the PPPoE subscriber interface. It also configures the router to act as a PPPoE server and enables the local address to be derived from the specified address without assigning an explicit IP address to the interface. The **pppoe-profile** dynamic profile is assigned to the dynamic, intermediate VLAN and S-VLAN demux interfaces. This dynamic profile includes the following predefined variables:

- **$junos-interface-unit**—Represents the logical unit number of the dynamic PPPoE logical interface. This predefined variable is dynamically replaced with the unit number supplied by the router when the subscriber logs in.
- **$junos-underlying-interface**—Represents the name of the underlying Ethernet interface. This predefined variable is dynamically replaced with the interface name supplied by the router when the subscriber logs in.

This example does not show all possible configuration choices.

## Configuration

**CLI Quick Configuration**

To quickly configure link redundancy for dynamic PPPoE subscribers over a dynamic VLAN demux interface over aggregated Ethernet, copy the following commands, paste them in a text file, remove any line breaks, and then copy and paste the commands into the CLI.

```
[edit]
set chassis aggregated-devices ethernet device-count 1
set interfaces ge-5/0/3 gigether-options 802.3ad ae0
set interfaces ge-5/0/3 gigether-options 802.3ad primary
set interfaces ge-5/1/2 gigether-options 802.3ad ae0
set interfaces ge-5/1/2 gigether-options 802.3ad backup
edit interfaces ae0
set flexible-vlan-tagging
set aggregated-ether-options link-protection
edit auto-configure
set vlan-ranges dynamic-profile vlan-profile accept pppoe
set vlan-ranges dynamic-profile vlan-profile ranges 1-4094
set stacked-vlan-ranges dynamic-profile svlan-profile accept pppoe
set stacked-vlan-ranges dynamic-profile svlan-profile ranges 1-4094,1-4094
top
edit dynamic-profiles pppoe-profile
edit interfaces pp0 unit $junos-interface-unit
set pppoe-options underlying-interface $junos-underlying-interface
set pppoe-options server
set family inet unnumbered-address lo0.0
```

```
top
edit dynamic-profiles vlan-profile interfaces demux0
edit unit $junos-interface-unit
set vlan-id $junos-vlan-id
set demux-options underlying-interface $junos-interface-ifd-name
set family pppoe access-concentrator pppoe-server-1
set family pppoe duplicate-protection
set family pppoe dynamic-profile pppoe-profile
top
edit dynamic-profiles svlan-profile interfaces demux0
edit unit $junos-interface-unit
set vlan-tags outer $junos-stacked-vlan-id
set vlan-tags inner $junos-vlan-id
set demux-options underlying-interface $junos-interface-ifd-name
set family pppoe access-concentrator pppoe-server-1
set family pppoe duplicate-protection
set family pppoe dynamic-profile pppoe-profile
top
```

**Step-by-Step Procedure**

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

To configure link redundancy for dynamic PPPoE subscribers over a dynamic VLAN demux interface over aggregated Ethernet:

1. Define the number of aggregated Ethernet devices on the router.

   ```
   [edit chassis]
   user@host# set aggregated-devices ethernet device-count 1
   ```

2. Configure a two-link aggregated Ethernet logical interface to serve as the underlying interface for the dynamic VLAN demux subscriber interface. In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the MPC level, the LAG bundle attaches to ports from two different MPCs.

   ```
   [edit interfaces]
   user@host# set ge-5/0/3 gigether-options 802.3ad ae0
   user@host# set ge-5/0/3 gigether-options 802.3ad primary
   user@host# set ge-5/1/2 gigether-options 802.3ad ae0
   user@host# set ge-5/1/2 gigether-options 802.3ad backup
   ```

3. Enable link protection on the aggregated Ethernet logical interface and configure support for single and dual (stacked) VLAN tags.

   ```
   [edit interfaces]
   user@host# set ae0 aggregated-ether-options link-protection
   user@host# set ae0 flexible-vlan-tagging
   ```

4. Configure the parameters for automatically configuring VLANs and S-VLANs, including the VLAN ranges and dynamic profiles.

   ```
   [edit interfaces]
   user@host# set ae0 auto-configure vlan-ranges dynamic-profile vlan-profile accept
     pppoe
   ```

```
user@host# set ae0 auto-configure vlan-ranges dynamic-profile vlan-profile ranges
  1-4094
user@host# set ae0 auto-configure stacked-vlan-ranges dynamic-profile
  svlan-profile accept pppoe
user@host# set ae0 auto-configure stacked-vlan-ranges dynamic-profile
  svlan-profile ranges 1-4094,1-4094
```

5. Configure the dynamic profile that creates the PPPoE subscriber interface.

```
[edit dynamic-profiles pppoe-profile]
user@host# edit interfaces pp0 unit $junos-interface-unit
[edit dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"]
user@host# set pppoe-options underlying-interface $junos-underlying-interface
user@host# set pppoe-options server
user@host# set family inet unnumbered-address lo0.0
```

6. Configure the dynamic profile that creates VLAN demux underlying interfaces, including the PPPoE family attributes.

```
[edit dynamic-profiles vlan-profile]
user@host# edit interfaces demux0 unit $junos-interface-unit
[edit dynamic-profiles vlan-profile interfaces demux0 unit "$junos-interface-unit"]
user@host# set vlan-id $junos-vlan-id
user@host# set demux-options underlying-interface $junos-interface-ifd-name
user@host# set family pppoe access-concentrator pppoe-server-1
user@host# set family pppoe duplicate-protection
user@host# set family pppoe dynamic-profile pppoe-profile
```

7. Configure the dynamic profile that creates S-VLAN demux underlying interfaces, including the PPPoE family attributes.

```
[edit dynamic-profiles svlan-profile]
user@host# edit interfaces demux0 unit $junos-interface-unit
[edit dynamic-profiles svlan-profile interfaces demux0 unit "$junos-interface-unit"]
user@host# set vlan-tags outer $junos-stacked-vlan-id
user@host# set vlan-tags inner $junos-vlan-id
user@host# set demux-options underlying-interface $junos-interface-ifd-name
user@host# set family pppoe access-concentrator pppoe-server-1
user@host# set family pppoe duplicate-protection
user@host# set family pppoe dynamic-profile pppoe-profile
```

**Results** From configuration mode, confirm the aggregated device configuration by entering the **show chassis** command. Confirm the interface configuration by entering the **show interfaces** command. Confirm the dynamic profile configuration by entering the **show dynamic-profiles** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show chassis
aggregated-devices {
  ethernet {
    device-count 1;
  }
}
```

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

```
    ge-5/0/3 {
      gigether-options {
        802.3ad {
          ae0;
          primary;
        }
      }
    }
    ge-5/1/2 {
      gigether-options {
        802.3ad {
          ae0;
          backup;
        }
      }
    }
    ae0 {
      flexible-vlan-tagging;
      aggregated-ether-options {
        link-protection;
      }
      auto-configure {
        vlan-ranges {
          dynamic-profile {
            vlan-profile {
              accept pppoe;
              vlan-ranges 1–4094};
            }
          }
        }
        stacked-vlan-ranges {
          dynamic-profile {
            svlan-profile {
              accept pppoe;
              vlan-ranges 1–4094,1–4094;
            }
          }
        }
      }
    }

[edit]
user@host# show dynamic-profiles
pppoe-profile {
  interfaces {
    pp0 {
      unit $junos-interface-unit {
        pppoe-options {
          underlying-interface $junos-underlying-interface;
          server;
        }
        family inet {
          unnumbered-address lo0.0;
        }
      }
    }
```

```
    }
  }
  vlan-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family pppoe {
            access-concentrator pppoe-server-1;
            duplicate-protection;
            dynamic-profile pppoe-profile;
          }
        }
      }
    }
  }
  svlan-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-tags outer "$junos-stacked-vlan-id" inner "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family pppoe {
            access-concentrator pppoe-server-1;
            duplicate-protection;
            dynamic-profile pppoe-profile;
          }
        }
      }
    }
  }
```

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

## Verification

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

- Verifying the Aggregated Ethernet Interface Configuration on page 125

### Verifying the Aggregated Ethernet Interface Configuration

**Purpose** Verify that the interface values match your configuration, the link is up, and traffic is flowing.

**Action** From operational mode, enter the **show interfaces redundancy** command.

```
user@host> show interfaces redundancy
Interface  State           Last change  Primary      Secondary    Current status
ae0        On primary                   ge-5/0/3     ge-5/1/2     both up
```

From operational mode, enter the **show interfaces ae0** command.

```
user@host> show interfaces ae0
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 606
  Link-level type: Ethernet, MTU: 1522, Speed: 1Gbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled, Minimum links needed: 1, Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:1f:12:b8:ef:c0, Hardware address: 00:1f:12:b8:ef:c0
  Last flapped   : 2011-03-11 13:24:18 PST (2d 03:34 ago)
  Input rate     : 1984 bps (2 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface ae0.32767 (Index 69) (SNMP ifIndex 709)
    Flags: SNMP-Traps 0x4004000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :        371259          2      46036116         1984
        Output:             0          0             0            0
    Protocol multiservice, MTU: Unlimited
      Flags: Is-Primary
```

**Meaning** The **show interfaces redundancy** output shows the redundant link configuration and that both link interfaces are up. The **show interfaces ae0** output shows that the aggregated Ethernet interface is up and that traffic is being received on the logical interface.

**Related Documentation**

- Subscriber Interfaces and Demultiplexing Overview on page 5
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 12
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Configuring a Basic PPPoE Dynamic Profile*

CHAPTER 7

# Configuration Statements


- [edit dynamic-profiles] Hierarchy Level on page 128
- access-concentrator on page 136
- address on page 137
- demux0 (Dynamic Interface) on page 138
- demux-options (Dynamic Interface) on page 139
- demux-source (Dynamic IP Demux Interface) on page 140
- direct-connect on page 141
- duplicate-protection (Dynamic PPPoE) on page 142
- dynamic-profile (Dynamic PPPoE) on page 143
- encapsulation (Dynamic Interfaces) on page 144
- enhanced-mode on page 147
- family (Dynamic Standard Interface) on page 149
- family (Dynamic Demux Interface) on page 151
- filter (Dynamic Firewalls) on page 152
- inner-tag-protocol-id (Dynamic VLANs) on page 153
- inner-vlan-id (Dynamic VLANs) on page 154
- input-vlan-map (Dynamic Interfaces) on page 155
- interfaces (Static and Dynamic Subscribers) on page 156
- logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces) on page 160
- mac-validate on page 161
- mac-validate (Dynamic IP Demux Interface) on page 162
- max-sessions (Dynamic PPPoE) on page 163
- mode (Dynamic Profiles) on page 164
- nd-override-preferred-src on page 165
- output-vlan-map (Dynamic Interfaces) on page 165
- pop (Dynamic VLANs) on page 166
- precedence on page 167

- proxy-arp on page 168
- push (Dynamic VLANs) on page 168
- rebalance-periodic (Aggregated Ethernet Subscriber Interfaces) on page 169
- rpf-check (Dynamic Profiles) on page 169
- service-name-table on page 170
- swap (Dynamic VLANs) on page 171
- tag-protocol-id (Dynamic VLANs) on page 171
- targeted-distribution (Dynamic Demux Interfaces over Aggregated Ethernet) on page 172
- targeted-distribution (Static Interfaces over Aggregated Ethernet) on page 172
- underlying-interface (demux0) on page 173
- unit (Dynamic Profiles Standard Interface) on page 174
- unit (Dynamic Demux Interface) on page 177
- unnumbered-address (Dynamic Profiles) on page 179
- vlan-id (Dynamic Profiles) on page 181
- vlan-id (Dynamic VLANs) on page 182
- vlan-tagging on page 183
- vlan-tags on page 184


## [edit dynamic-profiles] Hierarchy Level

```
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 (percent percentage | remainder | temporal microseconds |
              $junos-cos-scheduler-bs);
            drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
              protocol (any | non-tcp | tcp) drop-profile (profile-name | predefined-variable);
            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 | $junos-cos-scheduler-priority);
            shaping-rate (rate | predefined-variable);
            transmit-rate (rate | percent percentage | remainder | percent percentage
              $junos-cos-scheduler-tx) <exact | rate-limit>;
          }
        }
        traffic-control-profiles profile-name {
          delay-buffer-rate (percent percentage | rate);
          excess-rate (percent percentage | proportion value | percent
            $junos-cos-excess-rate);
          guaranteed-rate (percent percentage | rate);
          overhead-accounting (shaping-mode) <bytes (byte-value>;
          scheduler-map map-name;
          shaping-rate (percent percentage | 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;
          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-listname {
    ip-addresses;
  }
}
interfaces {
  interface-name {
    unit logical-unit-number {
      family family {
        access-concentrator name;
```

```
        address address;
        direct-connect;
        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 {
          fail-filter filter-name;
          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>;
      }
      ppp-options {
        chap;
        pap;
      }
      vlan-id number;
    }
    vlan-tagging;
  }
  interface-set interface-set-name {
    interface interface-name {
      unit logical-unit-number;
```

```
    }
  }
  demux0 {
    unit logical-unit-number {
      demux-options {
        underlying-interface interface-name
      }
      demux-source {
        source-prefix;
      }
      family family {
        access-concentrator name;
        address address;
        direct-connect;
        duplicate-protection;
        dynamic-profile profile-name;
        filter {
          input filter-name;
          output filter-name;
        }
        mac-validate (loose | strict):
        max-sessions number;
        max-sessions-vsa-ignore;
        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>;
      }
    }
  }
  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 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;
            }
        }
    }
  }
}
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 {
              (autonomous | no-autonomous);
              (on-link | no-on-link);
              preferred-lifetime seconds;
              valid-lifetime seconds;
            }
            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;
          uid;
          uid-reference;
        }
      }
    }
```

**Related Documentation**

- *Dynamic Profiles Overview*
- *CoS for Subscriber Access Overview*
- *Configuring a Basic Dynamic Profile*
- *Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access*
- *Two-Color Policer Configuration Overview*
- *Three-Color Policer Configuration Overview*
- *Hierarchical Policer Configuration Overview*
- *Guidelines for Applying Traffic Policers*

## access-concentrator

**Syntax** access-concentrator *name*;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-options],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information**
Statement introduced before Junos OS Release 7.4.
Support at the **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** and **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy levels introduced in Junos OS Release 10.1.
Support at the **[edit ... family pppoe]** hierarchies introduced in Junos OS Release 11.2.

**Description**
(J Series Services Routers with Point-to-Point Protocol over Ethernet (PPPoE) interfaces) Configure the name of the access concentrator. If you configure a specific access concentrator name on the client and the same access concentrator name server is available, then a PPPoE session is established. If there is a mismatch between the access concentrator names of the client and the server, the PPPoE session gets closed.

If you do not configure the access concentrator name, the PPPoE session starts using any available server in the network.

(Intelligent Queuing 2 (IQ2) PICs on M120 and M320 routers; MPCs on MX Series routers) Configure an alternative access concentrator name in the AC-NAME tag in a PPPoE control packet for use with a dynamic PPPoE subscriber interface. If you do not configure the access concentrator name, the AC-NAME tag contains the system name.

NOTE: **The [edit ... family pppoe] hierarchies are supported only on MX Series routers with MPCs.**

**Options** ***name***—Name of the access concentrator.

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

**Related Documentation**

- *Identifying the Access Concentrator*
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*
- *PPPoE Overview*

## address

**Syntax**

address (*ip-address* | *ipv6-address*);

**Hierarchy Level**

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*],
[edit interfaces *interface-name* unit *logical-unit-number* family inet],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

**Release Information**

Statement introduced in Junos OS Release 9.2.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*]** hierarchy level introduced in Junos OS Release 10.1.
Support at the **[edit interfaces *interface-name* unit *logical-unit-number* family *inet*]** hierarchy level introduced in Junos OS Release 13.2X50-D10 for EX Series switches.

**Description**

Configure the interface address.

**Options**

***ip-address***—IPv4 address of the interface.

***ipv6-address***—IPv6 address of the interface. When configuring an IPv6 address on a dynamically created interface, use the ***$junos-ipv6–address*** dynamic variable.

**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*
- *Format for Specifying IP Addresses, Network Masks, and Prefixes in Junos OS Configuration Statements*
- *Configuring VLANs for EX Series Switches (CLI Procedure)*

## demux0 (Dynamic Interface)

**Syntax**

```
demux0 {
  unit logical-unit-number {
    demux-options {
      underlying-interface interface-name
    }
    family family {
      access-concentrator name;
      address address;
      demux-source {
        source-prefix;
      }
      direct-connect;
      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]

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

**Description** Configure the logical demultiplexing (demux) interface in a dynamic profile.

Logical IP demux interfaces do not support IPv4 and IPv6 dual stack.

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Demultiplexing Interface Overview*

## demux-options (Dynamic Interface)

**Syntax**

```
demux–options {
  underlying-interface interface-name
}
```

**Hierarchy Level**

[edit dynamic-profiles *profile-name* interfaces demux0 *interface-name* unit *logical-unit-number*]

**Release Information**

Statement introduced in Junos OS Release 9.3.

**Description**

Configure logical demultiplexing (demux) interface options in a dynamic profile.

The remaining statement is 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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Demultiplexing Interface Overview*

## demux-source (Dynamic IP Demux Interface)

**Syntax**

```
demux-source {
  source-address;
}
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

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

**Description** Configure a logical demultiplexing (demux) source address for a subscriber in a dynamic profile.

**Options** ***source-address***—Either the specific source address you want to assign to the subscriber interface or the source address variable. For IPv4, specify **$junos-subscriber-ip-address**; for IPv6, specify **$junos-subscriber-ipv6-address**). The source address for the interface is dynamically supplied by DHCP when the subscriber accesses the router.

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

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Demultiplexing Interface Overview*

## direct-connect

**Syntax** direct-connect;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit interfaces *interface-name* unit *logical-unit-number*family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information** Statement introduced in Junos OS 13.3.

**Description** Configure the router to ignore any DSL Forum VSAs that it receives in PPPoE control packets when the router is directly connected to CPE devices.

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

**Related Documentation**

- *Ignoring DSL Forum VSAs from Directly Connected Devices*
- *Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces*
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview*

## duplicate-protection (Dynamic PPPoE)

**Syntax** duplicate-protection;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number*family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information** Statement introduced in Junos OS Release 10.1.
Support for the **[edit ... family pppoe]** hierarchies introduced in Junos OS Release 11.2.

**Description** Prevent the activation of another dynamic PPPoE logical interface on the same underlying interface when a dynamic PPPoE logical interface for a client with the same media access control (MAC) address is already active on that interface. Duplicate protection is disabled by default. Enabling duplicate protection has no effect on dynamic PPPoE logical interfaces that are already active.

NOTE: The **[edit ... family pppoe]** hierarchies are supported only on MX Series routers with MPCs.

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

**Related Documentation**

- *Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces*
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Configuring Lockout of PPPoE Subscriber Sessions*
- *Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview*

## dynamic-profile (Dynamic PPPoE)

**Syntax** dynamic-profile *profile-name*;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information** Statement introduced in Junos OS Release 10.1.
Support for the **[edit ... family pppoe]** hierarchies introduced in Junos OS Release 11.2.

**Description** Attach a PPPoE dynamic profile to an underlying Ethernet interface. This underlying interface is configured with either the **encapsulation ppp-over-ether** statement or the **family pppoe** 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.

NOTE: The **[edit ... family pppoe]** hierarchies are supported only on MX Series routers with MPCs.

**Options** *profile-name*—Name of a previously configured PPPoE dynamic profile, up to 64 characters in length, defined at the **[edit dynamic-profiles *profile-name* interfaces pp0]** hierarchy level.

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

**Related Documentation**
- *Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces*
- Configuring the PPPoE Family for an Underlying Interface on page 72
- *Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview*

## encapsulation (Dynamic Interfaces)

**Syntax** 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);

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** Dynamic interface configuration of the logical link-layer encapsulation type.

**Options** **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

**atm-ccc-vc-mux**—Use ATM virtual circuit (VC) multiplex encapsulation on circuit cross-connect (CCC) circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**atm-cisco-nlpid**—Use Cisco ATM network layer protocol ID (NLPID) encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

**atm-mlppp-llc**—For ATM2 IQ interfaces only, use Multilink Point-to-Point Protocol (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.

**atm-nlpid**—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

**atm-ppp-llc**—For ATM2 IQ interfaces only, use PPP over AAL5 LLC encapsulation.

**atm-ppp-vc-mux**—For ATM2 IQ interfaces only, use PPP over ATM AAL5 multiplex encapsulation.

**atm-snap**—Use ATM subnetwork attachment point (SNAP) encapsulation.

**atm-tcc-snap**—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

**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**—Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

**ether-over-atm-llc**—For interfaces that carry IPv4 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, as per *Multiprotocol Interconnect over Frame Relay* (RFC 2427 [1490]).

**ether-vpls-over-ppp**—For E1, T1, E3, T3 and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over 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-vpls**—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.

**extended-vlan-vpls**—Use extended virtual LAN (VLAN) VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901.

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

**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-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 unlike media. When you use this encapsulation type, you can configure the **tcc** 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 unlike media. The physical interface must be configured with **flexible-frame-relay** 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 Services 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 Series routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

**ppp-over-ether-over-atm-llc**—For underlying ATM interfaces on J Series Services routers only, 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.

**Required Privilege Level**

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

**Related Documentation**

- *Configuring a Retail Dynamic Profile for Use in the Layer 2 Wholesale Solution*
- *Configuring PPP over ATM2 Encapsulation*

## enhanced-mode

**Syntax** enhanced-mode;

**Hierarchy Level** [edit firewall filter *filter-name*],
[edit firewall family *family-name* filter *filter-name*],
[edit logical-systems *logical-system-name* firewall filter *filter-name*],
[edit logical-systems *logical-system-name* firewall family *family-name* filter *filter-name*]

**Release Information** Statement introduced in Junos OS Release 11.4.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

**Description** Limit static service filters or API-client filters to term-based filter format only for inet or inet6 families when enhanced network services mode is configured at the **[edit chassis network-services]** hierarchy level. When used with one of the chassis enhanced network services modes, firewall filters are generated in term-based format for use with MPC modules.

If enhanced network services are not configured for the chassis, the **enhanced-mode** statement is ignored and any enhanced mode firewall filters are generated in both term-based and compiled format (the default).

NOTE: You cannot attach enhanced mode filters to local loopback, management, or MS-DPC interfaces. These interfaces are processed by the Routing Engine and DPC modules and can accept only compiled firewall filter format. In cases where both filter formats are needed for dynamic service filters, you can use the *enhanced-mode-override* statement on the specific filter definition to override the default filter term-based only format of chassis network-service enhanced IP mode.

NOTE: Do not use enhanced mode for firewall filters that are intended for control plane traffic. Control plane filtering is handled by the Routing Engine kernel, which cannot use the term-based format of the enhanced mode filters.

For packets sourced from the Routing Engine, the Routing Engine processes Layer 3 packets by applying output filters to the packets and forwards Layer 2 packets to the Packet Forwarding Engine for transmission. By configuring the enhanced mode filter, you explicitly specify that only the term-based filter format is used, which also implies that the Routing Engine cannot use this filter.

NOTE: The **enhanced-mode** and the **enhanced-mode-override** statements are mutually exclusive; you can define the filter with either **enhanced-mode** or **enhanced-mode-override**, but not both.

**Required Privilege Level**

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

**Related Documentation**

- *enhanced-mode-override*
- *Network Services Mode Overview*
- *Firewall Filters and Enhanced Network Services Mode Overview*
- *Configuring a Filter for Use with Enhanced Network Services Mode*

## family (Dynamic Standard Interface)

**Syntax**

```
family family {
  access-concentrator name;
  address address;
  direct-connect;
  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;
    }
    output filter-name {
      precedence precedence;
    }
  }
  mac-validate (loose | strict);
  max-sessions number;
  max-sessions-vsa-ignore;
  rpf-check {
    fail-filter filter-name;
    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>;
}
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 9.2.
Option **pppoe** introduced in Junos OS Release 11.2.

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

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

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

- **inet**—IP version 4 suite
- **inet6**—IP version 6 suite
- **pppoe**—(MX Series routers with MPCs only) Point-to-Point Protocol over Ethernet
- **vpls**—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**

- *Example: Configuring Static Routing on Logical Systems*
- *Configuring the Protocol Family*

## family (Dynamic Demux Interface)

**Syntax**

```
family family {
  access-concentrator name;
  address address;
  demux-source {
    source-address;
  }
  direct-connect;
  duplicate-protection;
  dynamic-profile profile-name;
  filter {
    input filter-name;
    output filter-name;
  }
  mac-validate (loose | strict);
  max-sessions number;
  max-sessions-vsa-ignore;
  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>;
}
```

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

**Release Information** Statement introduced in Junos OS Release 9.3.
Option **pppoe** introduced in Junos OS Release 11.2.

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

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

**Options** *family*—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite
- **pppoe**—(MX Series routers with MPCs only) Point-to-Point Protocol over Ethernet

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- Subscriber Interfaces and Demultiplexing Overview on page 5

## filter (Dynamic Firewalls)

**Syntax**

```
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;
  }
}
```

**Hierarchy Level**

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family*]

**Release Information**

Statement introduced in Junos OS Release 9.2.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*]** hierarchy level introduced in Junos OS Release 10.1.
**shared-name** statement added in Junos OS Release 12.2.

**Description**

Apply a dynamic filter to an interface. You can configure filters for either **family inet** or **family inet6**, and the filters can be classic filters, fast update filters, or (for the **adf** statement) Ascend-Data-Filters. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

**Options**

**input *filter-name***—Name of one filter to evaluate when packets are received on the interface.

**output *filter-name***—Name of one filter to evaluate when packets are transmitted on the interface.

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**

- *Firewall Filters Overview*
- *Dynamic Firewall Filters Overview*
- *Classic Filters Overview*

- *Basic Classic Filter Syntax*

## inner-tag-protocol-id (Dynamic VLANs)

**Syntax** inner-tag-protocol-id *tpids*;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*input-vlan-map],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, configure the IEEE 802.1Q TPID value to rewrite for the inner tag. All TPIDs you include in input and output VLAN maps must be among those you specify at the **[edit interfaces *interface-name* gigether-options ethernet-switch-profile tag-protocol-id *tpids* ]** hierarchy level.

**Default** If the **inner-tag-protocol-id** statement is not configured, the TPID value is 0x8100.

**Options** ***tpids***—TPIDs to be accepted on the VLAN. Specify TPIDs in hexadecimal format.

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

**Related Documentation**
- *Configuring Inner and Outer TPIDs and VLAN IDs*

## inner-vlan-id (Dynamic VLANs)

**Syntax** inner-vlan-id *number*;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*input-vlan-map],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, specify the VLAN ID to rewrite for the inner tag of the final packet.

You cannot include the **inner-vlan-id** statement with the **swap** statement, **swap-push** statement, **push-push** statement, or **push-swap** statement and the **inner-vlan-id** statement at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]** hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the **inner-vlan-id** statement you include at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

**Options** *number*—VLAN ID number.

**Range:** 0 through 4094

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

**Related Documentation**

- *Configuring Inner and Outer TPIDs and VLAN IDs*

## input-vlan-map (Dynamic Interfaces)

**Syntax**

```
input-vlan-map {
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  (push | swap);
  tag-protocol-id tpid;
  vlan-id number;
}
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic interfaces, define the rewrite profile to be applied to incoming frames on this logical interface.

The 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**

- *Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution*

## 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;
                direct-connect;
                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;
          direct-connect;
          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 on page 21
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*
- *Configuring Dynamic VLANs Based on Agent Circuit Identifier Information*
- Subscriber Interface Overview on page 3
- *Relationship Between Subscribers and Interfaces in an Access Network*
- *Configuring Subscribers over Static Interfaces*
- *Demultiplexing Interface Overview*

## logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces)

**Syntax** logical-interface-fpc-redundancy;

**Hierarchy Level** [edit interfaces ae*number* aggregated-ether-options]

**Release Information** Statement introduced in Junos OS Release 11.2.
Statement introduced in Junos OS Release 13.2R2 for EX Series switches.

**Description** Provide module redundancy for demux subscribers on aggregated Ethernet bundles configured with targeted distribution. Backup links for a subscriber are chosen on a different EQ DPC or MPC from the primary link, based on the link with the fewest number of subscribers among the links on different modules. If all links are on a single module when this is configured, backup links are not provisioned.

By default, link redundancy is provided for the aggregated Ethernet bundle.

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

**Related Documentation**

- Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 75
- *Configuring Module Redundancy for a Virtual Chassis*

## mac-validate

**Syntax** mac-validate (loose | strict);

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

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

**Description** Enable IP and MAC address validation for static Ethernet and IP demux interfaces. Supported on MX Series routers only.

**Options**

**loose**—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not match the MAC address of the tuple. Continues to forward incoming packets when the source address of the incoming packet does not match any of the trusted IP addresses.

**strict**—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

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

**Related Documentation**

- *MAC Address Validation on Static Ethernet Interfaces Overview*
- *Configuring MAC Address Validation on Static Demux Interfaces*

## mac-validate (Dynamic IP Demux Interface)

**Syntax** mac-validate (loose | strict);

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family inet]

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

**Description** Enable IP and MAC address validation for dynamic IP demux interfaces in a dynamic profile. Supported on MX Series routers only.

**Options**

**loose**—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not match the MAC address of the tuple. Continues to forward incoming packets when the source address of the incoming packet does not match any of the trusted IP addresses.

**strict**—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

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

**Related Documentation**

- Configuring MAC Address Validation for Subscriber Interfaces on page 29

## max-sessions (Dynamic PPPoE)

**Syntax** max-sessions *number*;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces interface-set *interface-set-name* pppoe-underlying-options]
[edit interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information** Statement introduced in Junos OS Release 10.1.
Support for the **[edit ... family pppoe]** hierarchies introduced in Junos OS Release 11.2.
Support at the **[edit dynamic-profiles ... interfaces interface-set ... pppoe-underlying-options]** hierarchy level introduced in Junos OS Release 12.2.

**Description** Configure the maximum number of dynamic PPPoE logical interfaces that the router can activate on the underlying interface. The **max-sessions** value does not affect the maximum number of static PPPoE logical interfaces that can be configured on the underlying interface.

NOTE: The **[edit ... family pppoe]** hierarchies and the **[edit dynamic-profiles ... interfaces interface-set ... pppoe-underlying-options]** hierarchy level are supported only on MX Series routers with MPCs/MICs.

**Options** *number*—Maximum number of dynamic PPPoE logical interfaces (sessions) that the router can activate on the underlying interface. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform. You can configure from 1 to the platform-specific default for your routing platform. Changing the **max-sessions** value has no effect on dynamic PPPoE logical interfaces that are already active.

For information about scaling values for PPPoE interfaces, access the *Subscriber Management Scaling Values (XLS)* spreadsheet from the Downloads box on the *Junos OS Subscriber Management* pathway page for the current release.

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

**Related Documentation**
- *Limiting the Maximum Number of PPPoE Sessions on the Underlying Interface*
- *Defining Agent Circuit Identifier Interface Sets*

- *PPPoE Maximum Session Limit Overview*
- *Guidelines for Using PPPoE Maximum Session Limit from RADIUS*
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- *Subscriber Interfaces and PPPoE Overview*

## mode (Dynamic Profiles)

**Syntax** mode loose;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family (inet) rpf-check]

**Release Information** Statement introduced in Junos OS Release 9.6.

**Description** Check whether the packet has a source address with a corresponding prefix in the routing table. If a corresponding prefix is not found, unicast reverse path forwarding (RPF) loose mode does not accept the packet. Unlike strict mode, loose mode does not check whether the interface expects to receive a packet with a specific source address prefix.

**Default** If you do not include this statement, unicast RPF is in strict mode.

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

**Related Documentation**
- *Configuring Unicast RPF*

## nd-override-preferred-src

**Syntax** nd-override-preferred-src;

**Hierarchy Level** [edit system]

**Release Information** Statement introduced in Junos OS Release 13.3

**Description** Configure the router to override the default configuration and use the appropriate address based on destination address scope for the source address for Neighbor Solicitation/Neighbor Advertisement (NS/NA) for unnumbered interfaces.

**Default** The router uses the preferred source address, if configured, as source for NS/NA for unnumbered interfaces. If no preferred source address is configured, the router uses the appropriate address based on destination address scope.

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

**Related Documentation**
- unnumbered-address on page 179

## output-vlan-map (Dynamic Interfaces)

**Syntax**
```
output-vlan-map {
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  (pop | swap);
  tag-protocol-id tpid;
  vlan-id number;
}
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic interfaces, define the rewrite profile to be applied to outgoing frames on this logical interface.

The 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**
- *Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution*

## pop (Dynamic VLANs)

**Syntax** pop;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, specify the VLAN rewrite operation to remove a VLAN tag from the top of the VLAN tag stack. The outer VLAN tag of the frame is removed.

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

**Related Documentation**

- *Removing a VLAN Tag*
- *Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution*

## precedence

**Syntax** precedence *precedence*;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* filter input *filter-name*],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* filter output *filter-name*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family* filter input *filter-name*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family* filter output *filter-name*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family* filter input *filter-name*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family* filter output *filter-name*]

**Release Information** Statement introduced in Junos OS Release 9.3.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet filter input *filter-name*]** hierarchy level and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet filter output *filter-name*]** hierarchy level introduced in Junos OS Release 10.1.

**Description** Apply a precedence to a dynamic filter. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

**Options** ***precedence***—Precedence value for the filter. The lower the precedence value, the higher the precedence.

**Range:** 0 through 250

**Default:** 0

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

**Related Documentation**

- *Firewall Filters Overview*
- *Dynamic Firewall Filters Overview*
- *Classic Filters Overview*
- *Fast Update Filters Overview*
- *Basic Classic Filter Syntax*
- *Basic Fast Update Filter Syntax*

## proxy-arp

**Syntax** proxy-arp;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 9.5.

**Description** For Ethernet interfaces only, configure the router to respond to any ARP request, as long as the router has an active route to the target address of the ARP request.

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

**Related Documentation**
- *Configuring Restricted and Unrestricted Proxy ARP*
- *Configuring Gratuitous ARP*

## push (Dynamic VLANs)

**Syntax** push;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* input-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, specify the VLAN rewrite operation to add a new VLAN tag to the top of the VLAN stack. An outer VLAN tag is pushed in front of the existing VLAN tag. If you include the **push** statement in the configuration, you must also include the *pop* statement at the **[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]** hierarchy level.

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

**Related Documentation**
- *Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution*

## rebalance-periodic (Aggregated Ethernet Subscriber Interfaces)

**Syntax** rebalance-periodic time *hour:minute* <interval *hours*>

**Hierarchy Level** [edit interfaces ae *number* aggregated-ether-options]

**Release Information** Statement introduced in Junos OS Release 11.2.

**Description** Configure periodic rebalancing of distribution of subscribers on an aggregated Ethernet bundle.

**Options** ***hour:minute***—Time at which the rebalancing occurs, in military time.

***hours***—Interval at which the rebalancing occurs, in hours. Default: 24 hours.

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

**Related Documentation**
- Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface on page 76

## rpf-check (Dynamic Profiles)

**Syntax**
```
rpf-check {
  fail-filter filter-name;
  mode loose;
}
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

**Release Information** Statement introduced in Junos OS Release 9.6.

**Description** Check whether traffic is arriving on an expected path. You can include this statement with the **inet** protocol family only.

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 Unicast RPF*
- *Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces*

## service-name-table

**Syntax** service-name-table *table-name*;

**Hierarchy Level**
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family pppoe],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family pppoe],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]

**Release Information** Statement introduced in Junos OS Release 10.0.
Support at the **[edit ... family pppoe]** hierarchies introduced in Junos OS Release 11.2.

**Description** Specify the PPPoE service name table assigned to a PPPoE underlying interface. This underlying interface is configured with either the **encapsulation ppp-over-ether** statement or the **family pppoe** statement; the two statements are mutually exclusive.

NOTE: The **[edit ... family pppoe]** hierarchies are supported only on MX Series routers with MPCs.

**Options** ***table-name***—Name of the PPPoE service name table, a string of up to 32 alphanumeric characters.

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

**Related Documentation**
- *Configuring PPPoE Service Name Tables*
- *Assigning a Service Name Table to a PPPoE Underlying Interface*
- Configuring the PPPoE Family for an Underlying Interface on page 72

## swap (Dynamic VLANs)

**Syntax** swap;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* input-vlan-map],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, specify the VLAN rewrite operation to replace a VLAN tag. The outer VLAN tag of the frame is overwritten with the user-specified VLAN tag information.

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

**Related Documentation**
- *Rewriting the VLAN Tag on Tagged Frames*
- *Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution*

## tag-protocol-id (Dynamic VLANs)

**Syntax** tag-protocol-id *tpids*;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* input-vlan-map],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, configure the outer TPID value. All TPIDs you include in input and output VLAN maps must be among those you specify at the **[edit interfaces *interface-name* gigether-options ethernet-switch-profile tag-protocol-id [ *tpids* ]]** hierarchy level.

**Default** If the **tag-protocol-id** statement is not configured, the TPID value is 0x8100.

**Options** ***tpids***—TPIDs to be accepted on the VLAN. Specify TPIDs in hexadecimal format.

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

**Related Documentation**
- *Configuring Inner and Outer TPIDs and VLAN IDs*

## targeted-distribution (Dynamic Demux Interfaces over Aggregated Ethernet)

**Syntax** targeted-distribution;

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

**Release Information** Statement introduced in Junos OS Release 12.3.

**Description** Configure egress data for a dynamic logical interface to be sent across a single member link in an aggregated Ethernet bundle. A backup link is provisioned with CoS scheduling resources in the event that the primary assigned link goes down. The aggregated Ethernet interface must be configured without link protection.

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

**Related Documentation**

- Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 74

## targeted-distribution (Static Interfaces over Aggregated Ethernet)

**Syntax** targeted-distribution;

**Hierarchy Level** [edit interfaces demux0 unit *logical-unit-number*],
[edit interfaces pp0 unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 11.2.
Statement introduced in Junos OS Release 13.2R2 for EX Series switches.

**Description** Configure egress data for a logical interface to be sent across a single member link in an aggregated Ethernet bundle. A backup link is provisioned with CoS scheduling resources in the event that the primary assigned link goes down. The aggregated Ethernet interface must be configured without link protection.

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

**Related Documentation**

- *CoS for PPPoE Subscriber Interfaces Overview*
- Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 76
- Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 77
- *Targeted Traffic Distribution on Aggregated Ethernet Interfaces in a Virtual Chassis*
- *Configuring Module Redundancy for a Virtual Chassis*
- *Configuring Chassis Redundancy for a Virtual Chassis*

## underlying-interface (demux0)

**Syntax** underlying-interface *underlying-interface-name*;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces demux0 *interface-name* unit unit *logical-unit-number* demux-options]

**Release Information** Statement introduced in Junos OS Release 9.3.
Support for aggregated Ethernet introduced in Junos OS Release 9.4.

**Description** Configure the underlying interface on which the demultiplexing (demux) interface is running.

**Options** ***underlying-interface-name***—Either the specific name of the interface on which the DHCP discover packet arrives or one of the following interface variables:

- **$junos-underlying-interface** when configuring dynamic IP demux interfaces.
- **$junos-interface-ifd-name** when configuring dynamic VLAN demux interfaces.

The variable is used to specify the underlying interface when a new demux interface is dynamically created. The variable is dynamically replaced with the underlying interface that DHCP supplies when the subscriber logs in.

NOTE: Logical demux interfaces are currently supported on Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet interfaces.

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

**Related Documentation**

- Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 22
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28
- *Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview*

## unit (Dynamic Profiles Standard Interface)

**Syntax**

```
unit logical-unit-number {
  auto-configure {
    agent-circuit-identifier {
      dynamic-profile profile-name;
    }
  }
  dial-options {
    ipsec-interface-id name;
    l2tp-interface-id name;
    (shared | dedicated);
  }
  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 {
    access-concentrator name;
    address address;
    direct-connect;
    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;
      }
      output filter-name {
        precedence precedence;
      }
    }
    max-sessions number;
    max-sessions-vsa-ignore;
    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;
        }
      }
      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;
      }
      keepalives {
        interval seconds;
        }
      ppp-options {
        chap;
        pap;
      }
      vlan-id number;
      vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
    }
  }
```

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

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

**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*—The specific unit number of the interface you want to assign to the dynamic profile, or one of the following Junos OS predefined variables:

- **$junos-underlying-interface-unit**—For static VLANs, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP when it accesses the subscriber network.
- **$junos-interface-unit**—The unit number variable on a dynamic underlying VLAN interface for which you want to enable the creation of dynamic VLAN subscriber interfaces based on agent circuit identifier information.

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 Dynamic Underlying VLAN Interfaces to Use Agent Circuit Identifier Information*
- *Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information*
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

## 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;
    }
    direct-connect;
    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.

**Required Privilege Level**

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

**Related Documentation**

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 27
- *Configuring an IP Demultiplexing Interface*

## unnumbered-address (Dynamic Profiles)

**Syntax** unnumbered-address *interface-name* <preferred-source-address *address*>;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

**Release Information** Statement introduced in Junos OS Release 9.2.
**$junos-preferred-source-address** variable support added in Junos OS Release 9.6.
Support for the **$junos-loopback-interface** predefined variable introduced in Junos OS Release 9.6.

**Description** For Ethernet 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. To configure unnumbered address dynamically, include the **$junos-loopback-interface-address** predefined variable.

You can configure unnumbered address support on Ethernet interfaces for IPv4 and IPv6 address families.

**Options** *interface-name*—Name of the interface from which the local address is derived. The specified interface must have a logical unit number, a configured IP address, and must not be an unnumbered interface. This value can be a specific interface name or the **$junos-loopback-interface** dynamic variable.

When defining the **unnumbered-address** statement using a static interface, keep the following in mind:

- If you choose to include the **routing-instance** statement at the **[edit dynamic-profiles]** hierarchy level, that statement must be configured with a valid, static routing instance value. In addition, whatever static unnumbered interface you specify must belong to that routing instance.
- If you choose to not include the **routing-instance** statement at the **[edit dynamic-profiles]** hierarchy level, the unnumbered-address statement uses the default routing instance. The use of the default routing instance requires that the unnumbered interface be configured statically and that it reside in the default routing instance.

When defining the **unnumbered-address** statement using the **$junos-loopback-interface** dynamic variable, keep the following in mind:

- To use the **$junos-loopback-interface** dynamic variable, the dynamic profile must also contain the **routing-instance** statement configured with the **$junos-routing-instance** dynamic variable at the [edit dynamic-profiles] hierarchy level.
- The applied loopback interface is based on the dynamically obtained routing instance of the subscriber.

***address***—(Optional) Secondary IP address of the donor interface. Configuring the preferred source address enables you to use an IP address other than the primary IP address on some of the unnumbered Ethernet interfaces in your network. This value can be a static IP address, the **$junos-preferred-source-address** dynamic variable for the inet family, or **$junos-preferred-source-ipv6-address** dynamic variable for the inet6 family.

When defining the **preferred-source-address** value using a static IP address, keep the following in mind:

- The unnumbered interface must be statically configured.
- The IP address specified as the **preferred-source-address** must be configured in the specified unnumbered interface.

When defining the **preferred-source-address** value using the **$junos-preferred-source-address** or **$junos-preferred-source-ipv6-address** dynamic variables, keep the following in mind:

- You must configure the **unnumbered-address** statement using the **$junos-loopback-interface** dynamic variable.
- You must configure the **routing-instance** statement using the **$junos-routing-instance** dynamic variable at the **[edit dynamic-profiles]** hierarchy level.
- The preferred source address chosen is based on the dynamically applied loopback address which is in turn derived from the dynamically obtained routing instance of the subscriber. The configured loopback address with the closest network match to the user IP address is selected as the preferred source address.

**Required Privilege Level**

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

**Related Documentation**

- *Configuring an Unnumbered Interface*
- *Dynamic Profiles Overview*

## vlan-id (Dynamic Profiles)

**Syntax** vlan-id (*number* | none);

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 9.5.
VLAN demux interface support introduced in Junos OS Release 10.2.

**Description** For VLAN demux, Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.

**Options** *number*—A valid VLAN identifier. When used in the **dynamic-profiles** hierarchy, specify the **$junos-vlan-id** predefined variable to dynamically obtain the VLAN identifier.

**none**—Enable the use of untagged pseudo-wire frames on dynamic interfaces.

- For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023.
- For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094.
- VLAN ID 0 is reserved for tagging the priority of frames.

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

**Related Documentation**

- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 23
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 28

## vlan-id (Dynamic VLANs)

**Syntax** vlan-id *number*;

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* input-vlan-map],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** For dynamic VLAN interfaces, specify the line VLAN identifiers to be rewritten at the input or output interface.

You cannot include the **vlan-id** statement with the **swap** statement, **swap-push** statement, **push-push** statement, or **push-swap** statement at the **[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]** hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the **vlan-id** statement that you include at the **[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

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

**Related Documentation**

- *Rewriting the VLAN Tag on Tagged Frames*
- *Binding VLAN IDs to Logical Interfaces*

## vlan-tagging

**Syntax** vlan-tagging;

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

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

**Description** For Fast Ethernet and Gigabit Ethernet interfaces and aggregated Ethernet interfaces configured for VPLS, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.

NOTE: For Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces supporting VPLS, the Junos OS supports a subset of the IEEE 802.1Q standard for channelizing an Ethernet interface into multiple logical interfaces, allowing many hosts to be connected to the same Gigabit Ethernet switch, but preventing them from being in the same routing or bridging domain.

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

**Related Documentation**

- *Configuring VLAN Ranges for Use with Dynamic Profiles*
- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 21
- *Configuring the L2TP LNS Peer Interface*

## vlan-tags

**Syntax** vlan-tags outer [*tpid*].*vlan-id* [inner [*tpid*].*vlan-id*];

**Hierarchy Level** [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Release 9.5.
VLAN demux interface support introduced in Junos OS Release 10.2.

**Description** For Gigabit Ethernet IQ and IQE interfaces only, binds TPIDs and 802.1Q VLAN tag IDs to a logical interface. You must include the **stacked-vlan-tagging** statement at the **[edit interfaces *interface-name*]** hierarchy level.

NOTE: The inner-range *vid1–vid2* option is supported on MX Series routers with IQE PICs only.

**Options**

**inner [*tpid*].*vlan-id***—A TPID (optional) and a valid VLAN identifier in the format *tpid.vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the **$junos-vlan-id** predefined variable to dynamically obtain the VLAN ID.

**Range:** For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.

**outer [*tpid*].*vlan-id***—A TPID (optional) and a valid VLAN identifier in the format *tpid.vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the **$junos-stacked-vlan-id** predefined variable.

**Range:** For VLAN ID, 1 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces. VLAN ID 0 is reserved for tagging the priority of frames.

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

**Related Documentation**

- *Configuring Dual VLAN Tags*
- *stacked-vlan-tagging*

PART 3

# Administration


- Operational Commands on page 187
- Monitoring Commands on page 189

CHAPTER 8

# Operational Commands

- request interface rebalance (Aggregated Ethernet for Subscriber Management)

## request interface rebalance (Aggregated Ethernet for Subscriber Management)

**Syntax** request interface rebalance interface *interface-name*

**Release Information** Command introduced in Junos OS Release 11.2.

**Description** Manually rebalance the subscribers on an aggregated Ethernet bundle with targeted distribution enabled.

**Options** ***interface-name***—Aggregated Ethernet logical interface number.

**Required Privilege Level** view

**List of Sample Output** request interface rebalance on page 188

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

#### request interface rebalance

```
user@host >request interface rebalance interface ae0
```

CHAPTER 9

# Monitoring Commands


- show interfaces (10-Gigabit Ethernet)
- show interfaces (PPPoE)
- show interfaces demux0 (Demux Interfaces)
- show interfaces (Gigabit Ethernet)
- show interfaces targeting (Aggregated Ethernet for Subscriber Management)

## show interfaces (10-Gigabit Ethernet)

**Syntax**

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

**Release Information**

Command introduced in Junos OS Release 8.0.

**Description**

(M320, M120, MX Series, and T Series routers and EX Series switches only) Display status information about the specified 10-Gigabit Ethernet interface.

**Options**

**xe-*fpc/pic/port***—Display standard information about the specified 10-Gigabit Ethernet interface.

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

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

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

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

**statistics**—(Optional) Display static interface statistics.

**Required Privilege Level**

view

**List of Sample Output**

show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, IQ2) on page 205
show interfaces extensive (10-Gigabit Ethernet, WAN PHY Mode) on page 208
show interfaces extensive (10-Gigabit Ethernet, DWDM OTN PIC) on page 210
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode) on page 212
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Transmit-Only) on page 212
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Receive-Only) on page 213

**Output Fields**

See Table 5 on page 191 for the output fields for the **show interfaces** (10–Gigabit Ethernet) command.

## Table 5: show interfaces Gigabit Ethernet Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| Physical Interface | | |
| **Physical interface** | Name of the physical interface. | All levels |
| **Enabled** | State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*. | All levels |
| **Interface index** | Index number of the physical interface, which reflects its initialization sequence. | **detail extensive** none |
| **SNMP ifIndex** | SNMP index number for the physical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Link-level type** | Encapsulation being used on the physical interface. | All levels |
| **MTU** | Maximum transmission unit size on the physical interface. | All levels |
| **Speed** | Speed at which the interface is running. | All levels |
| **Loopback** | Loopback status: **Enabled** or **Disabled**. If loopback is enabled, type of loopback: **Local** or **Remote**. | All levels |
| **Source filtering** | Source filtering status: **Enabled** or **Disabled**. | All levels |
| **LAN-PHY mode** | 10-Gigabit Ethernet interface operating in Local Area Network Physical Layer Device (LAN PHY) mode. LAN PHY allows 10-Gigabit Ethernet wide area links to use existing Ethernet applications. | All levels |
| **WAN-PHY mode** | 10-Gigabit Ethernet interface operating in Wide Area Network Physical Layer Device (WAN PHY) mode. WAN PHY allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and other devices intended for SONET/SDH. | All levels |
| **Unidirectional** | Unidirectional link mode status for 10-Gigabit Ethernet interface: **Enabled** or **Disabled** for parent interface; **Rx-only** or **Tx-only** for child interfaces. | All levels |
| **Flow control** | Flow control status: **Enabled** or **Disabled**. | All levels |
| **Auto-negotiation** | (Gigabit Ethernet interfaces) Autonegotiation status: **Enabled** or **Disabled**. | All levels |
| **Remote-fault** | (Gigabit Ethernet interfaces) Remote fault status:<br>• **Online**—Autonegotiation is manually configured as online.<br>• **Offline**—Autonegotiation is manually configured as offline. | All levels |
| **Device flags** | Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*. | All levels |
| **Interface flags** | Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*. | All levels |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Link flags** | Information about the link. Possible values are described in the "Links Flags" section under *Common Output Fields Description*. | All levels |
| **Wavelength** | (10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm). | All levels |
| **Frequency** | (10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz). | All levels |
| **CoS queues** | Number of CoS queues configured. | **detail extensive** none |
| **Schedulers** | (Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces only) Number of CoS schedulers configured. | **extensive** |
| **Hold-times** | Current interface hold-time up and hold-time down, in milliseconds. | **detail extensive** |
| **Current address** | Configured MAC address. | **detail extensive** none |
| **Hardware address** | Hardware MAC address. | **detail extensive** none |
| **Last flapped** | Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second:timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).** | **detail extensive** none |
| **Input Rate** | Input rate in bits per second (bps) and packets per second (pps). The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. | None specified |
| **Output Rate** | Output rate in bps and pps. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. | None specified |
| **Statistics last cleared** | Time when the statistics for the interface were last set to zero. | **detail extensive** |
| **Egress account overhead** | Layer 2 overhead in bytes that is accounted in the interface statistics for egress traffic. | **detail extensive** |
| **Ingress account overhead** | Layer 2 overhead in bytes that is accounted in the interface statistics for ingress traffic. | **detail extensive** **detail extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the physical interface.<br>• **Input bytes**—Number of bytes received on the interface. The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Output bytes**—Number of bytes transmitted on the interface. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface.<br>Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes.<br>For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 5 on page 191. | **detail extensive** |
| **Input errors** | Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Errors**—Sum of the incoming frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **Framing errors**—Number of packets received with an invalid frame checksum (FCS).<br>• **Runts**—Number of frames received that are smaller than the runt threshold.<br>• **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.<br>• **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** statement.<br>• **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame.<br>• **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.<br>• **FIFO errors**—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Output errors** | Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.<br>• **Errors**—Sum of the outgoing frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **Collisions**—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.<br>• **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.<br>• **FIFO errors**—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.<br>• **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.<br>• **MTU errors**—Number of packets whose size exceeded the MTU of the interface.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |
| **Egress queues** | Total number of egress queues supported on the specified interface. | **detail extensive** |
| **Queue counters (Egress)** | CoS queue number and its associated user-configured forwarding class name.<br>• **Queued packets**—Number of queued packets.<br>• **Transmitted packets**—Number of transmitted packets.<br>• **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. | **detail extensive** |
| **Ingress queues** | Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces. | **extensive** |
| **Queue counters (Ingress)** | CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces.<br>• **Queued packets**—Number of queued packets.<br>• **Transmitted packets**—Number of transmitted packets.<br>• **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Active alarms and Active defects** | Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the routing device configuration, an alarm can ring the red or yellow alarm bell on the routing device, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**.<br>• **None**—There are no active defects or alarms.<br>• **Link**—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning. | **detail extensive** none |
| **OTN alarms** | Active OTN alarms identified on the interface. | **detail extensive** |
| **OTN defects** | OTN defects received on the interface. | **detail extensive** |
| **OTN FEC Mode** | The FECmode configured on the interface.<br>• **efec**—Enhanced forward error correction (EFEC) is configured to defect and correct bit errors.<br>• **gfec**—G.709 Forward error correction (GFEC) mode is configured to detect and correct bit errors.<br>• **none**—FEC mode is not configured. | **detail extensive** |
| **OTN Rate** | OTN mode.<br>• **fixed-stuff-bytes**—Fixed stuff bytes 11.0957 Gbps.<br>• **no-fixed-stuff-bytes**—No fixed stuff bytes 11.0491 Gbps.<br>• **pass-through**—Enable OTN passthrough mode.<br>• **no-pass-through**—Do not enable OTN passthrough mode. | **detail extensive** |
| **OTN Line Loopback** | Status of the line loopback, if configured for the DWDM OTN PIC. Its value can be: **enabled** or **disabled**. | **detail extensive** |
| **OTN FEC statistics** | The forward error correction (FEC) counters for the DWDM OTN PIC.<br>• **Corrected Errors**—The count of corrected errors in the last second.<br>• **Corrected Error Ratio**—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits. | **detail extensive** |
| **OTN FEC alarms** | OTN FEC excessive or degraded error alarms triggered on the interface.<br>• **FEC Degrade**—OTU FEC Degrade defect.<br>• **FEC Excessive**—OTU FEC Excessive Error defect. | **detail extensive** |
| **OTN OC** | OTN OC defects triggered on the interface.<br>• **LOS**—OC Loss of Signal defect.<br>• **LOF**—OC Loss of Frame defect.<br>• **LOM**—OC Loss of Multiframe defect.<br>• **Wavelength Lock**—OC Wavelength Lock defect. | **detail extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **OTN OTU** | OTN OTU defects detected on the interface<br>• **AIS**—OTN AIS alarm.<br>• **BDI**—OTN OTU BDI alarm.<br>• **IAE**—OTN OTU IAE alarm.<br>• **TTIM**—OTN OTU TTIM alarm.<br>• **SF**—OTN ODU bit error rate fault alarm.<br>• **SD**—OTN ODU bit error rate defect alarm.<br>• **TCA-ES**—OTN ODU ES threshold alarm.<br>• **TCA-SES**—OTN ODU SES threshold alarm.<br>• **TCA-UAS**—OTN ODU UAS threshold alarm.<br>• **TCA-BBE**—OTN ODU BBE threshold alarm.<br>• **BIP**—OTN ODU BIP threshold alarm.<br>• **BBE**—OTN OTU BBE threshold alarm.<br>• **ES**—OTN OTU ES threshold alarm.<br>• **SES**—OTN OTU SES threshold alarm.<br>• **UAS**—OTN OTU UAS threshold alarm. | **detail extensive** |
| **Received DAPI** | Destination Access Port Interface (DAPI) from which the packets were received. | **detail extensive** |
| **Received SAPI** | Source Access Port Interface (SAPI) from which the packets were received. | **detail extensive** |
| **Transmitted DAPI** | Destination Access Port Interface (DAPI) to which the packets were transmitted. | **detail extensive** |
| **Transmitted SAPI** | Source Access Port Interface (SAPI) to which the packets were transmitted. | **detail extensive** |
| **PCS statistics** | (10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device.<br>• **Bit errors**—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode.<br>• **Errored blocks**—Loss of block lock. The number of errored blocks when PCS receiver is operating in normal mode. | **detail extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **MAC statistics** | **Receive** and **Transmit** statistics reported by the PIC's MAC subsystem, including the following:<br>• **Total octets** and **total packets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see Table 6 on page 205<br>• **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets.<br>• **CRC/Align errors**—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).<br>• **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning.<br>• **MAC control frames**—Number of MAC control frames.<br>• **MAC pause frames**—Number of MAC control frames with **pause** operational code.<br>• **Oversized frames**—Number of frames that exceed 1518 octets.<br>• **Jabber frames**—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.<br>• **Fragment frames**—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.<br>• **VLAN tagged frames**—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not.<br>• **Code violations**—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.” | **extensive** |
| **OTN Received Overhead Bytes** | APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08 | **extensive** |
| **OTN Transmitted Overhead Bytes** | APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08 | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Filter statistics** | **Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem. The filtering is done by the content-addressable memory (CAM) on the PIC. The filter examines a packet's source and destination MAC addresses to determine whether the packet should enter the system or be rejected.<br>• **Input packet count**—Number of packets received from the MAC hardware that the filter processed.<br>• **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address.<br>• **Input DA rejects**—Number of packets that the filter rejected because the destination MAC address of the packet is not on the accept list. It is normal for this value to increment. When it increments very quickly and no traffic is entering the routing device from the far-end system, either there is a bad ARP entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local routing device (which the routing device is rejecting).<br>• **Input SA rejects**—Number of packets that the filter rejected because the source MAC address of the packet is not on the accept list. The value in this field should increment only if source MAC address filtering has been enabled. If filtering is enabled, if the value increments quickly, and if the system is not receiving traffic that it should from the far-end system, it means that the user-configured source MAC addresses for this interface are incorrect.<br>• **Output packet count**—Number of packets that the filter has given to the MAC hardware.<br>• **Output packet pad count**—Number of packets the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware. Usually, padding is done only on small ARP packets, but some very small IP packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist or it is misconfigured.<br>• **Output packet error count**—Number of packets with an indicated error that the filter was given to transmit. These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment.<br>• **CAM destination filters, CAM source filters**—Number of entries in the CAM dedicated to destination and source MAC address filters. There can only be up to 64 source entries. If source filtering is disabled, which is the default, the values for these fields should be 0. | **extensive** |
| **PMA PHY** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **PHY Lock**—Phase-locked loop<br>• **PHY Light**—Loss of optical signal | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **WIS section** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B1**—Bit interleaved parity for SONET section overhead<br>• **SEF**—Severely errored framing<br>• **LOL**—Loss of light<br>• **LOF**—Loss of frame<br>• **ES-S**—Errored seconds (section)<br>• S**ES-S**—Severely errored seconds (section)<br>• **SEFS-S**—Severely errored framing seconds (section) | **extensive** |
| **WIS line** | (10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. State other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B2**—Bit interleaved parity for SONET line overhead<br>• **REI-L**—Remote error indication (near-end line)<br>• **RDI-L**—Remote defect indication (near-end line)<br>• **AIS-L**—Alarm indication signal (near-end line)<br>• **BERR-SF**—Bit error rate fault (signal failure)<br>• **BERR-SD**—Bit error rate defect (signal degradation)<br>• **ES-L**—Errored seconds (near-end line)<br>• **SES-L**—Severely errored seconds (near-end line)<br>• **UAS-L**—Unavailable seconds (near-end line)<br>• **ES-LFE**—Errored seconds (far-end line)<br>• **SES-LFE**—Severely errored seconds (far-end line)<br>• **UAS-LFE**—Unavailable seconds (far-end line) | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **WIS path** | (10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B3**—Bit interleaved parity for SONET section overhead<br>• **REI-P**—Remote error indication<br>• **LOP-P**—Loss of pointer (path)<br>• **AIS-P**—Path alarm indication signal<br>• **RDI-P**—Path remote defect indication<br>• **UNEQ-P**—Path unequipped<br>• **PLM-P**—Path payload label mismatch<br>• **ES-P**—Errored seconds (near-end STS path)<br>• **SES-P**—Severely errored seconds (near-end STS path)<br>• **UAS-P**—Unavailable seconds (near-end STS path)<br>• **SES-PFE**—Severely errored seconds (far-end STS path)<br>• **UAS-PFE**—Unavailable seconds (far-end STS path) | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Autonegotiation information** | Information about link autonegotiation.<br>• **Negotiation status:**<br>  • **Incomplete**—Ethernet interface has the speed or link mode configured.<br>  • **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.<br>  • **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.<br>• **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.<br>• **Link partner:**<br>  • **Link mode**—Depending on the capability of the attached Ethernet device, either **Full-duplex** or **Half-duplex**.<br>  • **Flow control**—Types of flow control supported by the remote Ethernet device. For Fast Ethernet interfaces, the type is **None**. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), and **Symmetric/Asymmetric** (link partner supports both **PAUSE** on receive and transmit or only **PAUSE** receive).<br>  • **Remote fault**—Remote fault information from the link partner—**Failure** indicates a receive link error. **OK** indicates that the link partner is receiving. **Negotiation error** indicates a negotiation error. **Offline** indicates that the link partner is going offline.<br>• **Local resolution**—Information from the link partner:<br>  • **Flow control**—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), and **Symmetric/Asymmetric** (link partner supports both **PAUSE** on receive and transmit or only **PAUSE** receive).<br>  • **Remote fault**—Remote fault information. **Link OK** (no error detected on receive), **Offline** (local interface is offline), and **Link Failure** (link error detected on receive). | **extensive** |
| **Received path trace, Transmitted path trace** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the routing device at the other end of the fiber. The transmitted path trace value is the message that this routing device transmits. | **extensive** |
| **Packet Forwarding Engine configuration** | Information about the configuration of the Packet Forwarding Engine:<br>• **Destination slot**—FPC slot number. | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **CoS information** | Information about the CoS queue for the physical interface.<br>• **CoS transmit queue**—Queue number and its associated user-configured forwarding class name.<br>• **Bandwidth %**—Percentage of bandwidth allocated to the queue.<br>• **Bandwidth bps**—Bandwidth allocated to the queue (in bps).<br>• **Buffer %**—Percentage of buffer space allocated to the queue.<br>• **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.<br>• **Priority**—Queue priority: **low** or **high**.<br>• **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. | **extensive** |
| | | |
| Logical Interface | | |
| **Logical interface** | Name of the logical interface. | All levels |
| **Index** | Index number of the logical interface, which reflects its initialization sequence. | **detail extensive** none |
| **SNMP ifIndex** | SNMP interface index number for the logical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Flags** | Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*. | All levels |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **VLAN-Tag** | Rewrite profile applied to incoming or outgoing frames on the outer (**Out**) VLAN tag or for both the outer and inner (**In**) VLAN tags.<br>• **push**—An outer VLAN tag is pushed in front of the existing VLAN tag.<br>• **pop**—The outer VLAN tag of the incoming frame is removed.<br>• **swap**—The outer VLAN tag of the incoming frame is overwritten with the user specified VLAN tag information.<br>• **push**—An outer VLAN tag is pushed in front of the existing VLAN tag.<br>• **push-push**—Two VLAN tags are pushed in from the incoming frame.<br>• **swap-push**—The outer VLAN tag of the incoming frame is replaced by a user-specified VLAN tag value. A user-specified outer VLAN tag is pushed in front. The outer tag becomes an inner tag in the final frame.<br>• **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user specified VLAN tag value.<br>• **pop-swap**—The outer VLAN tag of the incoming frame is removed, and the inner VLAN tag of the incoming frame is replaced by the user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame.<br>• **pop-pop**—Both the outer and inner VLAN tags of the incoming frame are removed. | **brief detail extensive** none |
| **Demux:** | IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following:<br>• Source Family Inet<br>• Destination Family Inet | **detail extensive** none |
| **Encapsulation** | Encapsulation on the logical interface. | All levels |
| **Protocol** | Protocol family. Possible values are described in the "Protocol Field" section under *Common Output Fields Description*. | **detail extensive** none |
| **MTU** | Maximum transmission unit size on the logical interface. | **detail extensive** none |
| **Maximum labels** | Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface. | **detail extensive** none |
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the specified interface set.<br>• **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set. The value in this field also includes the Layer 2 overhead bytes for ingress or egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Input packets, Output packets**—Number of packets received and transmitted on the interface set. | **detail extensive** |
| **IPv6 transit statistics** | Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled. | **extensive** |
| **Local statistics** | Number and rate of bytes and packets destined to the routing device. | **extensive** |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Transit statistics** | Number and rate of bytes and packets transiting the switch.<br><br>NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the **Output bytes** and **Output packets** interface counters. However, correct values display for both of these egress statistics when per-unit scheduling is enabled for the Gigabit Ethernet IQ2 physical interface, or when a single logical interface is actively using a shared scheduler. | **extensive** |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Route Table** | Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0. | **detail extensive** none |
| **Flags** | Information about protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*. | **detail extensive** |
| **Donor interface** | (Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address. | **detail extensive** none |
| **Preferred source address** | (Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface. | **detail extensive** none |
| **Input Filters** | Names of any input filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parenthesis next to all interfaces. | **detail extensive** |
| **Output Filters** | Names of any output filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parenthesis next to all interfaces. | **detail extensive** |
| **Mac-Validate Failures** | Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface. | **detail extensive** none |
| **Addresses, Flags** | Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| ***protocol-family*** | Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed. | **brief** |
| **Flags** | Information about address flag (possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Destination** | IP address of the remote side of the connection. | **detail extensive** none |
| **Local** | IP address of the logical interface. | **detail extensive** none |
| **Broadcast** | Broadcast address of the logical interlace. | **detail extensive** none |

Table 5: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |

For Gigabit Ethernet IQ PICs, traffic and MAC statistics output varies. Table 6 on page 205 describes the traffic and MAC statistics for two sample interfaces, each of which is sending traffic in packets of 500 bytes (including 478 bytes for the Layer 3 packet, 18 bytes for the Layer 2 VLAN traffic header, and 4 bytes for cyclic redundancy check [CRC] information). In Table 6 on page 205, the **ge-0/3/0** interface is the inbound physical interface, and the **ge-0/0/0** interface is the outbound physical interface. On both interfaces, traffic is carried on logical unit **.50** (VLAN 50).

Table 6: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type

| Interface Type | Sample Command | Byte and Octet Counts Include | Comments |
|---|---|---|---|
| Inbound physical interface | **show interfaces ge-0/3/0 extensive** | Traffic statistics:<br><br>Input bytes: 496 bytes per packet, representing the Layer 2 packet<br><br>MAC statistics:<br><br>Received octets: 500 bytes per packet, representing the Layer 2 packet + 4 bytes | The additional 4 bytes are for the CRC. |
| Inbound logical interface | **show interfaces ge-0/3/0.50 extensive** | Traffic statistics:<br><br>Input bytes: 478 bytes per packet, representing the Layer 3 packet | |
| Outbound physical interface | **show interfaces ge-0/0/0 extensive** | Traffic statistics:<br><br>Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes<br><br>MAC statistics:<br><br>Received octets: 478 bytes per packet, representing the Layer 3 packet | For input bytes, the additional 12 bytes includes 6 bytes for the destination MAC address + 4 bytes for VLAN + 2 bytes for the Ethernet type. |
| Outbound logical interface | **show interfaces ge-0/0/0.50 extensive** | Traffic statistics:<br><br>Input bytes: 478 bytes per packet, representing the Layer 3 packet | |

## Sample Output

### show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, IQ2)

```
user@host> show interfaces xe-5/0/0 extensive
Physical interface: xe-5/0/0, Enabled, Physical link is Up
  Interface index: 177, SNMP ifIndex: 99, Generation: 178
  Link-level type: Ethernet, MTU: 1518, LAN-PHY mode, Speed: 10Gbps, Loopback:
```

```
None, Source filtering: Enabled,
  Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Schedulers     : 1024
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:14:f6:b9:f1:f6, Hardware address: 00:14:f6:b9:f1:f6
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :           6970332384                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:             81050506                    0 pps
   Output packets:                    0                    0 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :           6970299398                    0 bps
   Input  packets:             81049992                    0 pps
   Drop   bytes  :                    0                    0 bps
   Drop   packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0,
    MTU errors: 0, Resource errors: 0
  Ingress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort             81049992             81049992                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                             0
    Errored blocks                         0
```

```
MAC statistics:                      Receive         Transmit
  Total octets                    6970332384                0
  Total packets                     81050506                0
  Unicast packets                   81050000                0
  Broadcast packets                      506                0
  Multicast packets                        0                0
  CRC/Align errors                         0                0
  FIFO errors                              0                0
  MAC control frames                       0                0
  MAC pause frames                         0                0
  Oversized frames                         0
  Jabber frames                            0
  Fragment frames                          0
  VLAN tagged frames                       0
  Code violations                          0
Filter statistics:
  Input packet count                81050506
  Input packet rejects                   506
  Input DA rejects                         0
  Input SA rejects                         0
  Output packet count                                       0
  Output packet pad count                                   0
  Output packet error count                                 0
  CAM destination filters: 0, CAM source filters: 0
Packet Forwarding Engine configuration:
  Destination slot: 5
CoS information:
  Direction : Output
  CoS transmit queue          Bandwidth              Buffer Priority   Limit
                         %            bps     %         usec
  0 best-effort         95      950000000    95         0          low     none
  3 network-control      5       50000000     5         0          low     none

  Direction : Input
  CoS transmit queue          Bandwidth              Buffer Priority   Limit
                         %            bps     %         usec
  0 best-effort         95      950000000    95         0          low     none
  3 network-control      5       50000000     5         0          low     none

Logical interface xe-5/0/0.0 (Index 71) (SNMP ifIndex 95) (Generation 195)
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]  Encapsulation: ENET2
  Egress account overhead: 100
  Ingress account overhead: 90
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                  46
   Input  packets:                   0
   Output packets:                   1
   IPv6 transit statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                  46
   Input  packets:                   0
   Output packets:                   1
  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
   Protocol inet, MTU: 1500, Generation: 253, Route table: 0
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 192.1.1/24, Local: 192.1.1.1, Broadcast: 192.1.1.255,
Generation: 265
   Protocol multiservice, MTU: Unlimited, Generation: 254, Route table: 0
     Flags: None
     Policer: Input: __default_arp_policer__
```

## show interfaces extensive (10-Gigabit Ethernet, WAN PHY Mode)

```
user@host> show interfaces xe-1/0/0 extensive
Physical interface: xe-1/0/0, Enabled, Physical link is Up
  Interface index: 141, SNMP ifIndex: 34, Generation: 47
  Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Loopback: Disabled
  WAN-PHY mode
  Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:a2:10:9d, Hardware address: 00:05:85:a2:10:9d
  Last flapped   : 2005-07-07 11:22:34 PDT (3d 12:28 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS Link CRC errors: 0, HS Link FIFO overflows: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0,
    Aged packets: 0, FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0,
    Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets     Dropped packets
    0 best-effort                    0                    0                   0
    1 expedited-fo                   0                    0                   0
    2 assured-forw                   0                    0                   0
    3 network-cont                   0                    0                   0
  Active alarms : LOL, LOS, LBL
  Active defects: LOL, LOS, LBL, SEF, AIS-L, AIS-P
  PCS statistics             Seconds       Count
    Bit errors                     0           0
    Errored blocks                 0           0
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
```

```
    CRC/Align errors                          0                0
    FIFO errors                               0                0
    MAC control frames                        0                0
    MAC pause frames                          0                0
    Oversized frames                          0
    Jabber frames                             0
    Fragment frames                           0
    VLAN tagged frames                        0
    Code violations                           0
  Filter statistics:
    Input packet count                        0
    Input packet rejects                      0
    Input DA rejects                          0
    Input SA rejects                          0
    Output packet count                                        0
    Output packet pad count                                    0
    Output packet error count                                  0
    CAM destination filters: 0, CAM source filters: 0
  PMA PHY:                Seconds        Count  State
    PLL lock                    0            0  OK
    PHY light               63159            1  Light Missing
WIS section:
  BIP-B1                        0            0
  SEF                      434430       434438  Defect Active
  LOS                      434430            1  Defect Active
  LOF                      434430            1  Defect Active
  ES-S                     434430
  SES-S                    434430
  SEFS-S                   434430
WIS line:
  BIP-B2                        0            0
  REI-L                         0            0
  RDI-L                         0            0  OK
  AIS-L                    434430            1  Defect Active
  BERR-SF                       0            0  OK
  BERR-SD                       0            0  OK
  ES-L                     434430
  SES-L                    434430
  UAS-L                    434420
  ES-LFE                        0
  SES-LFE                       0
  UAS-LFE                       0
WIS path:
  BIP-B3                        0            0
  REI-P                         0            0
  LOP-P                         0            0  OK
  AIS-P                    434430            1  Defect Active
  RDI-P                         0            0  OK
  UNEQ-P                        0            0  OK
  PLM-P                         0            0  OK
  ES-P                     434430
  SES-P                    434430
  UAS-P                    434420
  ES-PFE                        0
  SES-PFE                       0
  UAS-PFE                       0
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Transmitted path trace: orissa so-1/0/0
  6f 72 69 73 73 61 20 73 6f 2d 31 2f 30 2f 30 00   orissa so-1/0/0.
  Packet Forwarding Engine configuration:
```

```
    Destination slot: 1
  CoS information:
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                          %           bps     %    bytes
    0 best-effort        95     950000000    95        0          low     none
    3 network-control     5      50000000     5        0          low     none
```

## show interfaces extensive (10-Gigabit Ethernet, DWDM OTN PIC)

```
user@host> show interfaces ge-7/0/0 extensive
Physical interface: ge-7/0/0, Enabled, Physical link is Down
  Interface index: 143, SNMP ifIndex: 508, Generation: 208
  Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  Wavelength     : 1550.12 nm, Frequency: 193.40 THz
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:70:2b:72, Hardware address: 00:05:85:70:2b:72
  Last flapped   : 2011-04-20 15:48:54 PDT (18:39:49 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
   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, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    FIFO errors: 0, Resource errors: 0
  Output errors:
   Carrier transitions: 2, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
    FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont
  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : LINK
  Active defects : LINK
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
```

```
  Unicast packets                          0               0
  Broadcast packets                        0               0
  Multicast packets                        0               0
  CRC/Align errors                         0               0
  FIFO errors                              0               0
  MAC control frames                       0               0
  MAC pause frames                         0               0
  Oversized frames                         0
  Jabber frames                            0
  Fragment frames                          0
  VLAN tagged frames                       0
  Code violations                          0
  Total octets                             0               0
  Total packets                            0               0
  Unicast packets                          0               0
  Broadcast packets                        0               0
  Multicast packets                        0               0
  CRC/Align errors                         0               0
  FIFO errors                              0               0
  MAC control frames                       0               0
  MAC pause frames                         0               0
  Oversized frames                         0
  Jabber frames                            0
  Fragment frames                          0
  VLAN tagged frames                       0
  Code violations                          0
OTN alarms            :   None
OTN defects           :   None
OTN FEC Mode       : GFEC
OTN Rate              : Fixed Stuff Bytes 11.0957Gbps
OTN Line Loopback : Enabled
OTN FEC statistics :
  Corrected Errors                                      0
  Corrected Error Ratio (          0 sec average)     0e-0
OTN FEC alarms:          Seconds        Count  State
  FEC Degrade                  0            0  OK
  FEC Excessive                0            0  OK
OTN OC:                  Seconds        Count  State
  LOS                          2            1  OK
  LOF                      67164            2  Defect Active
  LOM                      67164           71  Defect Active
  Wavelength Lock              0            0  OK
OTN OTU:
  AIS                          0            0  OK
  BDI                      65919         4814  Defect Active
  IAE                      67158            1  Defect Active
  TTIM                         7            1  OK
  SF                       67164            2  Defect Active
  SD                       67164            3  Defect Active
  TCA-ES                       0            0  OK
  TCA-SES                      0            0  OK
  TCA-UAS                     80           40  OK
  TCA-BBE                      0            0  OK
  BIP                          0            0  OK
  BBE                          0            0  OK
  ES                           0            0  OK
  SES                          0            0  OK
  UAS                        587            0  OK
  Received DAPI:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  Received SAPI:
```

```
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    Transmitted DAPI:
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    Transmitted SAPI:
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  OTN Received Overhead Bytes:
    APS/PCC0: 0x02, APS/PCC1: 0x42, APS/PCC2: 0xa2, APS/PCC3: 0x48
    Payload Type: 0x03
  OTN Transmitted Overhead Bytes:
    APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00
    Payload Type: 0x03
  Filter statistics:
    Input packet count                        0
    Input packet rejects                      0
    Input DA rejects                          0
    Input SA rejects                          0
    Output packet count                                    0
    Output packet pad count                                0
    Output packet error count                              0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 7
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                               %            bps     %           usec
    0 best-effort             95     9500000000    95              0      low
none
    3 network-control          5      500000000     5              0      low
none
    ...
```

## show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode)

```
user@host> show interfaces xe-7/0/0 extensive
Physical interface: xe-7/0/0, Enabled, Physical link is Up
  Interface index: 173, SNMP ifIndex: 212, Generation: 174
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
Unidirectional: Enabled,
  Loopback: None, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
...
```

## show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Transmit-Only)

```
user@host> show interfaces xe-7/0/0–tx extensive
Physical interface: xe-7/0/0-tx, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 137, Generation: 177
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
Unidirectional: Tx-Only
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:73:e4:83, Hardware address: 00:05:85:73:e4:83
  Last flapped   : 2007-06-01 09:08:19 PDT (3d 02:31 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
```

```
    Output bytes  :      322891152287160           9627472888 bps
    Input  packets:                   0                    0 pps
    Output packets:         328809727380              1225492 pps

...

  Filter statistics:
    Output packet count           328810554250
    Output packet pad count                  0
    Output packet error count                0
...

  Logical interface xe-7/0/0-tx.0 (Index 73) (SNMP ifIndex 138) (Generation 139)

    Flags: SNMP-Traps Encapsulation: ENET2
    Egress account overhead: 100
    Ingress account overhead: 90
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :      322891152287160
     Input  packets:                   0
     Output packets:         328809727380
     IPv6 transit 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  :      322891152287160           9627472888 bps
     Input  packets:                   0                    0 pps
     Output packets:         328809727380              1225492 pps
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Protocol inet, MTU: 1500, Generation: 147, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.11.12/24, Local: 10.11.12.13, Broadcast: 10.11.12.255,
Generation: 141
    Protocol multiservice, MTU: Unlimited, Generation: 148, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

## show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Receive-Only)

```
user@host> show interfaces xe-7/0/0—rx extensive
Physical interface: xe-7/0/0-rx, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 118, Generation: 175
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
Unidirectional: Rx-Only
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
```

```
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:73:e4:83, Hardware address: 00:05:85:73:e4:83
  Last flapped   : 2007-06-01 09:08:22 PDT (3d 02:31 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :      322857456303482           9627496104 bps
   Output bytes  :                   0                    0 bps
   Input  packets:         328775413751              1225495 pps
   Output packets:                   0                    0 pps

...

  Filter statistics:
    Input packet count            328775015056
    Input packet rejects                     1
    Input DA rejects                         0

...

  Logical interface xe-7/0/0-rx.0 (Index 72) (SNMP ifIndex 120) (Generation 138)

    Flags: SNMP-Traps Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :      322857456303482
     Output bytes  :                   0
     Input  packets:         328775413751
     Output packets:                   0
     IPv6 transit 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  :      322857456303482           9627496104 bps
     Output bytes  :                   0                    0 bps
     Input  packets:         328775413751              1225495 pps
     Output packets:                   0                    0 pps
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Protocol inet, MTU: 1500, Generation: 145, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.1.1/24, Local: 192.1.1.1, Broadcast: 192.1.1.255,
Generation: 139
    Protocol multiservice, MTU: Unlimited, Generation: 146, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

## show interfaces (PPPoE)

**Syntax**
show interfaces pp0.*logical*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

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

**Description**
(J Series Services Routers, M120 routers, M320 routers, and MX Series routers only) Display status information about the PPPoE interface.

**Options**
**pp0.*logical***—Display standard status information about the PPPoE interface.

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

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

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

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

**statistics**—(Optional) Display PPPoE interface statistics.

**Required Privilege Level**
view

**List of Sample Output**
show interfaces (PPPoE) on page 221
show interfaces (PPPoE over Aggregated Ethernet) on page 221
show interfaces brief (PPPoE) on page 222
show interfaces detail (PPPoE) on page 222
show interfaces detail (PPPoE on J Series Services Routers) on page 223
show interfaces extensive (PPPoE on M120 and M320 Routers) on page 224

**Output Fields**
Table 7 on page 215 lists the output fields for the **show interfaces** (PPPoE) command. Output fields are listed in the approximate order in which they appear.

### Table 7: show interfaces (PPPoE) Output Fields

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

Table 7: show interfaces (PPPoE) Output Fields *(continued)*

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

Table 7: show interfaces (PPPoE) Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the physical interface.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **IPv6 transit statistics** | Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.<br>NOTE: These fields include dropped traffic and exception traffic, as those fields are not separately defined.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Input errors** | Input errors on the interface:<br>• **Errors**—Sum of incoming frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **Framing errors**—Number of packets received with an invalid frame checksum (FCS).<br>• **Runts**—Number of frames received that are smaller than the runt threshold.<br>• **Giants**—Number of frames received that are larger than the giant threshold.<br>• **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.<br>• **Resource errors**—Sum of B chip Tx drops and IXP Tx net transmit drops. | **extensive** |
| **Output errors** | Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Carrier transitions** —Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the PIM is malfunctioning.<br>• **Errors**—Sum of the outgoing frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **MTU errors**—Number of packets whose size exceeded the MTU of the interface.<br>• **Resource errors**—Sum of B chip Tx drops and IXP Tx net transmit drops. | **extensive** |
| Logical Interface | | |

Table 7: show interfaces (PPPoE) Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Logical interface** | Name of the logical interface. | All levels |
| **Index** | Logical interface index number (which reflects its initialization sequence). | **detail extensive** none |
| **SNMP ifIndex** | Logical interface SNMP interface index number. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Flags** | Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*. | All levels |
| **Encapsulation** | Type of encapsulation configured on the logical interface. | All levels |
| **PPP parameters** | PPP status:<br>• LCP restart timer—Length of time (in milliseconds) between successive Link Control Protocol (LCP) configuration requests.<br>• NCP restart timer—Length of time (in milliseconds) between successive Network Control Protocol (NCP) configuration requests. | **detail** |
| **PPPoE** | PPPoE status:<br>• **State**—State of the logical interface (**up** or **down**).<br>• **Session ID**—PPPoE session ID.<br>• **Service name**—Type of service required. Can be used to indicate an Internet service provider (ISP) name or a class or quality of service.<br>• **Configured AC name**—Configured access concentrator name.<br>• **Auto-reconnect timeout**—Time after which to try to reconnect after a PPPoE session is terminated, in seconds.<br>• **Idle Timeout**—Length of time (in seconds) that a connection can be idle before disconnecting.<br>• **Underlying interface**—Interface on which PPPoE is running. | All levels |
| **Link** | 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 |
| **Traffic statistics** | Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter usually takes less than 1 second to stabilize. | **detail extensive** |

Table 7: show interfaces (PPPoE) Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **IPv6 transit statistics** | Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.<br><br>NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router.<br><br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Local statistics** | Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter usually takes less than 1 second to stabilize. | **detail extensive** |
| **Transit statistics** | Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter usually takes less than 1 second to stabilize.<br><br>NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router. | **detail extensive** |
| **Keepalive settings** | (PPP and HDLC) Configured settings for keepalives.<br><br>• **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds.<br>• **down-count** ***number***—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**.<br>• **up-count** ***number***—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**. | **detail extensive** |
| **Keepalive statistics** | (PPP and HDLC) Information about keepalive packets.<br><br>• **Input**—Number of keepalive packets received by PPP.<br>  • **(last seen 00:00:00 ago)**—Time the last keepalive packet was received, in the format ***hh*:*mm*:*ss***.<br>• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.<br>  • **(last seen 00:00:00 ago)**—Time the last keepalive packet was sent, in the format ***hh*:*mm*:*ss***.<br><br>(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. | **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 7: show interfaces (PPPoE) Output Fields *(continued)*

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

Table 7: show interfaces (PPPoE) Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Addresses, Flags** | Information about the addresses configured for the protocol family. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Destination** | IP address of the remote side of the connection. | **detail extensive** none |
| **Local** | IP address of the logical interface. | **detail extensive** none |
| **Broadcast** | Broadcast address. | **detail extensive** none |

## 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,
  mpls: 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: Sendbcast-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 demux0 (Demux Interfaces)

**Syntax**

show interfaces demux0.*logical-interface-number*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

**Release Information**

Command introduced in Junos OS Release 9.0.

**Description**

(MX Series and M Series routers only) Display status information about the specified demux interface.

**Options**

**none**—Display standard information about the specified demux interface.

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

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

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

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

**statistics**—(Optional) Display static interface statistics.

**Required Privilege Level**

view

**Related Documentation**

- *Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration*

**List of Sample Output**

show interfaces (Demux) on page 232
show interfaces (PPPoE over Aggregated Ethernet) on page 233
show interfaces extensive (Targeted Distribution for Aggregated Ethernet Links) on page 233
show interfaces demux0 (ACI Interface Set Configured) on page 234

**Output Fields**

Table 8 on page 226 lists the output fields for the **show interfaces** (demux interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 8: Demux show interfaces Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| Physical Interface | | |
| **Physical interface** | Name of the physical interface. | **brief detail extensive** none |
| **Interface index** | Index number of the physical interface, which reflects its initialization sequence. | **brief detail extensive** none |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Enabled** | State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*. | **brief detail extensive** none |
| **Physical link** | Status of the physical link (**Up** or **Down**). | **detail extensive** none |
| **Admin** | Administrative state of the interface (**Up** or **Down**). | **terse** |
| **Interface index** | Index number of the physical interface, which reflects its initialization sequence. | **detail extensive** none |
| **Link** | Status of the physical link (**Up** or **Down**). | **terse** |
| **Targeting summary** | Status of aggregated Ethernet links that are configured with targeted distribution (**primary** or **backup**) | **extensive** |
| Bandwidth | Bandwidth allocated to the aggregated Ethernet links that are configured with targeted distribution. | **extensive** |
| **Proto** | Protocol family configured on the interface. | **terse** |
| **SNMP ifIndex** | SNMP index number for the physical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Type** | Type of interface. **Software-Pseudo** indicates a standard software interface with no associated hardware device. | **brief detail extensive** none |
| **Link-level type** | Encapsulation being used on the physical interface. | **brief detail extensive** |
| **MTU** | Maximum transmission unit size on the physical interface. | **brief detail extensive** |
| **Clocking** | Reference clock source: **Internal** (1) or **External** (2). | **brief detail extensive** |
| **Speed** | Speed at which the interface is running. | **brief detail extensive** |
| **Device flags** | Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*. | **brief detail extensive** none |
| **Interface flags** | Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*. | **brief detail extensive** none |
| **Link type** | Data transmission type. | **detail extensive** none |
| **Link flags** | Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Physical info** | Information about the physical interface. | **detail extensive** |
| **Hold-times** | Current interface hold-time up and hold-time down, in milliseconds. | **detail extensive** |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Current address** | Configured MAC address. | **detail extensive** |
| **Hardware address** | Hardware MAC address. | **detail extensive** |
| **Alternate link address** | Backup address of the link. | **detail extensive** |
| **Last flapped** | Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** *year-month-day hour:minute:second:timezone* **(***hour:minute:second* **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).** | **detail extensive** none |
| **Statistics last cleared** | Time when the statistics for the interface were last set to zero. | **detail extensive** |
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the physical interface.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface.<br>• **IPv6 transit statistics**—Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.<br>NOTE: These fields include dropped traffic and exception traffic, as those fields are not separately defined.<br>◦ **Input bytes**—Number of bytes received on the interface<br>◦ **Output bytes**—Number of bytes transmitted on the interface.<br>◦ **Input packets**—Number of packets received on the interface.<br>◦ **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Input errors** | Input errors on the interface whose definitions are as follows:<br>• **Errors**—Sum of the incoming frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **Framing errors**—Number of packets received with an invalid frame checksum (FCS).<br>• **Runts**—Number of frames received that are smaller than the runt threshold.<br>• **Giants**—Number of frames received that are larger than the giant packet threshold.<br>• **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |
| **Input Rate** | Input rate in bits per second (bps) and packets per second (pps). | none |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Output errors** | Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.<br>• **Errors**—Sum of the outgoing frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **MTU errors**—Number of packets whose size exceeded the MTU of the interface.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |
| **Output Rate** | Output rate in bps and pps. | none |
| Logical Interface | | |
| **Logical interface** | Name of the logical interface. | **brief detail extensive** none |
| **Index** | Index number of the logical interface, which reflects its initialization sequence. | **detail extensive** none |
| **SNMP ifIndex** | SNMP interface index number for the logical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail** |
| **Flags** | Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*. | **brief detail extensive** none |
| **Encapsulation** | Encapsulation on the logical interface. | **brief extensive** none |
| **ACI VLAN: Dynamic Profile** | Name of the dynamic profile that defines the agent circuit identifier (ACI) interface set. If configured, the ACI interface set enables the underlying demux interface to create dynamic VLAN subscriber interfaces based on ACI information. | **brief detail extensive** none |
| **Demux** | Specific IP demultiplexing (demux) values:<br>• **Underlying interface**—The underlying interface that the demux interface uses.<br>• **Index**—Index number of the logical interface.<br>• **Family**—Protocol family configured on the logical interface.<br>• **Source prefixes, total**—Total number of source prefixes for the underlying interface.<br>• **Destination prefixes, total**—Total number of destination prefixes for the underlying interface.<br>• **Prefix—inet** family prefix. | **detail extensive** none |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| ***protocol-family*** | Protocol family configured on the logical interface. | **brief** |
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the specified interface set.<br>• **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set.<br>• **Input packets, Output packets**—Number of packets received and transmitted on the interface set.<br>• **IPv6 transit statistics**—Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.<br>NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router.<br>◦ **Input bytes**—Number of bytes received on the interface.<br>◦ **Output bytes**—Number of bytes transmitted on the interface.<br>◦ **Input packets**—Number of packets received on the interface.<br>◦ **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Local statistics** | Number of transit bytes and packets received and transmitted on the local interface.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Transit statistics** | Number and rate of bytes and packets transiting the switch.<br>NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **IPv6 Transit statistics** | Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.<br>NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router.<br>• **Input bytes**—Number of bytes received on the interface.<br>• **Output bytes**—Number of bytes transmitted on the interface.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface. | **detail extensive** |
| **Input packets** | Number of packets received on the interface. | none |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Output packets** | Number of packets transmitted on the interface. | none |
| **Protocol** | Protocol family. Possible values are described in the "Protocol Field" section under *Common Output Fields Description*. | **detail extensive** none |
| **MTU** | Maximum transmission unit size on the logical interface. | **detail extensive** none |
| **Maximum labels** | Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Route table** | Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0. | **detail extensive** |
| **Flags** | Information about protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Mac-Validate Failures** | Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface. | **detail extensive** none |
| **Addresses, Flags** | Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Destination** | IP address of the remote side of the connection. | **detail extensive statistics** none |
| **Local** | IP address of the logical interface. | **detail extensive terse** none |
| **Remote** | IP address of the remote interface. | **terse** |
| **Broadcast** | Broadcast address of the logical interlace. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Link** | 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. | **detail extensive** none |
| **Dynamic-profile** | Name of the PPPoE dynamic profile assigned to the underlying interface. | **detail extensive** none |
| **Service Name Table** | Name of the PPPoE service name table assigned to the PPPoE underlying interface. | **detail extensive** none |
| **Max Sessions** | Maximum number of dynamic PPPoE logical interfaces that the router can activate on the underlying interface. | **detail extensive** none |

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

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Duplicate Protection** | State of duplicate protection: **On** or **Off**. Duplicate protection prevents the activation of another dynamic PPPoE logical interface on the same underlying interface when a dynamic PPPoE logical interface for a client with the same MAC address is already active on that interface. | **detail extensive** none |
| Direct Connect | State of the configuration to ignore DSL Forum VSAs: **On** or **Off**. When configured, the router ignores any of these VSAs received from a directly connected CPE device on the interface. | **detail extensive** none |
| **AC Name** | Name of the access concentrator. | **detail extensive** none |

## Sample Output

### show interfaces (Demux)

```
user@host> show interfaces demux0
Physical interface: demux0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 79, Generation: 129
  Type: Software-Pseudo, Link-level type: Unspecified, MTU: 9192, Clocking: 1,
  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
  Last flapped   : Never
  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
   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 demux0.0 (Index 87) (SNMP ifIndex 84) (Generation 312)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Demux:
     Underlying interface: ge-2/0/1.0 (Index 74)
   Family Inet Source prefixes, total 1
   Prefix: 1.1.1/24
    Traffic statistics:
     Input  bytes  :                  0
```

```
     Output bytes  :                1554
     Input  packets:                   0
     Output packets:                  37
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                1554
     Input  packets:                   0
     Output packets:                  37
    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
    Protocol inet, MTU: 1500, Generation: 395, Route table: 0
      Flags: Is-Primary, Mac-Validate-Strict
      Mac-Validate Failures: Packets: 0, Bytes: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.1.1/24, Local: 11.1.1.1, Broadcast: 11.1.1.255,
        Generation: 434
```

## show interfaces (PPPoE over Aggregated Ethernet)

```
user@host> show interfaces demux0.100
Logical interface demux0.100 (Index 76) (SNMP ifIndex 61160)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]
    Encapsulation: ENET2
    Demux:
      Underlying interface: ae0 (Index 199)
    Link:
      ge-1/0/0
      ge-1/1/0
    Input packets : 0
    Output packets: 0
    Protocol pppoe
      Dynamic Profile: pppoe-profile,
      Service Name Table: service-table1,
      Max Sessions: 100, Duplicate Protection: On,
      Direct Connect: Off,
      AC Name: pppoe-server-1
```

## show interfaces extensive (Targeted Distribution for Aggregated Ethernet Links)

```
user@host> show interfaces demux0.1073741824 extensive

  Logical interface demux0.1073741824 (Index 75) (SNMP ifIndex 558) (Generation
346)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ]  Encapsulation: ENET2
    Demux:
      Underlying interface: ae0 (Index 201)
    Link:
      ge-1/0/0
```

```
    ge-1/1/0
    ge-2/0/7
    ge-2/0/8
  Targeting summary:
    ge-1/1/0, primary, Physical link is Up
    ge-2/0/8, backup, Physical link is Up
  Bandwidth: 1000mbps
```

### show interfaces demux0 (ACI Interface Set Configured)

```
user@host> show interfaces demux0.1073741827
  Logical interface demux0.1073741827 (Index 346) (SNMP ifIndex 527)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1802 0x8100.302 ]  Encapsulation:
 ENET2
    Demux: Source Family Inet
    ACI VLAN:
      Dynamic Profile: aci-vlan-set-profile
    Demux:
      Underlying interface: ge-1/0/0 (Index 138)
    Input packets : 18
    Output packets: 16
    Protocol inet, MTU: 1500
      Flags: Sendbcast-pkt-to-re, Unnumbered
      Donor interface: lo0.0 (Index 322)
      Preferred source address: 100.20.200.202
      Addresses, Flags: Primary Is-Default Is-Primary
        Local: 10.4.12.119
    Protocol pppoe
      Dynamic Profile: aci-vlan-pppoe-profile,
      Service Name Table: None,
      Max Sessions: 32000, Max Sessions VSA Ignore: Off,
      Duplicate Protection: On, Short Cycle Protection: Off,
      Direct Connect: Off,
      AC Name: nbc
```

## show interfaces (Gigabit Ethernet)

**Syntax**

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

**Release Information**

Command introduced before Junos OS Release 7.4.

**Description**

(M Series, T Series, and MX Series routers and EX Series switches only) Display status information about the specified Gigabit Ethernet interface.

**Options**

**ge-*fpc/pic/port***—Display standard information about the specified Gigabit Ethernet interface.

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

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

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

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

**statistics**—(Optional) Display static interface statistics.

**Additional Information**

In a logical system, this command displays information only about the logical interfaces and not about the physical interfaces.

**Required Privilege Level**

view

**Related Documentation**

- *Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration*

**List of Sample Output**

show interfaces (Gigabit Ethernet) on page 250
show interfaces (Gigabit Ethernet on MX Series Routers) on page 250
show interfaces extensive (Gigabit Ethernet on MX Series Routers showing interface transmit statistics configuration) on page 251
show interfaces brief (Gigabit Ethernet) on page 251
show interfaces detail (Gigabit Ethernet) on page 252
show interfaces extensive (Gigabit Ethernet IQ2) on page 253
show interfaces (Gigabit Ethernet Unnumbered Interface) on page 256
show interfaces (ACI Interface Set Configured) on page 256

**Output Fields**

Table 9 on page 236 describes the output fields for the **show interfaces** (Gigabit Ethernet) command. Output fields are listed in the approximate order in which they appear. For Gigabit Ethernet IQ and IQE PICs, the traffic and MAC statistics vary by interface type. For more information, see Table 10 on page 249.

## Table 9: show interfaces Gigabit Ethernet Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| Physical Interface | | |
| **Physical interface** | Name of the physical interface. | All levels |
| **Enabled** | State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*. | All levels |
| **Interface index** | Index number of the physical interface, which reflects its initialization sequence. | **detail extensive** none |
| **SNMP ifIndex** | SNMP index number for the physical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Link-level type** | Encapsulation being used on the physical interface. | All levels |
| **MTU** | Maximum transmission unit size on the physical interface. | All levels |
| **Speed** | Speed at which the interface is running. | All levels |
| **Loopback** | Loopback status: **Enabled** or **Disabled**. If loopback is enabled, type of loopback: **Local** or **Remote**. | All levels |
| **Source filtering** | Source filtering status: **Enabled** or **Disabled**. | All levels |
| **LAN-PHY mode** | 10-Gigabit Ethernet interface operating in Local Area Network Physical Layer Device (LAN PHY) mode. LAN PHY allows 10-Gigabit Ethernet wide area links to use existing Ethernet applications. | All levels |
| **WAN-PHY mode** | 10-Gigabit Ethernet interface operating in Wide Area Network Physical Layer Device (WAN PHY) mode. WAN PHY allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and other devices intended for SONET/SDH. | All levels |
| **Unidirectional** | Unidirectional link mode status for 10-Gigabit Ethernet interface: **Enabled** or **Disabled** for parent interface; **Rx-only** or **Tx-only** for child interfaces. | All levels |
| **Flow control** | Flow control status: **Enabled** or **Disabled**. | All levels |
| **Auto-negotiation** | (Gigabit Ethernet interfaces) Autonegotiation status: **Enabled** or **Disabled**. | All levels |
| **Remote-fault** | (Gigabit Ethernet interfaces) Remote fault status:<br>• **Online**—Autonegotiation is manually configured as online.<br>• **Offline**—Autonegotiation is manually configured as offline. | All levels |
| **Device flags** | Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*. | All levels |
| **Interface flags** | Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*. | All levels |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Link flags** | Information about the link. Possible values are described in the "Links Flags" section under *Common Output Fields Description*. | All levels |
| **Wavelength** | (10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm). | All levels |
| **Frequency** | (10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz). | All levels |
| **CoS queues** | Number of CoS queues configured. | **detail extensive** none |
| **Schedulers** | (Gigabit Ethernet intelligent queuing 2 [IQ2] interfaces only) Number of CoS schedulers configured. | **extensive** |
| **Hold-times** | Current interface hold-time up and hold-time down, in milliseconds (ms). | **detail extensive** |
| **Current address** | Configured MAC address. | **detail extensive** none |
| **Hardware address** | Hardware MAC address. | **detail extensive** none |
| **Last flapped** | Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second:timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).** | **detail extensive** none |
| **Input Rate** | Input rate in bits per second (bps) and packets per second (pps). The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. | None |
| **Output Rate** | Output rate in bps and pps. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. | None |
| **Statistics last cleared** | Time when the statistics for the interface were last set to zero. | **detail extensive** |
| **Egress account overhead** | Layer 2 overhead in bytes that is accounted in the interface statistics for egress traffic. | **detail extensive** |
| **Ingress account overhead** | Layer 2 overhead in bytes that is accounted in the interface statistics for ingress traffic. | **detail extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the physical interface.<br>• **Input bytes**—Number of bytes received on the interface. The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Output bytes**—Number of bytes transmitted on the interface. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Input packets**—Number of packets received on the interface.<br>• **Output packets**—Number of packets transmitted on the interface.<br>Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes.<br>For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 31 under the show interfaces (10-Gigabit Ethernet) command. | **detail extensive** |
| **Input errors** | Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Errors**—Sum of the incoming frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>• **Framing errors**—Number of packets received with an invalid frame checksum (FCS).<br>• **Runts**—Number of frames received that are smaller than the runt threshold.<br>• **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle.<br>• **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** statement.<br>• **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame.<br>• **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.<br>• **FIFO errors**—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Output errors** | Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:<br>• **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.<br>• **Errors**—Sum of the outgoing frame aborts and FCS errors.<br>• **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.<br>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the **Drops** field does not always use the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.<br>• **Collisions**—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.<br>• **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.<br>• **FIFO errors**—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.<br>• **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.<br>• **MTU errors**—Number of packets whose size exceeded the MTU of the interface.<br>• **Resource errors**—Sum of transmit drops. | **extensive** |
| **Egress queues** | Total number of egress queues supported on the specified interface. | **detail extensive** |
| **Queue counters (Egress)** | CoS queue number and its associated user-configured forwarding class name.<br>• **Queued packets**—Number of queued packets.<br>• **Transmitted packets**—Number of transmitted packets.<br>• **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.<br>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the **Dropped packets** field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs. | **detail extensive** |
| **Ingress queues** | Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces. | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Queue counters (Ingress)** | CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces.<br>• **Queued packets**—Number of queued packets.<br>• **Transmitted packets**—Number of transmitted packets.<br>• **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. | **extensive** |
| **Active alarms and Active defects** | Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**.<br>• **None**—There are no active defects or alarms.<br>• **Link**—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning. | **detail extensive** none |
| Interface transmit statistics | (On MX Series devices) Status of the **interface-transmit-statistics** configuration: Enabled or Disabled.<br>• **Enabled**—When the **interface-transmit-statistics** statement is included in the configuration. If this is configured, the interface statistics show the actual transmitted load on the interface.<br>• **Disabled**—When the **interface-transmit-statistics** statement is not included in the configuration. If this is not configured, the interface statistics show the offered load on the interface. | **detail extensive** |
| **OTN FEC statistics** | The forward error correction (FEC) counters provide the following statistics:<br>• **Corrected Errors**—The count of corrected errors in the last second.<br>• **Corrected Error Ratio**—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits. | **detail extensive** |
| **PCS statistics** | (10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device.<br>• **Bit errors**—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode.<br>• **Errored blocks**—Loss of block lock. The number of errored blocks when the PCS receiver is operating in normal mode. | **detail extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **MAC statistics** | **Receive** and **Transmit** statistics reported by the PIC's MAC subsystem, including the following:<br>• **Total octets** and **total packets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see Table 31 under the show interfaces (10-Gigabit Ethernet) command.<br>• **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets.<br>• **CRC/Align errors**—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).<br>• **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning.<br>• **MAC control frames**—Number of MAC control frames.<br>• **MAC pause frames**—Number of MAC control frames with **pause** operational code.<br>• **Oversized frames**—There are two possible conditions regarding the number of oversized frames:<br>  ◦ Packet length exceeds 1518 octets, or<br>  ◦ Packet length exceeds MRU<br>• **Jabber frames**—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.<br>• **Fragment frames**—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.<br>• **VLAN tagged frames**—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not.<br>NOTE: The 20-port Gigabit Ethernet MIC (MIC-3D-20GE-SFP) does not have hardware counters for VLAN frames. Therefore, the **VLAN tagged frames** field displays 0 when the **show interfaces** command is executed on a 20-port Gigabit Ethernet MIC. In other words, the number of VLAN tagged frames cannot be determined for the 20-port Gigabit Ethernet MIC.<br>• **Code violations**—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.” | **extensive** |
| **OTN Received Overhead Bytes** | APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08 | **extensive** |
| **OTN Transmitted Overhead Bytes** | APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08 | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Filter statistics** | **Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem. The filtering is done by the content-addressable memory (CAM) on the PIC. The filter examines a packet's source and destination MAC addresses to determine whether the packet should enter the system or be rejected.<br>• **Input packet count**—Number of packets received from the MAC hardware that the filter processed.<br>• **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address.<br>• **Input DA rejects**—Number of packets that the filter rejected because the destination MAC address of the packet is not on the accept list. It is normal for this value to increment. When it increments very quickly and no traffic is entering the router from the far-end system, either there is a bad ARP entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local router (which the router is rejecting).<br>• **Input SA rejects**—Number of packets that the filter rejected because the source MAC address of the packet is not on the accept list. The value in this field should increment only if source MAC address filtering has been enabled. If filtering is enabled, if the value increments quickly, and if the system is not receiving traffic that it should from the far-end system, it means that the user-configured source MAC addresses for this interface are incorrect.<br>• **Output packet count**—Number of packets that the filter has given to the MAC hardware.<br>• **Output packet pad count**—Number of packets the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware. Usually, padding is done only on small ARP packets, but some very small IP packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist or it is misconfigured.<br>• **Output packet error count**—Number of packets with an indicated error that the filter was given to transmit. These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment.<br>• **CAM destination filters, CAM source filters**—Number of entries in the CAM dedicated to destination and source MAC address filters. There can only be up to 64 source entries. If source filtering is disabled, which is the default, the values for these fields should be 0. | **extensive** |
| **PMA PHY** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **PHY Lock**—Phase-locked loop<br>• **PHY Light**—Loss of optical signal | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **WIS section** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B1**—Bit interleaved parity for SONET section overhead<br>• **SEF**—Severely errored framing<br>• **LOL**—Loss of light<br>• **LOF**—Loss of frame<br>• **ES-S**—Errored seconds (section)<br>• **SES-S**—Severely errored seconds (section)<br>• **SEFS-S**—Severely errored framing seconds (section) | **extensive** |
| **WIS line** | (10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B2**—Bit interleaved parity for SONET line overhead<br>• **REI-L**—Remote error indication (near-end line)<br>• **RDI-L**—Remote defect indication (near-end line)<br>• **AIS-L**—Alarm indication signal (near-end line)<br>• **BERR-SF**—Bit error rate fault (signal failure)<br>• **BERR-SD**—Bit error rate defect (signal degradation)<br>• **ES-L**—Errored seconds (near-end line)<br>• **SES-L**—Severely errored seconds (near-end line)<br>• **UAS-L**—Unavailable seconds (near-end line)<br>• **ES-LFE**—Errored seconds (far-end line)<br>• **SES-LFE**—Severely errored seconds (far-end line)<br>• **UAS-LFE**—Unavailable seconds (far-end line) | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **WIS path** | (10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information:<br>• **Seconds**—Number of seconds the defect has been active.<br>• **Count**—Number of times that the defect has gone from inactive to active.<br>• **State**—State of the error. Any state other than **OK** indicates a problem.<br>Subfields are:<br>• **BIP-B3**—Bit interleaved parity for SONET section overhead<br>• **REI-P**—Remote error indication<br>• **LOP-P**—Loss of pointer (path)<br>• **AIS-P**—Path alarm indication signal<br>• **RDI-P**—Path remote defect indication<br>• **UNEQ-P**—Path unequipped<br>• **PLM-P**—Path payload (signal) label mismatch<br>• **ES-P**—Errored seconds (near-end STS path)<br>• **SES-P**—Severely errored seconds (near-end STS path)<br>• **UAS-P**—Unavailable seconds (near-end STS path)<br>• **SES-PFE**—Severely errored seconds (far-end STS path)<br>• **UAS-PFE**—Unavailable seconds (far-end STS path) | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Autonegotiation information** | Information about link autonegotiation.<br>• **Negotiation status:**<br>  • **Incomplete**—Ethernet interface has the speed or link mode configured.<br>  • **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.<br>  • **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.<br>• **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.<br>• **Link partner**—Information from the remote Ethernet device:<br>  • **Link mode**—Depending on the capability of the link partner, either **Full-duplex** or **Half-duplex**.<br>  • **Flow control**—Types of flow control supported by the link partner. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), **Symmetric/Asymmetric** (link partner supports **PAUSE** on receive and transmit or only **PAUSE** on transmit), and **None** (link partner does not support flow control).<br>  • **Remote fault**—Remote fault information from the link partner—**Failure** indicates a receive link error. **OK** indicates that the link partner is receiving. **Negotiation error** indicates a negotiation error. **Offline** indicates that the link partner is going offline.<br>• **Local resolution**—Information from the local Ethernet device:<br>  • **Flow control**—Types of flow control supported by the local device. For Gigabit Ethernet interfaces, advertised capabilities are **Symmetric/Asymmetric** (local device supports **PAUSE** on receive and transmit or only **PAUSE** on receive) and **None** (local device does not support flow control). Depending on the result of the negotiation with the link partner, local resolution flow control type will display **Symmetric** (local device supports **PAUSE** on receive and transmit), **Asymmetric** (local device supports **PAUSE** on receive), and **None** (local device does not support flow control).<br>  • **Remote fault**—Remote fault information. **Link OK** (no error detected on receive), **Offline** (local interface is offline), and **Link Failure** (link error detected on receive). | **extensive** |
| **Received path trace, Transmitted path trace** | (10-Gigabit Ethernet interfaces, WAN PHY mode) SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. | **extensive** |
| **Packet Forwarding Engine configuration** | Information about the configuration of the Packet Forwarding Engine:<br>• **Destination slot**—FPC slot number. | **extensive** |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **CoS information** | Information about the CoS queue for the physical interface.<br>• **CoS transmit queue**—Queue number and its associated user-configured forwarding class name.<br>• **Bandwidth %**—Percentage of bandwidth allocated to the queue.<br>• **Bandwidth bps**—Bandwidth allocated to the queue (in bps).<br>• **Buffer %**—Percentage of buffer space allocated to the queue.<br>• **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.<br>• **Priority**—Queue priority: **low** or **high**.<br>• **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. | **extensive** |
| Logical Interface | | |
| **Logical interface** | Name of the logical interface. | All levels |
| **Index** | Index number of the logical interface, which reflects its initialization sequence. | **detail extensive** none |
| **SNMP ifIndex** | SNMP interface index number for the logical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Flags** | Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*. | All levels |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **VLAN-Tag** | Rewrite profile applied to incoming or outgoing frames on the outer (**Out**) VLAN tag or for both the outer and inner (**In**) VLAN tags.<br>• **push**—An outer VLAN tag is pushed in front of the existing VLAN tag.<br>• **pop**—The outer VLAN tag of the incoming frame is removed.<br>• **swap**—The outer VLAN tag of the incoming frame is overwritten with the user-specified VLAN tag information.<br>• **push**—An outer VLAN tag is pushed in front of the existing VLAN tag.<br>• **push-push**—Two VLAN tags are pushed in from the incoming frame.<br>• **swap-push**—The outer VLAN tag of the incoming frame is replaced by a user-specified VLAN tag value. A user-specified outer VLAN tag is pushed in front. The outer tag becomes an inner tag in the final frame.<br>• **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user-specified VLAN tag value.<br>• **pop-swap**—The outer VLAN tag of the incoming frame is removed, and the inner VLAN tag of the incoming frame is replaced by the user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame.<br>• **pop-pop**—Both the outer and inner VLAN tags of the incoming frame are removed. | **brief detail extensive** none |
| **Demux** | IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following:<br>• Source Family Inet<br>• Destination Family Inet | **detail extensive** none |
| **Encapsulation** | Encapsulation on the logical interface. | All levels |
| **ACI VLAN: Dynamic Profile** | Name of the dynamic profile that defines the agent circuit identifier (ACI) interface set. If configured, the ACI interface set enables the underlying Ethernet interface to create dynamic VLAN subscriber interfaces based on ACI information. | **brief detail extensive** none |
| **Protocol** | Protocol family. Possible values are described in the "Protocol Field" section under *Common Output Fields Description*. | **detail extensive** none |
| **MTU** | Maximum transmission unit size on the logical interface. | **detail extensive** none |
| **Dynamic Profile** | (MX Series routers with Trio MPCs only) Name of the dynamic profile that was used to create this interface configured with a Point-to-Point Protocol over Ethernet (PPPoE) family. | **detail extensive** none |
| **Service Name Table** | (MX Series routers with Trio MPCs only) Name of the service name table for the interface configured with a PPPoE family. | **detail extensive** none |
| **Max Sessions** | (MX Series routers with Trio MPCs only) Maximum number of PPPoE logical interfaces that can be activated on the underlying interface. | **detail extensive** none |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Duplicate Protection** | (MX Series routers with Trio MPCs only) State of PPPoE duplicate protection: **On** or **Off**. When duplicate protection is configured for the underlying interface, a dynamic PPPoE logical interface cannot be activated when an existing active logical interface is present for the same PPPoE client. | **detail extensive** none |
| Direct Connect | State of the configuration to ignore DSL Forum VSAs: **On** or **Off**. When configured, the router ignores any of these VSAs received from a directly connected CPE device on the interface. | **detail extensive** none |
| **AC Name** | Name of the access concentrator. | **detail extensive** none |
| **Maximum labels** | Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface. | **detail extensive** none |
| **Traffic statistics** | Number and rate of bytes and packets received and transmitted on the specified interface set.<br>• **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set. The value in this field also includes the Layer 2 overhead bytes for ingress or egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.<br>• **Input packets, Output packets**—Number of packets received and transmitted on the interface set. | **detail extensive** |
| **IPv6 transit statistics** | Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled. | **extensive** |
| **Local statistics** | Number and rate of bytes and packets destined to the router. | **extensive** |
| **Transit statistics** | Number and rate of bytes and packets transiting the switch.<br>NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the **Output bytes** and **Output packets** interface counters. However, correct values display for both of these egress statistics when per-unit scheduling is enabled for the Gigabit Ethernet IQ2 physical interface, or when a single logical interface is actively using a shared scheduler. | **extensive** |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |
| **Route Table** | Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0. | **detail extensive** none |
| **Flags** | Information about protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*. | **detail extensive** |
| **Donor interface** | (Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address. | **detail extensive** none |

Table 9: show interfaces Gigabit Ethernet Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Preferred source address** | (Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface. | **detail extensive** none |
| **Input Filters** | Names of any input filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parentheses next to all interfaces. | **detail extensive** |
| **Output Filters** | Names of any output filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parentheses next to all interfaces. | **detail extensive** |
| **Mac-Validate Failures** | Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface. | **detail extensive** none |
| **Addresses, Flags** | Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| ***protocol-family*** | Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed. | **brief** |
| **Flags** | Information about the address flag. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*. | **detail extensive** none |
| **Destination** | IP address of the remote side of the connection. | **detail extensive** none |
| **Local** | IP address of the logical interface. | **detail extensive** none |
| **Broadcast** | Broadcast address of the logical interface. | **detail extensive** none |
| **Generation** | Unique number for use by Juniper Networks technical support only. | **detail extensive** |

Table 10: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type

| Interface Type | Sample Command | Byte and Octet Counts Include | Comments |
|---|---|---|---|
| Inbound physical interface | **show interfaces ge-0/3/0 extensive** | Traffic statistics:<br><br>Input bytes: 496 bytes per packet, representing the Layer 2 packet<br><br>MAC statistics:<br><br>Received octets: 500 bytes per packet, representing the Layer 2 packet + 4 bytes | The additional 4 bytes are for the CRC. |
| Inbound logical interface | **show interfaces ge-0/3/0.50 extensive** | Traffic statistics:<br><br>Input bytes: 478 bytes per packet, representing the Layer 3 packet | |

Table 10: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type *(continued)*

| Interface Type | Sample Command | Byte and Octet Counts Include | Comments |
|---|---|---|---|
| Outbound physical interface | **show interfaces ge-0/0/0 extensive** | Traffic statistics:<br><br>Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes<br><br>MAC statistics:<br><br>Received octets: 478 bytes per packet, representing the Layer 3 packet | For input bytes, the additional 12 bytes include 6 bytes for the destination MAC address plus 4 bytes for VLAN plus 2 bytes for the Ethernet type. |
| Outbound logical interface | **show interfaces ge-0/0/0.50 extensive** | Traffic statistics:<br><br>Input bytes: 478 bytes per packet, representing the Layer 3 packet | |

## Sample Output

### show interfaces (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Interface index: 167, SNMP ifIndex: 35
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:05:85:4a:e9:7c, Hardware address: 00:05:85:4a:e9:7c
  Last flapped   : 2006-08-10 17:25:10 PDT (00:01:08 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Ingress rate at Packet Forwarding Engine      : 0 bps (0 pps)
  Ingress drop rate at Packet Forwarding Engine : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface ge-3/0/2.0 (Index 72) (SNMP ifIndex 69)
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [ 0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530) Out(swap-push
    0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    Egress account overhead: 100
    Ingress account overhead: 90
    Input packets : 0
    Output packets: 0
    Protocol ccc, MTU: 1522
      Flags: Is-Primary
```

### show interfaces (Gigabit Ethernet on MX Series Routers)

```
user@host> show interfaces ge-2/2/2
Physical interface: ge-2/2/2, Enabled, Physical link is Up
  Interface index: 156, SNMP ifIndex: 188
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, MAC-REWRITE Error: None,
 Loopback: Disabled,
```

```
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Schedulers     : 0
  Current address: 00:1f:12:b7:d7:c0, Hardware address: 00:1f:12:b7:d6:76
  Last flapped   : 2008-09-05 16:44:30 PDT (3d 01:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Logical interface ge-2/2/2.0 (Index 82) (SNMP ifIndex 219)
    Flags: SNMP-Traps 0x20000000 Encapsulation: Ethernet-Bridge
    Egress account overhead: 100
    Ingress account overhead: 90
    Input packets : 0
    Output packets: 0
     Protocol aenet, AE bundle: ae0.0    Link Index: 4
```

## show interfaces extensive (Gigabit Ethernet on MX Series Routers showing interface transmit statistics configuration)

```
user@host> show interfaces ge-2/1/2 extensive | match "output|interface"
Physical interface: ge-2/1/2, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 530, Generation: 154
  Interface flags: SNMP-Traps Internal: 0x4000
   Output bytes  :         240614363944            772721536 bps
   Output packets:           3538446506              1420444 pps
    Direction : Output
  Interface transmit statistics: Enabled

  Logical interface ge-2/1/2.0 (Index 331) (SNMP ifIndex 955) (Generation 146)
     Output bytes  :         195560312716            522726272 bps
     Output packets:           4251311146              1420451 pps
```

## show interfaces brief (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2 brief
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None

  Logical interface ge-3/0/2.0
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [ 0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530) Out(swap-push
    0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    ccc

  Logical interface ge-3/0/2.32767
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
```

## show interfaces detail (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2 detail
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Interface index: 167, SNMP ifIndex: 35, Generation: 177
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:4a:e9:7c, Hardware address: 00:05:85:4a:e9:7c
  Last flapped   : 2006-08-09 17:17:00 PDT (01:31:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Drop   bytes  :                   0                   0 bps
   Drop   packets:                   0                   0 pps
  Ingress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Active alarms  : None
  Active defects : None

  Logical interface ge-3/0/2.0 (Index 72) (SNMP ifIndex 69) (Generation 140)
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530)
Out(swap-push 0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    Egress account overhead: 100
    Ingress account overhead: 90
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```

```
    Input  packets:                  0
    Output packets:                  0
   Local statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
   Transit statistics:
    Input  bytes  :                  0                    0 bps
    Output bytes  :                  0                    0 bps
    Input  packets:                  0                    0 pps
    Output packets:                  0                    0 pps
   Protocol ccc, MTU: 1522, Generation: 149, Route table: 0
     Flags: Is-Primary

  Logical interface ge-3/0/2.32767 (Index 71) (SNMP ifIndex 70)
  (Generation 139)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
    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
```

## show interfaces extensive (Gigabit Ethernet IQ2)

```
user@host> show interfaces ge-7/1/3 extensive
Physical interface: ge-7/1/3, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 70, Generation: 171
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4004000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Schedulers     : 256
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:14:f6:30:5e:74, Hardware address: 00:14:f6:30:5e:74
  Last flapped   : 2007-11-07 21:31:41 PST (02:03:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :          38910844056                 7952 bps
   Output bytes  :              7174605                 8464 bps
   Input  packets:            418398473                   11 pps
   Output packets:                78903                   12 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
```

```
Ingress traffic statistics at Packet Forwarding Engine:
 Input  bytes  :          38910799145                 7952 bps
 Input  packets:            418397956                   11 pps
 Drop   bytes  :                    0                    0 bps
 Drop   packets:                    0                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  FIFO errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Ingress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort            418390823            418390823                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont                7133                 7133                    0

Egress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                 1031                 1031                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont               77872                77872                    0

Active alarms  : None
Active defects : None
MAC statistics:                      Receive         Transmit
  Total octets                    38910844056          7174605
  Total packets                     418398473            78903
  Unicast packets                 408021893366             1026
  Broadcast packets                       10               12
  Multicast packets                 418398217            77865
  CRC/Align errors                          0                0
  FIFO errors                               0                0
  MAC control frames                        0                0
  MAC pause frames                          0                0
  Oversized frames                          0
  Jabber frames                             0
  Fragment frames                           0
  VLAN tagged frames                        0
  Code violations                           0  OTN Received Overhead Bytes:
  APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58
  Payload Type: 0x08
OTN Transmitted Overhead Bytes:
  APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00
  Payload Type: 0x08
Filter statistics:
  Input packet count               418398473
  Input packet rejects                   479
  Input DA rejects                       479
```

```
    Input SA rejects                          0
    Output packet count                                    78903
    Output packet pad count                                    0
    Output packet error count                                  0
    CAM destination filters: 0, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete
    Link partner:
        Link mode: Full-duplex, Flow control: Symmetric/Asymmetric,
        Remote fault: OK
    Local resolution:
        Flow control: Symmetric, Remote fault: Link OK
  Packet Forwarding Engine configuration:
    Destination slot: 7
  CoS information:
    Direction : Output
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %            bps     %           usec
    0 best-effort            95      950000000    95             0
low    none
    3 network-control         5       50000000     5             0
low    none
    Direction : Input
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %            bps     %           usec
    0 best-effort            95      950000000    95             0
low    none
    3 network-control         5       50000000     5             0
low    none

  Logical interface ge-7/1/3.0 (Index 70) (SNMP ifIndex 85) (Generation 150)
    Flags: SNMP-Traps Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :              812400
     Output bytes  :             1349206
     Input  packets:                9429
     Output packets:                9449
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Local statistics:
     Input  bytes  :              812400
     Output bytes  :             1349206
     Input  packets:                9429
     Output packets:                9449
    Transit statistics:
     Input  bytes  :                   0                 7440 bps
     Output bytes  :                   0                 7888 bps
     Input  packets:                   0                   10 pps
     Output packets:                   0                   11 pps
     IPv6 transit statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
    Protocol inet, MTU: 1500, Generation: 169, Route table: 0
      Flags: Is-Primary, Mac-Validate-Strict
      Mac-Validate Failures: Packets: 0, Bytes: 0
      Addresses, Flags: Is-Preferred Is-Primary
```

```
    Input Filters: F1-ge-3/0/1.0-in, F3-ge-3/0/1.0-in
    Output Filters: F2-ge-3/0/1.0-out (53)
    Destination: 10.74.2/24, Local: 10.74.2.2, Broadcast: 10.74.2.255,
      Generation: 196
  Protocol multiservice, MTU: Unlimited, Generation: 170, Route table: 0
    Flags: Is-Primary
    Policer: Input: __default_arp_policer__
```

**NOTE:** For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics displayed in the **show interfaces** command output might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the interface counters. For detailed information, see the description of the logical interface **Transit statistics** fields in Table 9 on page 236.

### show interfaces (Gigabit Ethernet Unnumbered Interface)

```
user@host> show interfaces ge-3/2/0
Physical interface: ge-3/2/0, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 50
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Current address: 00:14:f6:11:26:f8, Hardware address: 00:14:f6:11:26:f8
  Last flapped   : 2006-10-27 04:42:23 PDT (08:01:52 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 624 bps (1 pps)
  Active alarms  : None
  Active defects : None

  Logical interface ge-3/2/0.0 (Index 67) (SNMP ifIndex 85)
    Flags: SNMP-Traps Encapsulation: ENET2
    Input packets : 0
    Output packets: 6
    Protocol inet, MTU: 1500
      Flags: Unnumbered
      Donor interface: lo0.0 (Index 64)
      Preferred source address: 22.22.22.22
```

### show interfaces (ACI Interface Set Configured)

```
user@host> show interfaces ge-1/0/0.4001
  Logical interface ge-1/0/0.4001 (Index 340) (SNMP ifIndex 548)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.4001 ]  Encapsulation: PPP-over-

    Ethernet
    ACI VLAN:
      Dynamic Profile: aci-vlan-set-profile
    PPPoE:
      Dynamic Profile: aci-vlan-pppoe-profile,
      Service Name Table: None,
      Max Sessions: 32000, Max Sessions VSA Ignore: Off,
      Duplicate Protection: On, Short Cycle Protection: Off,
      Direct Connect: Off,
      AC Name: nbc
```

```
Input packets : 9
Output packets: 8
Protocol multiservice, MTU: Unlimited
```

## show interfaces targeting (Aggregated Ethernet for Subscriber Management)

**Syntax** show interfaces targeting ae*x*

**Release Information** Command introduced in Junos OS Release 11.2.

**Description** (MX Series routers only) Display status information about the distribution of subscribers on different links in an aggregated Ethernet bundle.

**Required Privilege Level** view

**Output Fields** Table 11 on page 258 lists the output fields for the **show interfaces targeting** command. Output fields are listed in the approximate order in which they appear.

### Table 11: show interfaces targeting Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| Aggregated Ethernet Interface | | |
| **Aggregated interface** | Name of the aggregated Ethernet bundle. | All levels |
| **Redundancy mode** | Redundancy mechanism on the interface: **Link Level Redundancy** or **FPC Redundancy**. | All levels |
| **Total number of distributed interfaces** | Number of distributed links in the bundle. | All levels |
| Physical Interface | | |
| **Physical interface** | Name of the physical interface and state of the interface. | All levels |
| **Link status** | Status of the link on the physical interface: **up** or **down**. | |
| **Number of primary distributions** | Number of subscribers distributed on primary links. | All levels |
| **Number of backup distributions** | Number of subscribers distributed on backup links. | All levels |

## Sample Output

### show interfaces targeting ae0

```
user@host> show interfaces targeting ae0
Aggregated interface: ae0
Redundancy mode: Link Level Redundancy
Total number of distributed interfaces: 3
Physical interface: ge-1/0/0, Link status: Up
Number of primary distributions: 200
Number of backup distributions: 200
```

```
Physical interface: ge-1/1/0, Link status: Up
Number of primary distributions: 200
Number of backup distributions: 199
Physical interface: ge-2/0/7, Link status: Up
Number of primary distributions: 200
Number of backup distributions: 200
Physical interface: ge-2/0/8, Link status: Up
Number of primary distributions: 199
Number of backup distributions: 200
```

PART 4

# Troubleshooting


- Acquiring Troubleshooting Information on page 263

CHAPTER 10

# Acquiring Troubleshooting Information


- Collecting Subscriber Access Logs Before Contacting Juniper Technical Support on page 263


## Collecting Subscriber Access Logs Before Contacting Juniper Technical Support

**Problem** When you experience a subscriber access problem in your network, we recommend that you collect certain logs before you contact Juniper Technical Support. This topic shows you the most useful logs for a variety of network implementations. In addition to the relevant log information, you must also collect standard troubleshooting information and send it to Juniper Technical Support in your request for assistance.

**Solution** To collect standard troubleshooting information:

- Redirect the command output to a file.

  user@host> **request support information | save rsi-1**

To configure logging to assist Juniper Technical Support:

1. Review the following blocks of statements to determine which apply to your configuration.

```
[edit]
set system syslog archive size 100m files 25
set system auto-configuration traceoptions file filename
set system auto-configuration traceoptions file filename size 100m files 25
set protocols ppp-service traceoptions file filename size 100m files 25
set protocols ppp-service traceoptions level all
set protocols ppp-service traceoptions flag all
set protocols ppp traceoptions file filename size 100m files 25
set protocols ppp traceoptions level all
set protocols ppp traceoptions flag all
set protocols ppp monitor-session all
set interfaces pp0 traceoptions flag all
set demux traceoptions file filename size 100m files 25
set demux traceoptions level all
set demux traceoptions flag all
set system processes dhcp-service traceoptions file filename
set system processes dhcp-service traceoptions file size 100m
set system processes dhcp-service traceoptions file files 25
set system processes dhcp-service traceoptions flag all
set class-of-service traceoptions file filename
set class-of-service traceoptions file size 100m
set class-of-service traceoptions flag all
set class-of-service traceoptions file files 25
set routing-options traceoptions file filename
set routing-options traceoptions file size 100m
set routing-options traceoptions flag all
set routing-options traceoptions file files 25
set interfaces traceoptions file filename
set interfaces traceoptions file size 100m
set interfaces traceoptions flag all
set interfaces traceoptions file files 25
set system processes general-authentication-service traceoptions file filename
set system processes general-authentication-service traceoptions file size 100m
set system processes general-authentication-service traceoptions flag all
set system processes general-authentication-service traceoptions file files 25
```

2. Copy the relevant statements into a text file and modify the log filenames as you want.
3. Copy the statements from the text file and paste them into the CLI on your router to configure logging.
4. Commit the logging configuration to begin collecting information.

NOTE: The maximum file size for DHCP local server and DHCP relay log files is 1 GB. The maximum number of log files for DHCP local server and DHCP relay is 1000.

BEST PRACTICE: Enable these logs only to collect information when troubleshooting specific problems. Enabling these logs during normal operations can result in reduced system performance.

**Related Documentation**

- *Compressing Troubleshooting Logs from /var/logs to Send to Juniper Technical Support*

PART 5

# Index


- Index on page 269

# Index


## Symbols

#, comments in configuration statements....xvi
( ), in syntax descriptions....xvi
802.1Q VLANs
  VLAN tagging....183
< >, in syntax descriptions....xvi
[ ], in configuration statements....xvi
{ }, in configuration statements....xvi
| (pipe), in syntax descriptions....xvi

## A

access-concentrator statement....136
address statement
  interface....137
aggregated Ethernet
  targeted distribution of
    subscribers....160, 169, 172
Aggregated Ethernet interfaces
  targeted distribution status, displaying....258
aggregated Ethernet interfaces without link
  protection
  manually rebalancing subscribers ....76, 188
  periodically rebalancing subscribers ....76
  rebalancing subscribers....76, 188
  targeting subscribers....76
aggregated Ethernet logical interfaces *See*
  subscriber interfaces, IP demux over aggregated
  Ethernet *See* subscriber interfaces, VLAN demux
  over aggregated Ethernet *See* subscriber
  interfaces, VLAN over aggregated Ethernet

## B

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

## C

comments, in configuration statements....xvi
conventions
  text and syntax....xv
curly braces, in configuration statements....xvi
customer support....xvii
  contacting JTAC....xvii

## D

demux interfaces
  unit statement....177
demux logical interfaces *See* subscriber interfaces,
  IP demux over VLAN demux
demux-options statement
  dynamic IP demux interface....139
demux-source statement
  dynamic IP demux interfaces....140
demux0 statement
  dynamic IP demux interface....138
demux0 statements
  underlying-interface....173
direct-connect statement
  dynamic PPPoE....141
documentation
  comments on....xvii
duplicate-protection statement
  dynamic PPPoE....142
dynamic firewalls statements
  filter....152
  precedence....167
dynamic IP demux interface statements
  demux-source....140
  family....151
dynamic IP demux statements
  mac-validate....162
dynamic PPPoE
  example
    over dynamic VLAN demux over
      aggregated Ethernet....120
    over static VLAN demux over aggregated
      Ethernet....114
dynamic PPPoE statements
  direct-connect....141
  duplicate-protection....142
  dynamic-profile....143
  max-sessions....163
dynamic profiles statements
  interfaces....156
  unnumbered-address....179
  vlan-id....181
  vlan-tags....184
dynamic subscribers
  interfaces statement....156

dynamic-profile statement
dynamic PPPoE....143
dynamic-profiles
interfaces statement....156
dynamic IP demux....156

E
encapsulation statement
dynamic profiles....144
enhanced-mode statement
firewall....147
Ethernet interfaces
status information, displaying
Gigabit Ethernet....190, 235
VLAN tagging....183

F
family statement
dynamic IP demux interface....151
dynamic profiles....149
Fast Ethernet interfaces
VLAN tagging....183
filter statement
dynamic firewalls....152
font conventions....xv

G
Gigabit Ethernet interfaces
demultiplexing interface information, displaying....226
status information, displaying....190, 235
VLAN tagging....183
Gigabit Ethernet IQ PIC
traffic and MAC statistics....190

I
inner-tag-protocol-id statement
dynanic VLAN interfaces....153
inner-vlan-id statement
dynanic VLAN interfaces....154
input-vlan-map statement
dynamic interfaces....155
interfaces
unit statement....174
interfaces statement
dynamic profiles....156
IP demultiplexing interface statements
unit....177

L
log files
collecting for Juniper Technical Support....263
logical interface statements
family....149
logical-interface-fpc-redundancy statement
aggregated Ethernet....160
loose mode
MAC address validation
configuring....29
overview....7

M
MAC address validation
dynamic subscriber interfaces
configuring....31
overview....7
static subscriber interfaces
configuring....30
subscriber interfaces
configuring....29
underlying interfaces
configuring....31
mac-validate statement....161
dynamic IP demux interface....162
manuals
comments on....xvii
max-sessions statement
dynamic PPPoE....163
mode statement....164
multi-protocol stacking....57
multicast traffic
separating from unicast....99

N
nd-override-preferred-src statement....165
non-link-protected aggregated Ethernet interfaces
manually rebalancing subscribers....76, 188
periodically rebalancing subscribers....76
rebalancing subscribers....76, 188

O
OIF maps
separating multicast traffic....99
output-vlan-map statement
dynamic interfaces....165

P
parentheses, in syntax descriptions....xvi

physical interfaces
VLAN tagging....183
pop statement
dynanic VLAN interfaces....166
PPPoE
example
dynamic PPPoE over dynamic VLAN demux over aggregated Ethernet....120
dynamic PPPoE over static VLAN demux over aggregated Ethernet....114
static PPPoE over static VLAN demux over aggregated Ethernet....109
interfaces, displaying....215
PPPoE family
on underlying interface configuration....72
precedence statement....167
proxy-arp statement
subscriber interfaces....168
push statement
dynamic VLAN interfaces....168

## R

rebalance-periodic statement
aggregated Ethernet....169
redundancy mechanisms for Virtual Chassis module....160
request interface rebalance (Aggregated Ethernet for Subscriber Management) command....188
rpf-check statement....169

## S

service-name-table statement
PPPoE underlying interface....170
show interfaces (10-Gigabit Ethernet) command....190
show interfaces (Gigabit Ethernet) command....235
show interfaces (PPPoE) command....215
show interfaces demux0 (Demux Interfaces) command....226
show interfaces targeting command....258
static PPPoE
example
over static VLAN demux over aggregated Ethernet....109
static subscribers
interfaces statement....156
strict mode
MAC address validation
configuring....29
overview....7
subscriber interface statements
access-concentrator....136
address....137
demux-options....139
demux-source....140
demux0....138
direct-connect....141
duplicate-protection....142
dynamic-profile....143
family....149, 151
interfaces....156
mac-validate....162
max-sessions....163
mode....164
proxy-arp....168
rpf-check....169
underlying-interface....173
unit....174, 177
unnumbered-address....179
vlan-tagging....183
subscriber interfaces
configuring in dynamic profiles....21
example
dynamic PPPoE over dynamic VLAN demux over aggregated Ethernet....120
dynamic PPPoE over static VLAN demux over aggregated Ethernet....114
gigabit Ethernet VLAN....36
gigabit Ethernet VLAN with multiple logical units....35
gigabit Ethernet VLAN with no autonegotiation....36
IP demux over aggregated Ethernet....82
loopback....36
static PPPoE over static VLAN demux over aggregated Ethernet....109
VLAN over aggregated Ethernet....79, 84
IP demux
configuring....25, 26
guidelines....6
overview....5
IP demux over aggregated Ethernet
example....82
overview....12

IP demux over VLAN demux
overview....7, 51
overview....3
PPPoE family on underlying interface....72
VLAN
configuring....22
overview....4
VLAN demux
guidelines....6
overview....5
VLAN demux over aggregated Ethernet
overview....7, 12, 51
VLAN over aggregated Ethernet
configuring....68
example....79, 84
overview....11
subscribers
verifying configuration....32
support, technical *See* technical support
swap statement
dynamic VLAN interfaces....171
syntax conventions....xv

T

tag-protocol-id statement
dynamic VLAN map....171
targeted traffic
separating multicast....99
targeted traffic distribution
Virtual Chassis....172
targeted-distribution statement
aggregated Ethernet....172
technical support
collecting logs for....263
contacting JTAC....xvii
trace operations
collecting logs for Juniper technical support....263
traffic distribution mechanisms for Virtual Chassis
targeted distribution....172
troubleshooting subscriber access
collecting logs for Juniper Technical Support....263

U

underlying-interface statement
dynamic profiles....173
unit statement
demux interfaces....177
interfaces....174
unnumbered-address statement
dynamic profiles....179

V

verification
aggregate route....104
Virtual Chassis
module redundancy....160
redundancy
module....160
targeted traffic distribution....172
VLAN
multi-protocol stacking....57
VLAN tagging....183
vlan-id statement
dynamic profiles....181
dynamic VLAN map
rewriting at ingress or egress....182
vlan-tagging statement....183
vlan-tags statement
dynamic profiles....184