Junos® OS

Broadband Subscriber VLANs and Interfaces Feature Guide

Release
16.2

Modified: 2016-11-02

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Junos® OS Broadband Subscriber VLANs and Interfaces Feature Guide
16.2

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About the Documentation

Documentation and 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 CLI Explorer.

Documentation Conventions

Table 1 on page xxiii 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 xxiii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

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

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** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	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** **(*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]
		routing-options {
		static {
		route default {
		nexthop *address*;
		retain;
		}
		}
		}

; (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**. • 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**.

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We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

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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 Partner Support Service 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/.
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- 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/
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- 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

Configuring Dynamic VLANs for Subscriber Access Networks

CHAPTER 1

Dynamic VLAN Overview

Subscriber Management VLAN Architecture Overview

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

Customer VLANs

Customer VLANs (C-VLANs) provide one-to-one (1:1) subscriber-to-service connectivity: One VLAN carries all traffic to each subscriber on the network. Having a single VLAN per subscriber simplifies operations by providing a 1:1 mapping of technology (VLANs) to subscribers. You can also understand what applications any subscriber is using at any given time. Because you use only one VLAN to carry traffic to each subscriber, this approach is not affected when adding new services. However, using a pure C-VLAN model consumes more bandwidth because a single television channel being viewed by multiple subscribers is carried across the network several times—once on each C-VLAN. This approach requires a more scalable, robust edge router that can support several thousand VLANs.

Configurations that use C-VLANs uniquely identify subscribers by using the VLAN ID and stacked VLAN (S-VLAN) ID. Subscriber packets received from the access node that are either single-tagged with a VLAN ID or double-tagged with both an S-VLAN ID and a VLAN ID are examples of C-VLAN configurations because they provide a one-to-one correspondence between an individual subscriber and the VLAN encapsulation.

In the C-VLAN architecture, each customer premises equipment (CPE) or subscriber network has its own dedicated Layer 2 path to the router. Each subscriber network is separated by a customer VLAN (C-VLAN) that is dedicated to a particular customer. The services for each customer are transmitted from the router to the access node by means of that customer's C-VLAN.

The ability to uniquely identify subscribers by means of VLAN encapsulation facilitates delivery of services such as authentication, authorization, and accounting (AAA); class of service (CoS); and filters (policers) to subscribers in a C-VLAN configuration.

We recommend using C-VLANs for data and voice traffic to simplify configuration and management when expanding services. However, some MSANs are limited to the number of VLANs they can support, limiting the ability to use C-VLANs.

Service VLANs

Service VLANs (S-VLANs) provide many-to-one (N:1) subscriber-to-service connectivity: The service VLAN carries a service (for example, data, video, or voice) to all subscribers instead of having different services share a VLAN. Adding a new service requires adding a new VLAN and allocating bandwidth to the new service. The service VLAN model enables different groups that are using the broadband network (for example, external application providers) to manage a service. One limitation of service VLANs is the absence of any logical isolation between user sessions at the VLAN level. This lack of isolation requires that the multiservice access node (MSAN) and broadband network gateway (BNG) provide the necessary security filtering.

Service VLANs enable service providers to route different services to different routers to functionally separate network services and reduce network complexity.

Typically, you would use S-VLANs for video and IPTV traffic.

Hybrid VLANs

Hybrid C-VLAN—The hybrid VLAN combines the best of both previous VLANs by using one VLAN per subscriber to carry unicast traffic and one shared multicast VLAN (M-VLAN) for carrying broadcast (multicast) television traffic. You can use both the *pure* and *hybrid* C-VLAN models in different portions of the network, depending upon available bandwidth and MSAN capabilities.

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

Broadband Subscriber Management VLANs Across an MSAN

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

NOTE: Not all MSANs support these options.

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

NOTE: Most MSANs can support the service VLAN model.

Customer VLANs and Ethernet Aggregation

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

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

Related Documentation

- Static Subscriber Interfaces and VLAN Overview on page 7

Dynamic 802.1Q VLAN Overview

You can identify VLANs statically or dynamically. You can also configure a mix of static and dynamic VLANs on the same underlying interface.

For Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces supporting VPLS, Junos OS supports a subset of the IEEE 802.1Q standard for channelizing an Ethernet interface into multiple logical interfaces. Many hosts can be connected to the same Gigabit Ethernet switch, but they cannot be in the same routing or bridging domain.

To identify VLANs statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you use a variable to specify an 802.1Q VLAN that is dynamically created when a subscriber accesses the network.

Dynamic VLAN Configuration

You can configure the router to dynamically create VLANs when a client accesses an interface and requests a VLAN ID that does not yet exist. When a client accesses a particular interface, the router instantiates a VLAN dynamic profile that you have associated with the interface. Using the settings in the dynamic profile, the router extracts information about the client from the incoming packet (for example, the interface and unit values), saves this information in the routing table, and creates a VLAN or stacked VLAN ID for the client from a range of VLAN IDs that you configure for the interface.

Dynamic VLAN configuration supports the creation of IPv4 (inet), DHCPv4, IPv6 (inet6), and DHCPv6 VLANs.

Dynamic Mixed VLAN Ranges

Dynamic VLAN and dynamic stacked VLAN configuration supports mixed (or flexible) VLAN ranges. When you configure dynamic mixed VLAN ranges, you must create separate dynamic profiles for VLANs and stacked VLANs. Table 3 on page 6 lists all valid combinations for the maximum number of dynamic profiles and VLAN and stacked VLAN ranges on a single underlying interface.

Table 3: Maximum Dynamic Profiles and Ranges for Dynamic Mixed VLAN Configurations

VLANs		Stacked VLANs	
Maximum Number of Dynamic Profiles	Maximum Number of VLAN Ranges Per Profile	Maximum Number of Dynamic Profiles	Maximum Number of Stacked VLAN Ranges Per Profile
1	128	1	128
16	32	16	32
1	128	16	32
16	32	1	128

Table 3 on page 6 shows the valid maximums for the following dynamic mixed VLAN range configuration scenarios, in this order:

- Configurations that require up to 128 VLAN ranges and up to 128 stacked VLAN ranges on a single underlying interface. You must create one VLAN dynamic profile and one stacked VLAN dynamic profile, each with a maximum of 128 ranges per profile.
- Configurations that require up to 32 VLAN ranges and up to 32 stacked VLAN ranges on a single underlying interface. You can configure up to 16 VLAN dynamic profiles and up to 16 stacked VLAN dynamic profiles, each with a maximum of 32 ranges per profile.
- Configurations that consist of one VLAN dynamic profile with a maximum of 128 ranges, and up to 16 stacked VLAN dynamic profiles with 32 ranges each.
- Configurations that consist of up to 16 VLAN dynamic profiles with 32 ranges each, and one stacked VLAN dynamic profile with a maximum of 128 ranges.

The following guidelines apply to the limits in Table 3 on page 6 when you configure VLAN ranges and S-VLAN ranges for use with dynamic profiles:

- These limits apply to both single-tagged and double-tagged dynamic VLAN ranges.
- These limits apply only to MX Series routers with MPCs. For MX Series routers with Enhanced Queuing IP Services DPCs (DPCE-R-Q model numbers) or Enhanced Queuing Ethernet Services DPCs (DPCE-X-Q model numbers), the maximum number of VLAN ranges for a dynamic profile on an underlying interface remains unchanged at 32 VLAN ranges and 32 S-VLAN ranges.
- These limits have no effect on the maximum number of VLAN IDs on a given underlying interface. The valid range of ID values for a dynamic VLAN range or dynamic S-VLAN range remains unchanged at 1 through 4094.

Related Documentation

- Configuring Interfaces to Support Both Single and Stacked VLANs on page 22

Static Subscriber Interfaces and VLAN Overview

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

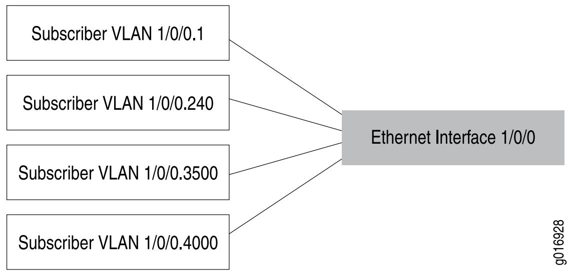
In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

- 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 8 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

- Subscriber Interfaces and Demultiplexing Overview on page 60

Pseudowire Termination: Explicit Notifications for Pseudowire Down Status

As the demand for MPLS-based Layer 2 services grows, new challenges arise for service providers to be able to interoperate Layer 2 with Layer 3 and give their customers value-added services. MPLS in the access networks is already used by applications like mobile or DSL backhaul to achieve a more cost-efficient solution, better service reliability, and quality of service. Most of the traditional access network infrastructure is built over TDM circuits such as DS3 for higher speeds, ATM, or Frame Relay as access trails in a Layer 3 service. For higher bandwidth requirements and more flexibility, service providers use Ethernet as access technology for a wide range of network services. Although Ethernet provides a convenient link topology for access networks, it is not well suited for Layer 2 switching and for aggregating traffic from the access network to the core. MPLS is already used in the core and now its presence in the access network enables use of a single technology across the network. When MPLS is deployed in the access network, Ethernet is used as a link-layer encapsulation technology only, and MPLS switches perform traffic forwarding and provide other Layer 2 services. There is an increase in demand for using pseudowires as access circuits in the service delivery points in the network. These pseudowires terminate on a service node on which the service provider applies Layer 3 or Layer 2 services to the customer data.

The following is a generic topology for understanding termination for pseudowire into a Layer 2 or Layer 3 instance and the notifications for both cases.

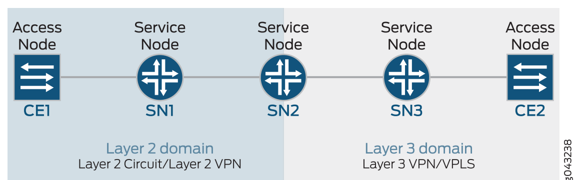
The following terminologies are used for the network elements:

- Access node (AN): An access node is typically a customer edge device that processes the packets entering or exiting the network at Layer 2. This includes devices such as DSLAMs and MSANs.
- Transport node(TN): A transport node acts like a P router as it does not have any customer or service state. It is either used for connecting the access node to the service node or to two service nodes.

- Service node (SN): A service node is a PE router that applies services to the customer packets. It includes Layer 2 PE, Layer 3 PE, peering routers, video servers, base station controllers, and media gateways.

The following example shows a linear L2-L3 interconnection set up with the absence of pseudowire redundancy. Here, the access circuit pseudowire is configured between the access PE (SN1) and service node (SN2), which defines the boundary of the L2 domain. The Layer 3 VPN is configured between SN2 and SN3, which constitute the L3 domain. Layer 2 circuit pseudowire terminates in the VRF of the device interconnecting the L2-L3 domains (SN2); that is, the service node performs stitching between the Layer 2 circuit and the Layer 3 VPN.

Figure 2: Pseudowire Termination



Related Documentation

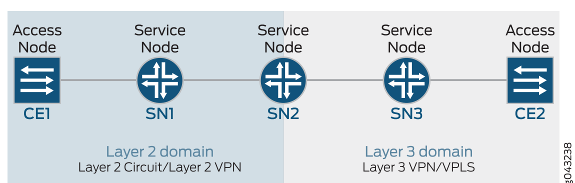
- Configuring an Access Pseudowire That Terminates into VRF on the Service Node on page 10
- Configuring an Access Pseudowire That Terminates into a VPLS Routing Instance on page 12

Configuring an Access Pseudowire That Terminates into VRF on the Service Node

Each VPN has its own VPN-specific routing table per VPN site. When an ingress PE router (SN2) receives routes advertised from a directly connected access node (CE2), it checks the received route against the VRF export policy for that VPN. If it matches, the route is converted to VPN-IPv4 format; that is, the route distinguisher is added to the route. This VPN-IPv4 route is advertised to the remote PE routers. It also attaches a route target to each route learned from the directly connected sites, which is based on the value of the configured export target policy of the VRF tables. When an egress PE router receives this route, it checks it against the import policy between the PE routers. If accepted, the route is placed into its **bgp.l3vpn.0** table. At the same time, the router checks the route against the VRF import policy for the VPN. If it matches, the route distinguisher is removed from the route, and the route is placed into the VRF table in IPv4 format.

On SN2 and SN1, routes are installed in the VRF based on the import and export VRF policies. OSPF and direct routes from CE2 are installed in the VRF of SN2, which is then converted into IPv4-VPN routes. The routes to be learned over the CE-PE link is defined under protocols in the routing instance. Now, from the other end, the access pseudowire terminates in the VRF of the SN1 device, and the static routing is configured between the access node (CE1) and the service node(SN1). Traffic at this point is handled at the IP level, before it enters the Layer 3 domain. The translation from IP route to IPv4-VPN route happens at SN2.

Figure 3: Pseudowire Termination



1. To configure the logical tunnel interfaces or the lt-ifls.

```
[edit interfaces]
lt-0/0/10 {
   unit 0 {
      encapsulation vlan-ccc;
      vlan-id number;
      peer-unit 1;
   }
   unit 1 {
      encapsulation vlan;
      vlan-id number;
      peer-unit 0;
      family inet {
         address IPv4 address;
      }
   }
}
```

2. To configure appropriate import and export policies.

Each VPN has its own VPN-specific routing table per VPN site. When an ingress PE router (CE2) receives routes advertised from a directly connected access node, it checks the received route against the VRF export policy for that VPN. If it matches, the route is converted to VPN-IPv4 format; that is, the route distinguisher is added to the route.

```
[edit policy-options]
policy-statement policy-name {
   term 1 {
      from protocol [ direct ospf ];
      then {
         community add l3vpn;
         accept;
      }
   }
}
```

When an egress router receives this route, it checks it against the import policy between the CE routers. If it is accepted, then the route is placed into its **bgp.l3vpn.0** table. At the same time, the router checks the route against the VRF import policy for the VPN.

```
[edit policy-options]
policy-statement policy-name {
   term 1 {
      from community l3vpn;
      then accept;
   }
}
```

3. To access the pseudowire configuration on SN1.

```
[edit protocols]
l2circuit {
   neighbor address {
      interface lt-0/0/10.0 {
         virtual-circuit-id number;
      }
   }
}
```

4. To configure the Layer 3 VPN routing instance.

   In Layer 2 domains where service node SN1 interconnects the L2 to L3 domain, you need to activate the **vrf-table-label** feature to be able to advertise the direct-subnet prefix that corresponds to the lt-ifl toward the Layer 3 domain.

```
[edit routing-instances]
l3vpn routing instance {
   instance-type vrf;
   interface lt-0/0/10.1;
   route-distinguisher 100:2;
   vrf-import l3vpn-import;
   vrf-export l3vpn-export;
   vrf-table-label;
   protocols {
      ospf {
         export ospf_export;
```

```
                area 0.0.0.0 {
                    interface all {
                        priority 0;
                    }
                }
            }
        }
    }
```

Use the following operational mode commands to verify termination of an access pseudowire into VRF:

- **show l2circuit connections**
- **show route table l3vpn_1.inet.0**

Related Documentation

- Pseudowire Termination: Explicit Notifications for Pseudowire Down Status on page 8
- Configuring an Access Pseudowire That Terminates into a VPLS Routing Instance on page 12

Configuring an Access Pseudowire That Terminates into a VPLS Routing Instance

Terminating the access pseudowire into a VPLS instance is supported for both LDP-VPLS and BGP-VPLS.

To configure an access pseudowire that terminates into VPLS on the service node using LT-IFLS and mesh-groups:

1. Configure the logical tunnel interfaces or the lt-ifls.

   Logical tunnel interface pairs are used for stitching Layer 2 network elements to VPLS when an access pseudowire terminates into a VPLS routing instance.

   ```
   [edit interfaces]
   interface name {
       unit 0 {
           encapsulation vlan-ccc;
           vlan-id number;
           peer-unit 1;
       }
       unit 1 {
           encapsulation vlan-vpls;
           vlan-id number;
           peer-unit 0;
           family vpls;
       }
   }
   ```

2. Configure the VPLS routing instance.

   To terminate the access pseudowire into a VPLS routing instance, use mesh groups as follows:

   ```
   [edit routing-instances]
   ```

```
routing-instance name {
    instance-type vpls;
    interface interface name;
    route-distinguisher 192.0.2.255:1;
    vrf-target target:64577:1;
    protocols {
        site vpls {
            site-identifier 4;
            interface interface name;
        }
        mesh-group pe-mid {
            vpls-id number;
            local-switching;
            neighbor 192.0.2.1;
        }
    }
}
```

In LDP-VPLS and BGP-VPLS, the Layer 2 circuit only needs to be configured on the access PE (SN1) with a virtual circuit ID, and the corresponding VPLS ID is configured on the service node for terminating the pseudowire. Local switching can be used on the service node to switch the traffic from multiple pseudowires into the desired VPLS routing instance.

Use the **show vpls connections** operational mode command to verify termination of an access pseudowire into a VPLS routing instance.

Related Documentation

- Pseudowire Termination: Explicit Notifications for Pseudowire Down Status on page 8
- Configuring an Access Pseudowire That Terminates into VRF on the Service Node on page 10

CHAPTER 2

Configuring Dynamic Profiles and Interfaces Used to Create Dynamic VLANs

Configuring a Dynamic Profile Used to Create Single-Tag VLANs

Starting in Junos OS Release 14.1, you can configure a dynamic profile for creating single-tagged VLANs.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the **$junos-interface-ifd-name** variable for the dynamic interface and the **$junos-interface-unit** variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them for IPv4 or IPv6.
   - For IPv4 demux interfaces:

     ```
     [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
       "$junos-interface-unit"]
     ```

user@host# **set** demux-source **inet**

- For IPv6 demux interfaces:

  [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
  user@host# **set** demux-source **inet6**

3. (Optional) To configure the router to respond to any ARP request, specify the proxy-arp (Dynamic Profiles) statement.

   [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set** proxy-arp (Dynamic Profiles)

4. Specify that you want to use dynamic VLAN IDs in the dynamic profile. You can configure the dynamic profile to create a single-tag VLAN using only standard tag protocol identifier (TPID) values (0x8100) or to create a VLAN using any TPID value.

   - To configure the dynamic profile to create single-tag VLANs that accept only standard TPID values (a TPID value of 0x8100):

     [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
     user@host# **set** vlan-id **$junos-vlan-id**

     When the dynamic profile is instantiated, the variable is dynamically replaced with a VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

   - To configure the dynamic profile to create single-tag VLANs that accept any TPID value:

     [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
     user@host# **set** vlan-tags **outer $junos-vlan-id**

     The variable is dynamically replaced with both the TPID value and a VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

5. Define the unit family type.

   a. For IPv4 interfaces:

      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
      user@host# **set** family **inet**

   b. For IPv6 interfaces:

      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
      user@host# **set** family **inet6**

6. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

   [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family inet]
   user@host# **set** mac-validate **loose**

7. Specify the unnumbered address and preferred source address.


```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
   "$junos-interface-unit" family inet]
user@host# set unnumbered-address lo.0 preferred-source-address 192.0.2.16
```

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you can configure a dynamic profile for creating single-tagged VLANs.

Related Documentation

- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
- Dynamic 802.1Q VLAN Overview on page 6
- *Dynamic Variables Overview*

Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs

Starting in Junos OS Release 14.1, you configure an interface to use a dynamic profile when the dynamic VLANs are created. The dynamic profile uses the VLAN ranges configured for the interface.

To configure the interface:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Access the VLAN range configuration

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure vlan-ranges
   ```

3. Specify the dynamic profile used to create VLANs.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit dynamic-profile VLAN-PROF-1
   ```

4. Specify the VLAN Ethernet packet type the VLAN dynamic profile accepts.

   inet and **dhcp-v4** for IPv4 packets, **inet6** and **dhcp-v6** for IPv6 packets, and **pppoe** for PPP packets are supported.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF-1]
   user@host# set accept inet
   ```

5. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 3000 and any upper VLAN ID limit (a range from 1 through 4094).

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF1]
   user@host# set ranges 3000-any
   ```


NOTE: You can configure multiple VLAN range groups (up to 32 total) on the same physical interface that use different VLAN dynamic profiles.

6. (Optional) Access another VLAN dynamic profile for which you want to configure VLAN ranges. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 2000 and any upper VLAN ID limit (a range from 1 through 4094).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit dynamic-profile VLAN-PROF2
user@host# set ranges 2000-any
```

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you configure an interface to use a dynamic profile when the dynamic VLANs are created. The dynamic profile uses the VLAN ranges configured for the interface.

Related Documentation

- Configuring a Dynamic Profile Used to Create Single-Tag VLANs on page 15
- Dynamic 802.1Q VLAN Overview on page 6

Configuring a Dynamic Profile Used to Create Stacked VLANs

Starting in Junos OS Release 14.1, you can configure a dynamic profile for creating stacked 802.1Q VLANs.

Before you begin:

- Configure the dynamic profile.

  See *Configuring a Basic Dynamic Profile*.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the **$junos-interface-ifd-name** variable for the dynamic interface and the **$junos-interface-unit** variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them for IPv4 or IPv6.
   - For IPv4 demux interfaces:

     ```
     [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name"
       unit "$junos-interface-unit"]
     user@host# set demux-source inet
     ```

   - For IPv6 demux interfaces:

     ```
     [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name"
       unit "$junos-interface-unit"]
     user@host# set demux-source inet6
     ```


3. (Optional) To configure the router to respond to any ARP request, specify the proxy-arp (Dynamic Profiles) statement.

   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set** proxy-arp (Dynamic Profiles)

4. Specify the outer VLAN ID variable.

   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set** vlan-tags **outer $junos-stacked-vlan-id**

   The variable is dynamically replaced with an outer VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

5. Specify the inner VLAN ID variable.

   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set** vlan-tags **inner $junos-vlan-id**

   The variable is dynamically replaced with an inner VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

6. Define the unit family type.

   a. For IPv4 interfaces:

      [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
      user@host# **set** family **inet**

   b. For IPv6 interfaces:

      [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
      user@host# **set** family **inet6**

7. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family inet]
   user@host# **set** mac-validate **loose**

8. Specify the unnumbered address and preferred source address.

   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family inet]
   user@host# **set** unnumbered-address **lo.0 preferred-source-address 192.0.2.16**

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you can configure a dynamic profile for creating stacked 802.1Q VLANs.

Related Documentation

- Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- *Configuring a Basic Dynamic Profile*
- Dynamic 802.1Q VLAN Overview on page 6
- *Dynamic Variables Overview*
- *Junos OS Predefined Variables*

Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs

Starting in Junos OS Release 14.1, you configure an interface to use a dynamic profile when the dynamic VLANs are created. The dynamic profile uses the VLAN ranges configured for the interface.

To configure the interface:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Specify that this interface is for use with stacked VLAN ranges.

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

3. Access the VLAN range configuration

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure stacked-vlan-ranges
   ```

4. Specify the dynamic profile used to create VLANs.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit dynamic-profile STACKED-VLAN-PROF1
   ```

5. Specify the VLAN Ethernet packet type the VLAN dynamic profile accepts.

   inet and **dhcp-v4** for IPv4 packets, **inet6** and **dhcp-v6** for IPv6 packets, and **pppoe** for PPP packets are supported.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile
     STACKED-VLAN-PROF1]
   user@host# set accept inet
   ```

6. 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 2000 through 4000 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-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF1]
user@host# set ranges 2000-4000,any
```

NOTE: You can configure multiple dynamic profile associations (up to 32) with different VLAN range groups on each physical interface.

7. (Optional) Access another VLAN dynamic profile for which you want to configure VLAN ranges.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit dynamic-profile VLAN-PROF2
```

8. (Optional) 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 3001 through 4000 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-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF2]
user@host# set ranges 3001-4000,any
```

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you configure an interface to use a dynamic profile when the dynamic VLANs are created. The dynamic profile uses the VLAN ranges configured for the interface.

Related Documentation

- Configuring a Dynamic Profile Used to Create Stacked VLANs on page 18
- Dynamic 802.1Q VLAN Overview on page 6

Configuring Interfaces to Support Both Single and Stacked VLANs

Starting in Junos OS Release 14.1, you can configure VLANs to support simultaneous transmission of 802.1Q VLAN single-tag and stacked frames on logical interfaces on the same Ethernet port, and on pseudowire logical interfaces.

Junos VLAN IDs for single-tag VLANs are equivalent to the outer tags used for stacked (dual-tag) VLANs. When configuring mixed (flexible) VLANs, any overlap on single-tag VLAN IDs and stacked VLAN outer tag values is supported only for dynamic VLANs on MPC line cards. When configuring mixed (flexible) VLANS on DPCE line cards, overlapping single-tag VLAN IDs and stacked VLAN outer tag values is not supported. This means that a dynamically created single-tagged VLAN interface prevents any overlapping stacked VLAN interfaces from being created or a dynamically created stacked VLAN interface prevents any overlapping single-tagged VLAN interfaces from being created.

NOTE: **For information about the maximum number of dynamic profiles, VLAN ranges, and stacked VLAN ranges for dynamic mixed VLAN configurations, see "Dynamic 802.1Q VLAN Overview" on page 6.**

To configure both VLAN and stacked VLAN ranges:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Indicate that this interface is for use with both VLAN and stacked VLAN ranges.

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

3. Define interface automatic configuration values.

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure
   ```

4. Specify that you want to modify VLAN ranges.

   ```
   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit vlan-ranges
   ```

5. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit dynamic-profile VLAN-PROF1
   ```

6. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 2000 and an upper VLAN ID limit of 3000.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF1]
   user@host# set ranges 2000-3000
   ```

   NOTE: **You can configure multiple dynamic profile associations (up to 32) with different VLAN range groups on each physical interface.**

7. Specify that you want to modify stacked VLAN ranges.

   ```
   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit stacked-vlan-ranges
   ```

8. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   ```
   [edit interfaces ge-0/0/0 auto-configure stacked-vlan-ranges]
   user@host# edit dynamic-profile VLAN-PROF2
   ```

9. 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 3001 through 4000 (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-0/0/0 auto-configure stacked-vlan-ranges dynamic-profile
     VLAN-PROF2]
   user@host# set ranges 3001-4000,any
   ```

   NOTE: You can configure multiple dynamic profile associations (up to 32) with different VLAN range groups on each physical interface.

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you can configure VLANs to support simultaneous transmission of 802.1Q VLAN single-tag and stacked frames on logical interfaces on the same Ethernet port, and on pseudowire logical interfaces.

Related Documentation

- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
- Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Dynamic 802.1Q VLAN Overview on page 6

Overriding the Dynamic Profile Used for an Individual VLAN

You can override dynamic profile assignment to individual VLANs that are already part of a previously defined VLAN range. This functionality provides a type of exception to an assigned VLAN range. It enables you to configure individual VLAN IDs to use a different dynamic profile from the one assigned to the VLAN range that includes the individual VLAN ID.

To configure dynamic profile override for a specific VLAN:

1. Access the interface on which you want to create a dynamic profile override.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Access the interface automatic configuration hierarchy.

   [edit interfaces ge-0/0/0]
   user@host# **edit auto-configure**

3. Access either the single-tagged or dual-tagged (stacked) VLAN ranges that you want to modify.

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# **edit vlan-ranges**

   or

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# **edit stacked-vlan-ranges**

4. Define the **override** statement along with the VLAN tag that you want to override and the dynamic profile that you want to use when overriding the specified VLAN tag.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# **set override tag 20 dynamic-profile NewProfile**

   or

   [edit interfaces ge-0/0/0 auto-configure stacked-vlan-ranges]
   user@host# **set override tag 20 dynamic-profile NewProfile**

Configuring a VLAN Dynamic Profile That Associates VLANs with Separate Routing Instances

You can configure a VLAN dynamic profile that dynamically creates underlying VLAN interfaces and associates these interfaces with statically created routing instances. The VLAN interface is created for a specific routing instance as defined by VSA 26–1 (Virtual-Router) on the AAA server (for example, RADIUS server).

To configure a dynamic VLAN profile to use routing instances when creating VLANs, add the routing instance configuration to your dynamic profile:

1. Access the dynamic profile.

   [edit]
   user@host# **edit dynamic-profiles VLAN_PROFILE_RI**

2. Specify that you want to dynamically associate the profile with routing instances.

   [edit dynamic-profiles VLAN_PROFILE_RI]
   user@host# **edit routing-instances $junos-routing-instance**

3. Define the routing instance **interface** statement with the internal **$junos-interface-name** variable used by the router to match the interface name of the receiving interface.

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

4. Define the dynamic profile **interfaces** statement with the internal **$junos-interface-ifd-name** variable.

   [edit dynamic-profiles VLAN_PROFILE_RI]
   user@host# **edit interfaces $junos-interface-ifd-name**

5. Define the **unit** statement with the internal **$junos-interface-unit** variable used by the router to generate a unit value for the interface.

   ```
   [edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name"]
   user@host# edit unit $junos-interface-unit
   ```

Related Documentation

- *Configuring a Basic Dynamic Profile*
- Dynamic 802.1Q VLAN Overview on page 6
- *Dynamic Variables Overview*
- *Junos OS Predefined Variables*
- *Configuring Frames with Particular TPIDs to Be Processed as Tagged Frames*
- Configuring Dynamic Authentication for VLAN Interfaces on page 28

Automatically Removing VLANs with No Subscribers

You can always clear or delete subscriber VLANs manually. However, you can also configure the interface to automatically remove dynamic subscriber VLANs when no client sessions (for example, DHCP or PPPoE) exist on the VLAN.

When configuring automatic removal of dynamic subscriber VLANs, keep the following in mind:

- You can configure automatic VLAN removal only on individual physical interfaces. You cannot configure the feature globally.
- Automatic VLAN removal is not supported for use on Layer 2 Wholesale interfaces. See *Layer 2 and Layer 3 Wholesale Overview*.
- PPPoE subscriber interfaces require the use of a dynamic profiles when configured over dynamic VLANS. However, dynamic profiles are not required for use with DHCP subscriber interfaces that use underlying dynamic VLANs. Because the remove-when-no-subscribers functionality triggers when no dynamic client sessions exist on a dynamic VLAN, automatic removal of underlying dynamic VLANs is not supported when DHCP subscriber interfaces are not created using dynamic profiles.
- The **maintain-subscriber** statement and **remove-when-no-subscribers** statement are mutually exclusive. When the router is configured to maintain subscribers, you cannot also specify that dynamically configured VLAN interfaces are removed when no subscribers exist.
- If PPPoE subscriber session lockout is also configured, the router does not remove the unused subscriber VLAN until the lockout time has expired for each client undergoing lockout on the underlying interface.

To configure automatic removal of subscriber VLANs when no client sessions exist on the VLAN:

1. Access the interface for which you want to enable automatic removal of subscriber VLANs.

user@host# **edit interfaces ge-1/1/1**

2. Access the interface automatic configuration hierarchy.

   [edit interfaces ge-1/1/1]
   user@host# **edit auto-configure**

3. Enable subscriber VLAN removal with the **remove-when-no-subscribers** statement.

   [edit interfaces ge1/1/1 auto-configure]
   user@host# **set remove-when-no-subscribers**

Related Documentation

- Dynamic 802.1Q VLAN Overview on page 6
- *Layer 2 and Layer 3 Wholesale Overview*
- *Layer 2 Wholesale Network Topology Overview*
- PPPoE Subscriber Session Lockout Overview on page 171

Verifying and Managing Dynamic VLAN Configuration

Purpose View or clear information about dynamic VLANs and stacked VLANs.

Action

- To display subscriber dynamic VLAN information:

  user@host>**show subscribers detail**

- To display interface-specific output for dynamic VLANs:

  user@host>**show interfaces *interface-name***

- To clear the binding state of dynamic VLAN interfaces:

  user@host> **clear auto-configuration interfaces**

Related Documentation

- CLI Explorer

CHAPTER 3

Configuring Subscriber Authentication for Dynamic VLANs

Configuring an Authentication Password for VLAN or Stacked VLAN Ranges

You can specify an authentication password for dynamically created VLAN or stacked VLAN interfaces at the **[edit interfaces *interface-name* auto-configure vlan-ranges authentication]** or **[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication]** hierarchy level. This password is sent to the external AAA authentication server for subscriber authentication.

NOTE: You must configure the username-include statement to enable the use of authentication. The password (Interfaces) statement is not required and does not cause the interface to use authentication if the username-include statement is not included.

To configure an authentication password:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Edit the VLAN **auto-configure** stanza.

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure
   ```

3. Edit the **vlan-ranges** or **stacked-vlan-ranges** stanza.

```
[edit interfaces ge-0/0/0 auto-configure]
user@host# edit vlan-ranges
```

or

```
[edit interfaces ge-0/0/0 auto-configure]
user@host# edit stacked-vlan-ranges
```

4. Edit the VLAN **authentication** stanza.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit authentication
```

5. Specify a password that is sent to the external AAA authentication server for subscriber authentication.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set password (Interfaces) $ABC123
```

Related Documentation

- Configuring Dynamic Authentication for VLAN Interfaces on page 28

Configuring Dynamic Authentication for VLAN Interfaces

You can use dynamic profiles, in conjunction with RADIUS, to dynamically create logical VLAN interfaces in the default logical system and in a specified routing instance. As DHCP clients in the same VLAN become active, corresponding interfaces are assigned to any specified routing instances. You can also dynamically create an underlying VLAN interface for incoming subscribers, associate interfaces created on this VLAN with the default logical system and a specified routing instance, and define RADIUS authentication values for the dynamically created interfaces.

Before you configure dynamic VLAN authentication, configure DHCP Local Server or DHCP Relay over which you want the dynamic VLAN interfaces to function.

For information about DHCP Local Server or DHCP Relay, see:

- *Extended DHCP Local Server Overview*
- *Extended DHCP Relay Agent Overview*

NOTE: You can also configure dynamically created VLAN interfaces over PPP or PPPoE interfaces. For information about how to configure PPP or PPPoE, see *Dynamic Profiles for PPP Subscriber Interfaces Overview* or "Subscriber Interfaces and PPPoE Overview" on page 129.

To configure dynamic authentication for dynamically created VLAN interfaces:

1. Configure an access profile that contains the appropriate accounting order, authentication order, and server access values.

   For information about how to configure an access profile, RADIUS accounting, RADIUS statistics, and how to define RADIUS server access, see:

   - *Configuring an Access Profile for Subscriber Management*
   - *Specifying the Authentication and Accounting Methods for Subscriber Access*
   - *Configuring Per-Subscriber Session Accounting*
   - *Configuring Router or Switch Interaction with RADIUS Servers*

2. Configure a dynamic profile that uses the default logical system and creates specific routing instances to contain dynamically created VLAN interfaces.

   See "Configuring a VLAN Dynamic Profile That Associates VLANs with Separate Routing Instances" on page 24.

3. Define the VLAN physical interface for automatic configuration.

   See the following topics:

   - *Enabling VLAN Tagging*
   - Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
   - Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
   - Configuring an Authentication Password for VLAN or Stacked VLAN Ranges on page 27
   - Configuring VLAN Interface Username Information for AAA Authentication on page 32

4. Associate an access profile to the VLAN interface.

   See *Attaching Access Profiles*.

5. Associate a dynamic profile to the VLAN interface.

Related Documentation

- Dynamic 802.1Q VLAN Overview on page 6

Subscriber Packet Type Authentication Triggers for Dynamic VLANs

By default, VLAN authentication is triggered by any of the packet types specified with the **accept** statement in the dynamic profile that instantiates the VLAN and subscriber interfaces. For certain business cases, you may want a more generic dynamic profile that includes several packet types, but in some situations want the VLAN to be authenticated for only a subset of your customers. You can use the **packet-types** statement to specify the desired subset.

Sample Uses for Packet Type Triggering

The following two use cases describe circumstances when you might want to authenticate a VLAN for only certain subscribers and not others.

- **Conserving resources in a mixed access model**—A mixed access model might employ dynamic VLANs to provide services for PPPoE subscribers, IPoE subscribers, IPv6oE subscribers, or other subscriber types. Typically, the PPPoE subscribers are residential customers, and the IP subscribers are business customers. An understanding of dynamic VLAN authentication and profile instantiation for these subscribers can help you conserve system resources and avoid some impacts to scaling limits.

  By default, authentication is configured for the interface based on the configured VLAN range or stacked VLAN range. Consequently, every dynamic VLAN created in the range must be authenticated, regardless of the packet type that triggers VLAN creation. This works well for the IPoE and IPv6oE subscribers, because dynamic VLAN authentication enables RADIUS-sourced services, such as CoS and filters, to be provisioned. However, the PPPoE subscribers are authenticated by PPP, making the dynamic VLAN authentication unnecessary and a waste of system resources.

  You can avoid this waste by restricting dynamic VLAN authentication to only the VLANs that need it. The **packet-types** statement enables you to specify that only a subset of the packet types accepted on the VLAN interface can trigger authentication. For example, in this heterogeneous access model, the VLAN dynamic profiles accept PPPoE, IPoE, and IPv6oE packets. When you use the **packet-types** statement to specify that only IPoE or IPv6oE packets can initiate VLAN authentication, the PPPoE VLANs are not submitted to RADIUS for authentication.

- **Overriding dynamic profiles in a mixed access model**—Another use for packet-type triggering is to override the configured dynamic profile for certain subscribers. To accomplish this, create one dynamic profile to match the needs of the PPPoE subscribers and create another dynamic profile for the IPoE subscribers. PPPoE subscribers make up the majority of subscribers in this model, so the PPPoE-tuned dynamic profile is applied to the VLAN interface. Include the IP profile in the Juniper Networks Client-Profile-Name VSA [26-174]. Configure the **packet-types** statement to specify that only IP packets trigger VLAN authentication.

  When an IPoE packet is received, RADIUS authenticates the VLAN. RADIUS returns the override profile contained in the Client-Profile-Name VSA and any other session attributes in the Access-Accept message. The VLAN autoconfiguration process overrides the PPPoE profile by instantiating the IP profile for the IPoE subscriber.

Packet Types for VLAN Creation and Authentication

Table 4 on page 31 lists the packet types that you can configure for VLAN authentication depending on the packet types configured for VLAN creation.

Table 4: Relationship Between Packet Types for VLAN Creation and Authentication

Packet Types for VLAN Creation	Packet Types for VLAN Authentication
any	Any combination of **any**, **dhcp-v4** or **inet**, **dhcp-v6** or **inet6**, and **pppoe**.
dhcp-v4	Either **dhcp-v4** or **inet**.
dhcp-v6	Either **dhcp-v6** or **inet6**.
inet	Either **dhcp-v4** or **inet**.
inet6	Either **dhcp-v6** or **inet6**.
pppoe	**pppoe**

NOTE: **You cannot simultaneously configure both dhcp-v4 and inet or dhcp-v6 and inet6 as packet types for VLAN creation or authentication.**

Authentication is performed for all VLANs in either of the following cases:

- You do not specify a packet type to trigger authentication.
- You configure the **any** option for both VLAN creation and authentication.

In general, VLAN authentication is performed when any packet of the type configured to trigger VLAN creation matches one of the packet types configured to trigger VLAN authentication. However, for certain combinations of configured packets, a specific packet is required to trigger authentication. Table 5 on page 31 lists these special cases.

Table 5: Packet Types Required to Trigger Authentication for Special Configuration Combinations

Packet Type for VLAN Creation	Packet Type for VLAN Authentication	Packet Required to Trigger Authentication
any	**inet**	any IPv4 packet
any	**inet6**	any IPv6 packet
any	**dhcp-v4**	DHCP discover
any	**dhcp-v6**	DHCPv6 solicit
dhcp-v4	**inet**	DHCP discover
dhcp-v6	**inet6**	DHCPv6 solicit
inet	**dhcp-v4**	DHCP discover
inet6	**dhcp-v6**	DHCPv6 solicit

Related Documentation

- Configuring Subscriber Packet Types to Trigger VLAN Authentication on page 32

Configuring Subscriber Packet Types to Trigger VLAN Authentication

By default, VLAN authentication is triggered by any of the packet types specified with the **accept** statement in the dynamic profile that instantiates the VLAN and subscriber interfaces. For certain business cases, you may want a more generic dynamic profile that includes several packet types, but in some situations want the VLAN to be authenticated for only a subset of your customers. You can use the **packet-types** statement to specify the desired subset.

To limit triggering of VLAN authentication to a subset of accepted packet types:

- Specify one or more packet types that you want to trigger VLAN authentication.

  [edit interfaces *interface-name* auto-configure vlan-ranges authentication]
  user@host# **set packet-types [*packet-type*]**

For example, the following partial configuration shows how to specify that IP, IPv6, and PPPoE packet types trigger the creation of autoconfigured, single-tagged VLANs, but only IP and IPv6 packets trigger authentication:

1. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# **edit dynamic-profile VLAN-PROF-1**
2. Specify the VLAN ranges for the VLAN dynamic profile.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF-1]
   user@host# **set ranges any**
3. Specify the VLAN packet types accepted by the VLAN dynamic profile.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges dynamic-profile VLAN-PROF-1]
   user@host# **set accept [inet inet6 pppoe]**
4. Specify the subset of those packet types that you want to trigger VLAN authentication.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges authentication]
   user@host# **set packet-types [inet inet6]**

Related Documentation

- Configuring a Dynamic Profile Used to Create Single-Tag VLANs on page 15
- Configuring a Dynamic Profile Used to Create Stacked VLANs on page 18

Configuring VLAN Interface Username Information for AAA Authentication

You can define interface information that is included in the username that is subsequently passed to the external AAA authentication service (for example, RADIUS) when creating dynamic VLANs or stacked VLANs. The AAA authentication service uses this information to authenticate the VLAN or stacked VLAN physical interface. After the interface is authenticated, the AAA service can send the required routing instance values to the system for use in dynamically creating VLAN or stacked VLAN interfaces.

NOTE: The following example configures username information on VLANs. However, you can also configure dynamic authentication on stacked VLANs by configuring the same statements at the **[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication]** hierarchy level.

To configure VLAN interface username information:

1. Access the interface over which you want to configure username information.

   user@host# **edit interfaces ge-0/0/0**

2. Edit the auto-configure stanza.

   [edit interfaces ge-0/0/0]
   user@host# **edit auto-configure**

3. Edit the vlan-ranges stanza.

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# **edit vlan-ranges**

4. Edit the authentication stanza.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# **edit authentication**

5. Edit the username-include stanza.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# **edit username-include**

6. Specify the username statements that you want the AAA authentication service to use to authenticate the username.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges authentication username-include]
   user@host# **set delimiter**

Related Documentation

- Configuring Dynamic Authentication for VLAN Interfaces on page 28
- Using DHCP Option 82 Suboptions in Authentication Usernames for Autosense VLANs on page 33

Using DHCP Option 82 Suboptions in Authentication Usernames for Autosense VLANs

You can specify the Option 82 suboptions that are concatenated with the username during the authentication process for autosense VLANs. The option 82 value used in creating the username is based on the option 82 value that is encoded in the incoming DHCP discover packet.

You can specify either, both, or neither of the Agent Circuit ID (suboption 1) and the Agent Remote ID (suboption 2). If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If you specify that neither suboption is supplied, the raw payload of Option 82 from the PDU is concatenated to the username. The use of Option 82 suboptions is supported for DHCPv4 discover packets only.

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

Using DHCP Option 18 and Option 37 in Authentication Usernames for DHCPv6 Autosense VLANs

For DHCPv4, Option 82 has suboptions containing the ACI and ARI that are concatenated with the username during the authentication process for autosense (dynamic) VLANs. For DHCPv6, the relay agent uses Options 18 and Option 37 to convey the ACI and ARI, respectively. You can include these options in the username to generate unique usernames that identify subscribers for authentication in DHCPv6 dynamic VLANs.

A DHCPv6 Solicit message encapsulated with a Relay-Forward message header and one without the Relay-Forward message header are eligible for dynamic VLAN creation when you configure the DHCPv6 packet type for autosensing. Options 18 and Option 37 are provided in the Relay-Forward message header and are extracted only from this header and not from the options within the DHCPv6 Solicit message. In addition, if the DHCPv6 Solicit message is encapsulated in multiple Relay-Forward message headers, only the option values from the innermost Relay-Forward message header are used for username authentication. If these options are sent by the client or DHCPv6 relay agent, and if dynamic VLAN authentication is configured to use these options in the username, then the options are included in the username for authentication. If either of these options is not sent by the client or DHCPv6 relay agent, or if the dynamic VLAN authentication is not configured to use the option in the username, the username is constructed without the option.

To include Option 18 or Option 37 in the username for DHCPv6 dynamic VLANs, include the option-37 and option-18 statements at the **[edit interfaces *interface-name* auto-configure** vlan-ranges authentication username-include**]** hierarchy level. To include Options 18 or Option 37 in the username for stacked VLANs, include **option-18** and **option-37** statements at the **[edit interfaces *interface-name* auto-configure** stacked-vlan-ranges authentication username-include**]** hierarchy level.

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

CHAPTER 4

Configuring VLANs for Households or Individual Subscribers Using ACI-Based Dynamic VLANs

Agent Circuit Identifier-Based Dynamic VLANs Overview

Dynamic VLAN subscriber interfaces that are created based on agent circuit identifier (ACI) value are useful in configurations with a mix of DHCP and PPPoE subscriber sessions at the same household.

When you use service VLANs (S-VLANs) to carry one service to many subscribers (1:N), each subscriber or household can have different types of traffic on multiple VLANs. To identify all subscriber sessions for an individual subscriber or a household, you can use the value of the ACI string. Using the ACI to uniquely identify subscribers, allows you to more easily apply services, such as CoS and filters, to individual subscribers or households.

Because an S-VLAN corresponds to a service rather than an individual subscriber, the router uses ACI information in DHCP and PPPoE control packets instead of VLAN encapsulation to uniquely identify subscribers and facilitate application of subscriber-based services.

How ACI-Based Dynamic VLANs Work

Figure xx shows the process of creating an ACI-based dynamic VLAN.

1. The residential gateway at a household sends a connection request to the access node.
2. The access node identifies the household and inserts an ACI value into the header of a DHCP or PPPoE control packet. The access node can insert the ACI value into one of the following DHCP options or PPPoE control packets:
   - Option 82 of DHCP packets
   - Option 18 of DHPv6 packets
   - The DSL Forum Agent-Circuit-ID VSA [26-1] (option 0x105) of PPPoE Active Discovery Initiation (PADI) and PPPoE Active Discovery Request (PADR) control packets

   The access node inserts the same ACI value to all subsequent sessions that originate from the same household.
3. The access node forwards the control packets to the BNG.
4. When the BNG receives the control packets, it extracts the ACI value in the header and uses it to build a unique dynamic VLAN subscriber interface.

   Subsequent control traffic sent from the same household will contain the same ACI value. The BNG groups subscriber interfaces that have the same ACI value into an ACI set.

The BNG can then apply CoS and policies to the ACI set to dynamically provision traffic for a household.

Interface Hierarchy When ACI Sets Are Used

Figure xx shows the ACI interface hierarchy that is created when . . .

The following describes the components of an ACI-based dynamic VLAN configuration, from bottom to top of the interface stack:

Static Physical Interface

ACI-based dynamic VLAN configurations support the following physical interface types:

- Gigabit Ethernet
- Aggregated Ethernet

You can configure ACI-based dynamic VLAN subscriber interfaces on Modular Port Concentrators/Modular Interface Cards (MPCs/MICs) that face the access side of the network in an MX Series router.

Underlying VLAN Interface

After you define the ACI interface set, you must configure the underlying VLAN interface to enable creation of dynamic VLAN subscriber interfaces based on ACI information. You can configure the underlying VLAN interface either dynamically (with a dynamic profile) or statically.

ACI-based dynamic VLAN configurations support the following underlying VLAN interface types:

- Gigabit Ethernet
- VLAN demux (demux0)

NOTE: **When you configure an underlying VLAN interface to support creation of ACI-based dynamic VLANs, we recommend that you use this underlying interface only for subscriber interfaces that contain agent-circuit-identifier information in their DHCP or PPPoE control packets. If the router receives DHCP or PPPoE control packets without agent-circuit-identifier information on an underlying VLAN interface configured for ACI-based dynamic VLANs, the associated subscriber interfaces might not instantiate successfully.**

Dynamic ACI Interface Set

The dynamic ACI interface set groups the DHCP and PPPoE subscriber sessions that belong to a particular household and share a common unique ACI value. The router creates one ACI interface set per household.

You must create a dynamic profile to define the ACI interface set, which is represented in the profile by the Junos OS predefined dynamic variable **$junos-interface-set-name**. When a DHCP or PPPoE subscriber accesses the router on a particular interface, the router obtains the agent-circuit-identifier information from the DHCP or PPPoE control packets transmitted on that interface and dynamically creates the ACI interface set when the first subscriber from that household logs in.

ACI-Based Dynamic Subscriber Interface

You must create a dynamic profile to define either a dynamic PPPoE subscriber interface for PPPoE subscriber sessions, or a dynamic IP demultiplexer (IP demux) subscriber interface for DHCP subscriber sessions. The router creates the subscriber interface when a subscriber logs in on the associated underlying VLAN interface associated with the dynamic profile that defines the ACI interface set.

Related Documentation

- Subscriber Management VLAN Architecture Overview on page 3
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- Clearing Agent Circuit Identifier Interface Sets on page 46

Configuring Dynamic VLANs Based on Agent Circuit Identifier Information

To configure dynamic VLAN subscriber interfaces based on agent circuit identifier (ACI) information, also known as *ACI-based dynamic VLANs*, for DHCP and PPPoE subscribers. To do so, you create an *ACI interface set*, which is a logical collection of subscriber interfaces that originate at the same household or on the same access-loop port, and then reference the ACI interface set in the dynamic profile for a PPPoE or IP demultiplexing (IP demux) logical subscriber interface.

Before you begin:

1. Configure the underlying physical interface for single-tag VLANs or stacked (dual-tag) VLANs.

   See the following topics:

   - Configuring a Dynamic Profile Used to Create Stacked VLANs on page 18
   - Configuring a Dynamic Profile Used to Create Single-Tag VLANs on page 15
   - Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
   - Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20

2. Create a dynamic profile that defines the logical subscriber interface.

   See the following topics:

   - *Configuring a Basic Dynamic Profile*
   - Configuring Dynamic PPPoE Subscriber Interfaces on page 136
   - Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 67

To configure a dynamic VLAN subscriber interface based on ACI information:

1. Configure a dynamic profile that defines the dynamic ACI interface set.

   See “Defining ACI Interface Sets” on page 39.

2. (Optional) In the dynamic profile for the ACI interface set, configure the router to use the Actual-Data-Rate-Downstream VSA [26-130] or Access-Loop-Encapsulation VSA [26-144] value in PPPoE control packets to adjust CoS shaping-rate and overhead-accounting attributes at a per-household level.

   See *Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs*.

3. Dynamically or statically configure the underlying VLAN logical interface to enable dynamic subscriber interface creation based on ACI information.

   - For dynamic underlying VLAN interfaces, see “Configuring Dynamic Underlying VLAN Interfaces to Use Agent Circuit Identifier Information” on page 41.

- For static underlying VLAN interfaces, see "Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information" on page 42.

4. Associate the dynamic ACI interface set with the dynamic PPPoE or dynamic IP demux logical subscriber interface.

   See "Configuring Dynamic VLAN Subscriber Interfaces Based on Agent Circuit Identifier Information" on page 43.

5. (Optional) In the dynamic profile for the PPPoE (**pp0**) subscriber interface, configure the router to use the Actual-Data-Rate-Downstream VSA [26-130] or Access-Loop-Encapsulation VSA [26-144] value in PPPoE control packets to adjust CoS shaping-rate and overhead-accounting attributes at a per-subscriber level.

   See *Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs*.

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- *Agent Circuit Identifier-Based Dynamic VLANs Bandwidth Management Overview*
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- Clearing Agent Circuit Identifier Interface Sets on page 46

Defining ACI Interface Sets

To configure the router to create dynamic VLAN subscriber interfaces for DHCP and PPPoE subscribers based on ACI information, you must create a dynamic ACI interface set.

To configure an ACI interface set in a dynamic profile:

1. Access the dynamic profile that defines the ACI interface set.

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

2. Configure the dynamic ACI interface set.

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

   Use the **$junos-interface-set-name** predefined variable to represent the name of the ACI interface set. It is replaced with the actual ACI interface set name generated by the router when the first subscriber from that household logs in.

3. Include the underlying interfaces for the dynamic ACI interface set.

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

Use the **$junos-interface-ifd-name** predefined variable to represent the name of the interface. The variable is replaced with the name of the interface on which the subscriber accesses the BNG.

The **unit** statement is not required in the dynamic profile when you configure an ACI interface set.

4. (Optional) For dynamic PPPoE subscriber interfaces, configure the maximum number of dynamic PPPoE sessions that the router can activate for the ACI interface set; that is, for the same household.

```
[edit dynamic-profiles profile-name interfaces interface-set
  “$junos-interface-set-name”]
user@host# edit pppoe-underlying-options
[edit dynamic-profiles profile-name interfaces interface-set “$junos-interface-set-name”
  pppoe-underlying-options]
user@host# set max-sessions number
```

5. (Optional) Apply attributes for CoS and interface filters to all subscriber interfaces belonging to the ACI interface set.

The following example shows the minimum dynamic profile required to define an ACI interface set named **aci-vlan-set-profile**. It uses predefined variables to represent the interface set and the underlying physical interface.

```
[edit dynamic-profiles aci-vlan-set-profile]
interfaces {
  interface-set "$junos-interface-set-name" {
    interface "$junos-interface-ifd-name";
  }
}
```

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- Clearing Agent Circuit Identifier Interface Sets on page 46
- *Applying CoS Attributes to VLANs Using Agent-Circuit-Identifiers*
- *Example: Implementing a Filter for Households That Use ACI-Based VLANs*

Configuring Dynamic Underlying VLAN Interfaces to Use Agent Circuit Identifier Information

After you define the agent circuit identifier (ACI) interface set, you must configure the underlying VLAN interface to enable creation of dynamic VLAN subscriber interfaces based on ACI information. You can configure the underlying VLAN interface statically or dynamically.

This topic describes how to configure the underlying VLAN interface *dynamically*.

Before you begin:

- Create a dynamic profile that defines the underlying VLAN interface.

  See the following topics:

  - *Configuring a Basic Dynamic Profile*
  - Configuring a Dynamic Profile Used to Create Single-Tag VLANs on page 15
  - Configuring a Dynamic Profile Used to Create Stacked VLANs on page 18

To configure a dynamic underlying VLAN interface to use ACI information:

- In the dynamic profile for the underlying VLAN interface, associate the dynamic profile that defines the ACI interface set with the underlying VLAN interface.

  [edit dynamic-profiles *profile-name*]
  user@host# **set** interfaces ***interface-name*** unit ***logical-unit-number*** auto-configure agent-circuit-identifier dynamic-profile ***aci-interface-set-profile-name***

  For example, the following statement in a dynamic profile named aci-vlan-underlying-profile-demux associates the dynamic underlying VLAN interface with dynamic profile aci-vlan-set-profile2 that defines the ACI interface set. You must use the predefined dynamic variable **$junos-interface-ifd-name** to represent the interface name, and **$junos-interface-unit** to represent the logical unit number.

  [edit dynamic-profiles aci-vlan-underlying-profile-demux]
  user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" auto-configure agent-circuit-identifier dynamic-profile aci-vlan-set-profile2**

The following example shows the dynamic configuration that uses this statement. This configuration enables the underlying dynamic IP demultiplexing (IP demux) VLAN interface to create dynamic subscriber interfaces based on ACI information by applying a single default ACI interface set dynamic profile (aci-vlan-set-profile2) to all households on the VLAN interface.

```
[edit dynamic-profiles aci-vlan-underlying-profile-demux]
interfaces {
  "$junos-interface-ifd-name" {
    unit "$junos-interface-unit" {
      auto-configure {
        agent-circuit-identifier {
          dynamic-profile aci-vlan-set-profile2;
        }
```

```
            }
            vlan-id "$junos-vlan-id";
            demux-options {
              underlying-interface "$junos-interface-ifd-name";
            }
            family inet {
              unnumbered-address lo0.0 preferred-source-address 198.51.100.20;
            }
          }
        }
      }
```

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45

Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information

After you define the agent circuit identifier (ACI) interface set, you must configure the underlying VLAN interface to enable creation of dynamic VLAN subscriber interfaces based on ACI information. You can configure the underlying VLAN interface statically or dynamically.

This topic describes how to configure the underlying VLAN interface statically.

To configure a static underlying VLAN interface to use ACI information:

- Associate the dynamic profile that defines the ACI interface set with the static underlying VLAN interface.

  [edit]
  user@host# **set** interfaces ***interface-name*** unit ***logical-unit-number*** auto-configure agent-circuit-identifier dynamic-profile ***aci-interface-set-profile-name***

  For example, the following statement associates static Gigabit Ethernet VLAN interface ge-1/0/0.0 with the dynamic profile aci-vlan-set-profile that defines the ACI interface set.

  [edit]
  user@host# **set interfaces ge-1/0/0 unit 0 auto-configure agent-circuit-identifier dynamic-profile aci-vlan-set-profile**

The following example shows the static configuration that uses this statement. This configuration enables the underlying VLAN interface ge-1/0/0.0 to create dynamic subscriber interfaces based on ACI information by applying a single default ACI interface set dynamic profile (aci-vlan-set-profile) to all households on the VLAN interface.

```
[edit]
interfaces {
```



```
    ge-1/0/0 {
      flexible-vlan-tagging;
      unit 0 {
        vlan-id 100;
        auto-configure {
          agent-circuit-identifier {
            dynamic-profile aci-vlan-set-profile;
          }
        }
      }
    }
  }
```

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45

Configuring Dynamic VLAN Subscriber Interfaces Based on Agent Circuit Identifier Information

After you define the dynamic agent circuit identifier (ACI) interface set and enable creation of ACI-based dynamic VLAN subscriber interfaces on the underlying VLAN interface, you must complete the configuration by associating the ACI interface set with the PPPoE or IP demultiplexing (IP demux) subscriber interface in the dynamic profile for the subscriber interface.

Before you begin:

- Create a dynamic profile that defines the logical subscriber interface.

  See the following topics:

  - *Configuring a Basic Dynamic Profile*
  - Configuring Dynamic PPPoE Subscriber Interfaces on page 136
  - Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 67

To configure a dynamic VLAN subscriber interface based on ACI information:

- In the dynamic profile for the PPPoE or IP demux subscriber interface, associate the dynamic ACI interface set with the dynamic VLAN subscriber interface name (**pp0** or **demux0**) and logical unit number.

  [edit dynamic-profiles *profile-name*]
  user@host# **set interfaces interface-set $junos-interface-set-name interface *interface-name* unit $junos-interface-unit**

For example, the following statement in a dynamic profile named aci-vlan-pppoe-profile associates the dynamic ACI interface set with the dynamic **pp0** (PPPoE) logical subscriber interface. You must use the predefined dynamic variable **$junos-interface-set-name** to represent the name of the dynamic ACI interface set, and **$junos-interface-unit** to represent the logical unit number of the subscriber interface.

```
[edit dynamic-profiles aci-vlan-pppoe-profile]
user@host# set interfaces interface-set $junos-interface-set-name interface pp0 unit
  $junos-interface-unit
```

Similarly, the following statement in a dynamic profile named aci-vlan-demux-profile associates the dynamic ACI interface set (represented by **$junos-interface-set-name**) with the **demux0** (IP demux) logical subscriber interface.

```
[edit dynamic-profiles aci-vlan-demux-profile]
user@host# set interfaces interface-set $junos-interface-set-name interface demux0
  unit $junos-interface-unit
```

The following examples show the dynamic configurations that use each of these statements. The following sample configuration shows a dynamic profile named aci-vlan-pppoe-profile for an ACI-based dynamic PPPoE (**pp0**) subscriber interface for use by PPPoE subscribers.

```
[edit dynamic-profiles aci-vlan-pppoe-profile]
interfaces {
  interface-set "$junos-interface-set-name" {
    interface pp0 {
      unit "$junos-interface-unit";
    }
  }
  pp0 {
    unit "$junos-interface-unit" {
      ppp-options {
        chap;
        pap;
      }
      pppoe-options {
        underlying-interface "$junos-underlying-interface";
        server;
      }
      no-keepalives;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
}
```

The following sample configuration shows a dynamic profile named aci-vlan-demux-profile for an ACI-based dynamic IP demux(**demux0**) subscriber interface for use by DHCP subscribers.

```
[edit dynamic-profiles aci-vlan-demux-profile]
interfaces {
  interface-set "$junos-interface-set-name" {
    interface demux0 {
```



```
            unit "$junos-interface-unit";
          }
        }
        demux0 {
          unit "$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 198.51.100.202;
            }
          }
        }
      }
```

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- Clearing Agent Circuit Identifier Interface Sets on page 46

Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration

Purpose View information about dynamic agent circuit identifier (ACI) interface sets and ACI-based dynamic VLAN subscriber interfaces configured on the router.

Action

- To display the logical and physical interface associations for the classifier, rewrite rules, scheduler map objects, and CoS adjustment settings:

  `user@host>` **show class-of-service interface** ***interface-name***

- To display the CoS associations for the specified dynamic ACI interface set:

  `user@host>` **show class-of-service interface-set** ***aci-interface-set-name***

- To display information about the specified CoS traffic shaping and scheduling profile:

  `user@host>` **show class-of-service traffic-control-profile** ***profile-name***

- To display address bindings and ACI interface set information in the client table on the extended DHCP local server:

  `user@host>` **show dhcp server binding detail**

- To display status information about a specified Gigabit Ethernet interface:

  `user@host>` **show interfaces ge-*fpc/pic/port.logical-unit-number***

- To display status information about a specified IP demultiplexing (IP demux) interface:

  `user@host>` **show interfaces demux0.*logical-interface-number***

- To display information about all dynamic ACI interface sets configured on the router:

user@host> **show interfaces interface-set**

- To display session-specific information about ACI-based dynamic PPPoE subscriber interfaces:

  user@host> **show pppoe interfaces pp0.*logical-unit-number***

- To display information about PPPoE underlying interfaces, including whether creation of ACI-based dynamic VLAN subscriber interfaces is enabled on the underlying interface:

  user@host> **show pppoe underlying-interfaces *logical-interface-name* detail**

- To display information about active subscriber sessions associated with ACI interface sets:

  user@host> **show subscribers detail**

- To display information about active subscriber sessions associated with a specified ACI interface set:

  user@host> **show subscribers aci-interface-set-name *aci-interface-set-name* detail**

- To display information about active subscriber sessions that have an agent circuit identifier value containing a matching substring:

  user@host> **show subscribers agent-circuit-identifier *agent-circuit-identifier-substring* detail**

Related Documentation

- Agent Circuit Identifier-Based Dynamic VLANs Overview on page 35
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Clearing Agent Circuit Identifier Interface Sets on page 46
- CLI Explorer

Clearing Agent Circuit Identifier Interface Sets

Purpose Clear a specified dynamic agent circuit identifier (ACI) interface set configured on the router.

Action

- To clear a specified ACI interface set that that has no active members:

  user@host> **clear auto-configuration interfaces interface-set *interface-set-name***

  For example, the following command clears the ACI interface set named aci-1003-ge-1/0/0.4001:

```
user@host> clear auto-configuration interfaces interface-set aci-1003-ge-1/0/0.4001
Interface-set aci-1003-ge-1/0/0.4001 deleted
```

Meaning The router dynamically creates an ACI interface set, if configured, when the first DHCP or PPPoE subscriber from a particular household logs in. However, the router does not automatically delete the ACI interface set when the last subscriber from that household logs out. As a result, you must use the **clear auto-configuration interfaces interface-set** command to explicitly clear the ACI interface set when it no longer has any active subscriber interface members. If you attempt to clear an ACI interface that still has active member interfaces, the router displays an error message and rejects the command.

When you specify the name of the ACI interface set to be cleared, you must use the ACI interface set name internally generated by the router, and not the actual ACI string carried in DHCP and PPPoE control packets. The router uses the following format to name ACI interface sets, as shown in the ACI interface set named aci-1003-ge-1/0/0.4001:

aci-*nnnn-interface-name.logical-unit-number*

where:

- *nnnn* is a randomly generated 4-digit identifier (1003 in the example)
- *interface-name* is the name of the dynamic subscriber interface (ge-1/0/0 in the example)
- *logical-unit-number* is the logical unit number of the dynamic subscriber interface (4001 in the example)

To view the names of the ACI interface sets configured on the router, use the **show subscribers** command.

Related Documentation

- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- CLI Explorer

CHAPTER 5

High Availability for Service VLANs

Ethernet OAM Support for Service VLANs Overview

You can enable propagation of the Ethernet IEEE 802.1ag Operation, Administration, and Maintenance (OAM) state of a static single-tagged service VLAN (S-VLAN) to a dynamic or static double-tagged customer VLAN (C-VLAN) and, by extension, to the subscriber interfaces configured on the C-VLAN. The static S-VLAN logical interface must be configured on a Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet physical interface.

Propagation of the S-VLAN OAM state to associated C-VLANs ensures that when the OAM state of the S-VLAN link is down, the associated C-VLANs and all subscriber interfaces configured on the C-VLANs are brought down as well.

Ethernet OAM Support for Service VLANs Terms and Acronyms

Table 6 on page 49 defines the basic terms and acronyms used in this discussion of Ethernet OAM support for service VLANs.

Table 6: Ethernet OAM Support for Service VLANs Terms and Acronyms

Term	Definition
CFM	Connectivity fault management. Provides end-to-end monitoring of an Ethernet network that can be made up of one or more service instances. Junos OS supports Ethernet IEEE 802.1ag CFM.
Continuity check protocol	A feature of Ethernet IEEE 802.1ag CFM that provides fault detection within a maintenance association.

Table 6: Ethernet OAM Support for Service VLANs Terms and Acronyms *(continued)*

Term	Definition
C-VLAN	Customer VLAN. A dynamic or static double-tagged logical interface that has both an outer VLAN tag (corresponding to the S-VLAN) and an inner VLAN tag (corresponding to the C-VLAN). In a 1:1 subscriber network access model, dedicated C-VLANs provide a one-to-one correspondence between an individual subscriber and the VLAN encapsulation.
OAM	Operation, Administration, and Maintenance. A set of Ethernet connectivity specifications and functions providing connectivity monitoring, fault detection and notification, fault verification, fault isolation, loopback, and remote defect identification. Ethernet interfaces on MX Series routers support the IEEE 802.1ag standard for OAM.
S-VLAN	Service VLAN. A static single-tagged logical interface that has only one outer VLAN tag (corresponding to the S-VLAN). In an N:1 subscriber network access model, S-VLANs are dedicated to a particular service, such as video, voice, or data, instead of to a particular subscriber. Because an S-VLAN is typically shared by many subscribers within the same household or in different households, it provides a many-to-one correspondence between individual subscribers and the VLAN encapsulation.
VLAN	Virtual local area network. A logical group of network devices that appear to be on the same local area network, regardless of their physical location.

Components of Ethernet OAM Support for Service VLANs

Ethernet OAM support for S-VLANs involves the following components:

- Physical interface—On MX Series routers with Modular Port Concentrator/Modular Interface Card (MPC/MIC) interfaces, you can enable propagation of the S-VLAN OAM state to a C-VLAN on Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet physical interfaces.
- S-VLAN—To enable propagation of the S-VLAN Ethernet OAM state to associated C-VLANs and subscriber interfaces, configure the static single-tagged S-VLAN logical interface to run the Ethernet IEEE 802.1ag CFM continuity check protocol.
- C-VLAN—The C-VLAN is a dynamic or static double-tagged logical interface that has the same S-VLAN (outer) tag as the static single-tagged S-VLAN logical interface. If propagation of the S-VLAN OAM state to the C-VLAN is enabled on the physical interface, the router brings down the C-VLAN and its associated subscriber interfaces when the CFM continuity check protocol detects that the OAM state of the underlying S-VLAN is down.
- Subscriber interfaces—Propagation of the S-VLAN Ethernet OAM state to associated C-VLANs and subscriber interfaces applies to all dynamic or static DHCP, IP demultiplexing (IP demux), and PPPoE subscriber interfaces configured on the C-VLAN.

How Ethernet OAM Support for Service VLANs Works

To enable propagation of the Ethernet OAM state of the S-VLAN to associated C-VLANs and subscriber interfaces, use the **oam-on-svlan** statement when you configure a Gigabit Ethernet (ge), 10-Gigabit Ethernet (xe), or aggregated Ethernet (ae) physical interface.

If Ethernet IEEE 802.1ag CFM is properly configured on the S-VLAN logical interface, including the **oam-on-svlan** statement for these Ethernet interfaces causes the router to bring down both of the following when the CFM continuity check protocol detects that the OAM state of the S-VLAN logical interface is down:

- All dynamic or static double-tagged C-VLAN logical interfaces that have the same S-VLAN (outer) tag as the S-VLAN logical interface on which they are configured.
- All dynamic or static DHCP, IP demux, and PPPoE logical subscriber interfaces configured on the associated C-VLANs.

To illustrate how Ethernet OAM support for S-VLANs works, consider the following sample configuration on a Gigabit Ethernet physical interface:

- Gigabit Ethernet physical interface ge-1/0/3 configured with the **svlan-on-oam** statement.
- Static single-tagged S-VLAN logical interface ge-1/0/3.0, which has a single S-VLAN outer tag, VLAN ID 600.
- Ethernet OAM CFM protocol configured on the static S-VLAN logical interface. The CFM configuration includes an action profile with the **interface-down** default action to bring down the C-VLAN and dynamic subscriber interfaces when the continuity check protocol detects that the Ethernet OAM state of S-VLAN interface ge-1/0/3.0 is down.
- Static double-tagged C-VLAN logical interface ge-1/0/3.100, which has an S-VLAN outer tag, VLAN ID 600, and a C-VLAN inner tag, VLAN ID 1.
- Static PPPoE subscriber interfaces configured on C-VLAN interface ge-1/0/3.100.

Because the S-VLAN and C-VLAN logical interfaces in this example have the same S-VLAN outer tag (VLAN ID 600), the router brings down the C-VLAN interface and the PPPoE logical subscriber interfaces when the CFM continuity check detects that the OAM status of S-VLAN interface ge-1/0/3.0 is down.

Restrictions for Using Ethernet OAM Support for Service VLANs

Ethernet OAM support for S-VLANs is *not currently supported* for use with any of the following:

- Dynamically configured S-VLAN logical interfaces
- S-VLAN trunk interfaces
- C-VLAN trunk interfaces

Related Documentation

- Configuring Ethernet OAM Support for Service VLANs with Double-Tagged Customer VLANs on page 52

- *IEEE 802.1ag OAM Connectivity Fault Management Overview*

Configuring Ethernet OAM Support for Service VLANs with Double-Tagged Customer VLANs

You can enable propagation of the Ethernet IEEE 802.1ag Operation, Administration, and Maintenance (OAM) state of a static single-tagged service VLAN (S-VLAN) to the dynamic or static double-tagged customer VLAN (C-VLAN) that has the same S-VLAN (outer) tag as the S-VLAN, and, by extension, to subscriber interfaces configured on the C-VLAN. The static S-VLAN logical interface must be configured on a Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet physical interface.

Before you begin:

- Make sure the static single-tagged S-VLAN logical interface is configured with the Ethernet 802.1ag OAM connectivity fault management (CFM) continuity check protocol.

  See *IEEE 802.1ag OAM Connectivity Fault Management Overview*.

To enable propagation of the Ethernet OAM state of a static single-tagged S-VLAN to dynamic or static double-tagged C-VLAN logical interfaces:

- Configure a Gigabit Ethernet (ge), 10-Gigabit Ethernet (xe), or aggregated Ethernet (ae) physical interface to propagate the S-VLAN Ethernet OAM state to C-VLAN logical interfaces that have the same S-VLAN (outer) tag as the S-VLAN interface.

  ```
  [edit]
  user@host# set interfaces interface-name-fpc/pic/port oam-on-svlan
  ```

  For example, the following statement enables propagation of the Ethernet OAM state of a static single-tagged S-VLAN on Gigabit Ethernet interface ge-1/0/5 to a dynamic or static double-tagged C-VLAN logical interface with the same S-VLAN (outer) tag as the S-VLAN interface.

  ```
  [edit]
  user@host# set interfaces ge-1/0/5 oam-on-svlan
  ```

  Including the **oam-on-svlan** statement when you configure a Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet physical interface causes the router to bring down both of the following when the CFM continuity check protocol detects that the OAM state of the S-VLAN logical interface is down:

  - All dynamic or static double-tagged C-VLANs on the S-VLAN interface that have the same S-VLAN (outer) tag as the S-VLAN interface.
  - All DHCP, IP demultiplexing (IP demux), and PPPoE logical subscriber interfaces configured on the associated C-VLANs.

Example: Gigabit Ethernet Interface with Static S-VLAN, Dynamic C-VLAN, and

Dynamic PPPoE Subscriber Interfaces

The following example shows a dynamic subscriber access configuration that uses the **oam-on-svlan** statement on a Gigabit Ethernet interface. This example configures Gigabit Ethernet physical interface ge-1/0/5 with a static single-tagged S-VLAN logical interface (ge-1/0/5.1) that runs the Ethernet 802.1ag OAM CFM continuity check protocol. A dynamic profile named double-vlans creates a dynamic double-tagged C-VLAN interface, and a dynamic profile named pppoe-profile creates dynamic PPPoE subscriber interfaces on the C-VLAN interface. The **oam-on-svlan** statement for ge-1/0/5 propagates the Ethernet OAM state of S-VLAN interface ge-1/0/5.1 to the C-VLAN interface and the dynamic PPPoE subscriber interfaces.

For clarity, the configuration is divided into five steps.

1. Configure a dynamic profile named double-vlans that defines a dynamic double-tagged C-VLAN logical interface.

```
[edit]
dynamic-profiles {
  double-vlans {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
          vlan-tags outer "$junos-stacked-vlan-id" inner "$junos-vlan-id";
          encapsulation ppp-over-ether;
          pppoe-underlying-options {
            dynamic-profile pppoe-profile;
          }
        }
      }
    }
  }
}
```

2. Configure a dynamic profile named pppoe-profile that defines dynamic PPPoE subscriber interfaces on the C-VLAN.

```
[edit]
dynamic-profiles {
  pppoe-profile {
    interfaces {
      pp0 {
        unit "$junos-interface-unit" {
          pppoe-options {
            underlying-interface "$junos-underlying-interface";
            server;
          }
          family inet {
            unnumbered-address lo0.0;
          }
        }
      }
    }
  }
}
```


3. Configure Gigabit Ethernet physical interface ge-1/0/5.

```
[edit]
interfaces {
  ge-1/0/5 {
    description "connect to remote router";
    flexible-vlan-tagging;
    oam-on-svlan;
    unit 1 {
      vlan-id 1;
    }
    auto-configure {
      stacked-vlan-ranges {
        dynamic-profile double-vlans {
          accept any;
          ranges {
            any,any;
          }
        }
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 198.51.1.1/32 {
          primary;
        }
      }
    }
  }
}
```

The preceding example in Step 3 configures a static, single-tagged S-VLAN logical interface (ge-1/0/5.1) with VLAN ID 1, and references the double-vlans dynamic profile to create a dynamic double-tagged C-VLAN logical interface with S-VLAN (outer) tag **any** and C-VLAN (inner) tag **any**. The tag value **any** represents the entire range of VLAN IDs or S-VLAN IDs, including VLAN ID 1.

Because the C-VLAN outer tag (**any**) matches the S-VLAN tag VLAN ID 1, the **oam-on-svlan** statement in the configuration causes the router to propagate the Ethernet OAM state of S-VLAN ge-1/0/5.1 to the dynamic double-tagged C-VLAN logical interface (created by the double-vlans dynamic profile) and, by extension, to the dynamic PPPoE subscriber interfaces on the C-VLAN (created by the pppoe-profile dynamic profile).

4. Configure the Ethernet 802.1ag OAM CFM continuity check protocol on the static S-VLAN interface (ge-1/0/5.1).

```
[edit]
protocols {
  oam {
    ethernet {
      connectivity-fault-management {
        action-profile myDefault {
          default-actions {
```



```
                    interface-down;
                }
            }
            maintenance-domain md1 {
                level 1;
                maintenance-association ma1 {
                    continuity-check {
                        interval 1s;
                    }
                    mep 100 {
                        interface ge-1/0/5.1;
                        direction down;
                        remote-mep 101 {
                            action-profile myDefault;
                        }
                    }
                }
            }
        }
    }
}
}
```

If the CFM continuity check protocol detects that the Ethernet OAM state of S-VLAN interface ge-1/0/5.1 is down, the **interface-down** action in the myDefault action profile causes the router to bring down both of the following:

- The dynamic double-tagged C-VLAN logical interface that has the same S-VLAN (outer) tag as S-VLAN interface ge-1/0/5.1
- The dynamic PPPoE subscriber interfaces configured on the dynamic C-VLAN interface

5. Create a PPP access profile.

   For brevity, this configuration is only partially shown. The missing portions of the configuration are replaced with ellipses (...).

```
[edit]
access {
    ...
    profile ppp-authenticator {
        ...
    }
}
```

Related Documentation

- Ethernet OAM Support for Service VLANs Overview on page 49
- *IEEE 802.1ag OAM Connectivity Fault Management Overview*

PART 2

Configuring DHCP Subscriber Interfaces

CHAPTER 6

VLAN and Demux Subscriber Interfaces Overview

DHCP Subscriber Interface Overview

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 7
- Subscriber Interfaces and Demultiplexing Overview on page 60

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).

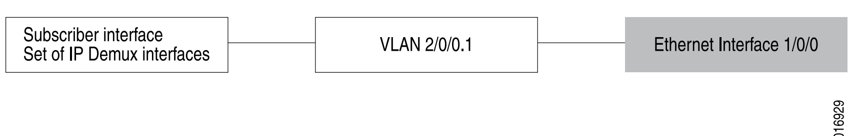
The subscriber interfaces can provide different levels of services for individual subscribers in an access network. For example, you can apply CoS parameters for each subscriber.

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 4 on page 60 shows a subscriber interface configured using a set of IP demux interfaces with an underlying VLAN interface.

Figure 4: 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:

- Hierarchical and per-unit scheduling is supported for dynamically created demux interfaces on the EQ DPC.
- IP demux interfaces support IPv4 (**family inet**) and IPv6 (**family inet6)**).
- IP 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.
- 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 a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 63
- Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces on page 64

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 67
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 69
- *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 60
- *Distribution of Demux Subscribers in an Aggregated Ethernet Interface*
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 82
- Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces on page 70
- Example: Concurrent Configuration of Dynamic DHCP IP Demux and PPPoE Demux Interfaces over the Same VLAN Demux Interface on page 107
- *Aggregated Ethernet Interfaces Overview*

CHAPTER 7

Configuring Sets of Demux Interfaces to Provide Services to a Group of Subscribers

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 {
        203.0.113.0/24;
```

```
            }
            address 203.0.113.25/24;
        }
    }
    unit 1 {
        demux-options {
            underlying-interface ge-2/0/1.1;
        }
        family inet {
            demux-source {
                203.0.133.110/24;
            }
            address 203.0.113.12/24;
        }
    }
}
```

Related Documentation

• Subscriber Interfaces and Demultiplexing Overview on page 60

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 203.0.113.201/24;
```



```
    }
  }
  unit 1 {
    vlan-id 20;
    demux-options {
      underlying-interface ge-2/0/1;
    }
    family inet {
      address 203.0.113.202/24;
    }
  }
}
```

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 60

CHAPTER 8

Configuring Dynamic Demux Interfaces That are Created by DHCP

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 60
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 120
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

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 60
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 120
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104
- Example: Dynamic IP Demux Subscriber Interfaces over Dynamic VLAN Demux Interfaces on page 70

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.

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

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 198.51.100.100/32
```

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 198.51.100.100/32**

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 198.51.100.100
```

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 198.51.100.100
```

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 198.51.100.100
```

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 198.51.100.100
```

Verification

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

- *Configuring Predefined Dynamic Variables in Dynamic Profiles*
- Dynamic 802.1Q VLAN Overview on page 6
- *Demultiplexing Interface Overview*

CHAPTER 9

Configuring DHCP Subscriber Interfaces over Aggregated Ethernet

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 78

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 7
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 81
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 85

- *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

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.

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 7 on page 80 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 7: Features Supported with Static or Dynamic Demux Subscriber Interfaces

	Static or Dynamic Demux Subscriber Interface	
Feature	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 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 60
- *Distribution of Demux Subscribers in an Aggregated Ethernet Interface*

- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 82
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 88
- *Aggregated Ethernet Interfaces Overview*

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 LACP for Aggregated Ethernet Interfaces*.
   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.

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 78
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 85
- *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 LACP for Aggregated Ethernet Interfaces*.

   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 Demultiplexing Interface*.

3. Configure the static or dynamic IP demux interface.

   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 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 88
- *Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces*

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 LACP for Aggregated Ethernet Interfaces*.

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 Demultiplexing Interface*.

3. Configure the static or dynamic VLAN demux interface.

   NOTE: VLAN demux interfaces 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 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- *Associating VLAN IDs to VLAN Demux Interfaces*

- Example: Configuring IPv4 Static VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 90
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 92

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 78
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 81
- *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 203.0.113.110/24;
                }
            }
            unit 1 {
                demux-source inet {
                family inet {
                    address 203.0.113.111/24;
                }
            }
        }
    }
```

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 203.0.113.100/16;
                address 203.0.113.0/24;
            }
        }
        unit 101 {
            demux-options {
                underlying-interface ae0.1;
            }
            family inet {
                demux-source 203.0.113.221/16;
                address 203.0.113.0/24;
            }
        }
    }
}
```

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 82

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 127.16.1.1/32;
            }
        }
    }
}
```

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 67
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

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 127.16.1.1/32;
      }
    }
  }
}
```

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 127.16.1.1;
                    }
                }
            }
        }
    }
}
```

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 69
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

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 2001:db8:174:1:1::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 2001:db8:174:1:1::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 69
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

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 127.16.1.1/32;
                }
            }
        }
    }
```

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 127.16.1.1;
          }
        }
      }
    }
  }
}
```

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 69
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

CHAPTER 10

Using Dynamic Profiles to Apply Services to DHCP Subscriber Interfaces

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

The router's DHCP support enables you to attach a dynamic profile to a DHCP subscriber interface. When a DHCP subscriber logs in, the router instantiates the specified dynamic profile and then applies the services defined in the profile to the interface.

You can attach dynamic profiles to all interfaces or you can specify a particular group of interfaces to which the profile is attached. Both the DHCP local server and the DHCP relay agent support the attachment of dynamic profiles to interfaces.

You can enable the following optional features when the dynamic profile is attached. The two options cannot be used together.

- Enable multiple DHCP subscribers to share the same VLAN logical interface. The firewall filters, CoS schedulers, and IGMP configuration of the clients are merged.
- Specify the primary dynamic profile that is instantiated when the first subscriber logs in.

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

The **aggregate-clients** statement specifies that the router merge the firewall filters, CoS schedulers, and IGMP configuration of multiple DHCP clients that are on the same VLAN logical interface (for example, multiple clients belonging to the same household). You can configure the aggregate-clients support for all interfaces or for a group of interfaces. The **aggregate-clients** statement provides the option of either merging (chaining) or replacing software components for each client.

By default, the feature is disabled and a single DHCP client is allowed per VLAN when a dynamic profile is associated with the VLAN logical interface.

When you specify the **merge** option, the router aggregates the software components for multiple subscribers as follows:

- Firewall filters—The filters are chained together using the precedence as the order of execution. If the same firewall filter is attached multiple times, the filter is executed only once.
- CoS schedulers—The different CoS schedulers are merged as if the scheduler map has multiple schedulers. The merge operation for the individual traffic-control-profiles parameters (shaping-rate, delay-buffer-rate, guaranteed-rate) preserves the maximum value for each parameter.
- IGMP configuration—The current IGMP configuration is replaced with the configuration of the newest DHCP client.

When you specify the **replace** option, the entire logical interface is replaced whenever a new client logs in to the network using the same VLAN logical interface. For example, if a customer subscribes to voice, video, and data services on the network, when a voice client logs in, instead of applying a specific voice filter for only that service, the entire voice, video, and data filter chain is applied.

NOTE: 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.

Primary Dynamic Profile

The **use-primary** option enables you to specify the primary dynamic profile that is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

This feature can conserve logical interfaces in a network where dynamic IP demux interfaces are used to represent subscribers. To conserve interfaces, make sure the primary profile that you specify does not create a demux interface, but provides the initial policies for the primary interface subscriber.

Related Documentation

- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces

This topic describes how to attach a dynamic profile to a DHCP subscriber interface or a DHCP client interface. When a DHCP subscriber or DHCP client logs in, the specified dynamic profile is instantiated and the services defined in the profile are applied to the interface.

This topic contains the following sections:

Attaching a Dynamic Profile to All DHCP Subscriber or All DHCP Client Interfaces

To attach a dynamic profile to all DHCP subscriber or all DHCP client interfaces:

1. At the DHCP configuration hierarchy, use the **dynamic-profile** statement to specify the name of the dynamic profile to attach to all interfaces.

   - For DHCP local server:

     [edit system services dhcp-local-server]
     user@host# **set dynamic-profile vod-profile-22**

   - For DHCP relay agent:

     [edit forwarding-options dhcp-relay]
     user@host# **set dynamic-profile vod-profile-west**

2. (Routers only) Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     [edit system services dhcp-local-server dynamic-profile]
     user@host# **set aggregate-clients merge**

   - To use the primary dynamic profile:

     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# **set use-primary subscriber_profile**

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces or a Group of DHCP Client Interfaces

Before you begin:

- Configure the interface group.

  See *Grouping Interfaces with Common DHCP Configurations*.

To attach a dynamic profile to a group of interfaces:

1. At the DHCP configuration hierarchy, specify the name of the interface group and the dynamic profile to attach to the group.

- For DHCP local server:

  [edit system services dhcp-local-server]
  user@host# **set group boston dynamic-profile vod-profile-42**

- For DHCP relay agent:

  [edit forwarding-options dhcp-relay]
  user@host# **set group quebec dynamic-profile vod-profile-east**

2. (Routers only) Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     [edit system services dhcp-local-server dynamic-profile]
     user@host# **set aggregate-clients merge**

   - To use the primary dynamic profile:

     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# **set use-primary subscriber_profile**

Related Documentation

- *Dynamic Profiles Overview*
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 103

CHAPTER 11

Configuring DHCP IP Demux and PPPoE Demux Interfaces Over the Same VLAN

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.

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

- Configuring a Dynamic Profile to Create Dynamic IP Demux Interfaces on page 114
- Configuring a Dynamic Profile to Create Dynamic PPPoE Interfaces on page 115

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 116
- Interface Verification on page 116

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

- *Configuring a Basic Dynamic Profile*
- *Configuring Predefined Dynamic Variables in Dynamic Profiles*
- Dynamic 802.1Q VLAN Overview on page 6
- *Demultiplexing Interface Overview*
- Configuring the PPPoE Family for an Underlying Interface on page 140

CHAPTER 12

Providing Security for DHCP Interfaces Using MAC Address Validation

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 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 8 on page 118 compares the behavior of the two modes. Dropped packets are considered to be spoofed.

Table 8: Comparison of MAC Address Validation Modes

Incoming Packet Addresses Match Trusted Address Tuple	Loose Mode Action	Strict Mode Action
• IP source address matches and • MAC source address matches	Forwards packet	Forwards packet
• IP source address matches but • MAC source address does not match	Drops packet	Drops packet
• IP source address does not match and • 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 119

Configuring MAC Address Validation for Subscriber Interfaces

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

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

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

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.

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.

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.
- (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 117

CHAPTER 13

Verifying Configuration and Status of Dynamic Subscribers

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 user@test.com default:testnet
demux0.1073741825 0x8100.1500 0x8100.2901 user@test.com default:testnet
demux0.1073741826 0x8100.1500 0x8100.2902 user@test.com default:testnet
demux0.1073741827 0x8100.1500 0x8100.2903 user@test.com default:testnet
demux0.1073741826 172.16.200.6 user@test.com default:testnet
demux0.1073741827 172.16.200.7 user@test.com default:testnet
demux0.1073741824 172.16.200.8 user@test.com default:testnet
demux0.1073741825 172.16.200.9 user@test.com default:testnet
demux0.1073741828 0x8100.1500 0x8100.2910 user@test.com default:default
demux0.1073741828 20.20.0.2 user@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: user@test.com
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Dynamic
Dynamic Profile Name: profile-vdemux-relay-23qos
MAC Address: 00:00:5e:00:53:04
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: user@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: 00:00:5e:00:53:04
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

PART 3

Configuring PPPoE Subscriber Interfaces

CHAPTER 14

Configuring Dynamic PPPoE Subscriber Interfaces

Subscriber Interfaces and PPPoE Overview

You can configure the router to dynamically create Point-to-Point Protocol over Ethernet (PPPoE) logical interfaces on statically created underlying Ethernet interfaces. The router creates the dynamic interface in response to the receipt of a PPPoE Active Discovery Request (PADR) control packet on the underlying interface. Because the router creates a dynamic PPPoE logical interface on demand when a subscriber logs in to the network, dynamic PPPoE logical interfaces are also referred to as *dynamic PPPoE subscriber interfaces*.

This overview covers the following topics:

Benefits of Using Dynamic PPPoE Subscriber Interfaces

Configuring and using dynamic PPPoE subscriber interfaces offers the following benefits:

- On-demand dynamic interface creation

  Dynamic PPPoE subscriber interfaces provides the flexibility of dynamically creating the PPPoE subscriber interface only when needed; that is, when a subscriber logs in on the associated underlying Ethernet interface. By contrast, statically created interfaces allocate and consume system resources when the interface is created. Configuring and using dynamically created interfaces helps you effectively and conveniently manage edge or access networks in which large numbers of subscribers are constantly logging in to and logging out from the network on a transient basis.

- Dynamic removal of PPPoE subscriber interfaces without manual intervention

  When the PPPoE subscriber logs out or the PPPoE session is terminated, the router dynamically deletes the associated PPPoE subscriber interface without your intervention, thereby restoring any consumed resources to the router.

- Use of dynamic profiles to efficiently manage multiple subscriber interfaces

  By using a profile, you reduce the management of a large number of interfaces by applying a set of common characteristics to multiple interfaces. When you configure a dynamic profile for PPPoE, you use predefined dynamic variables in the profile to represent information that varies from subscriber to subscriber, such as the logical unit number and underlying interface name. These variables are dynamically replaced with the values supplied by the network when the subscriber logs in.

- Denial of service (DoS) protection

  You can configure the underlying Ethernet interface with certain PPPoE-specific attributes that can reduce the potential for DoS attacks. Duplicate protection, which is disabled by default, prevents activation of another dynamic PPPoE logical interface on the underlying interface when a PPPoE logical interface for the same client is already active on the underlying interface. You can also specify the maximum number of PPPoE sessions that the router can activate on the underlying interface. By enabling duplicate protection and restricting the maximum number of PPPoE sessions on the underlying interface, you can ensure that a single toxic PPPoE client cannot monopolize allocation of the PPPoE session.

- Support for dynamic PPPoE subscriber interface creation from PPPoE service name tables

  You can assign a previously configured PPPoE dynamic profile to a named, **empty**, or **any** service entry in a PPPoE service name table, or to an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services. The router uses the attributes defined in the profile to instantiate a dynamic PPPoE subscriber interface based on the service name, ACI, and ARI information provided by the PPPoE client during PPPoE negotiation. To specify the routing instance in which to instantiate the dynamic PPPoE subscriber interface, you can assign a previously configured routing instance to a named, **empty**, or **any** service, or to an ACI/ARI pair defined for these services. The dynamic profile and routing instance configured for the PPPoE service name table overrides the dynamic profile and routing instance assigned to the PPPoE underlying interface on which the dynamic subscriber interface is created.

Supported Platforms for Dynamic PPPoE Subscriber Interfaces

Configuration of dynamic PPPoE subscriber interfaces over static underlying Ethernet interfaces is supported on MPC/MIC interfaces on MX Series 3D Universal Edge Routers.

Sequence of Operations for PPPoE Subscriber Access

When a PPPoE subscriber logs in the PPPoE protocol defines the sequence of operations by which a connection is established and traffic flow is enabled on the dynamic PPPoE subscriber interface. Similarly, when the PPPoE subscriber logs out from the network, PPPoE defines the sequence that occurs to terminate the connection and remove the dynamic PPPoE subscriber interface from the router.

The router creates a dynamic PPPoE subscriber interface for each new PPPoE session, and removes the dynamic PPPoE subscriber interface when the session is terminated due to subscriber logout, PPP negotiation failure, or down status of the underlying Ethernet interface. Dynamic PPPoE subscriber interfaces are never reused for multiple PPPoE sessions.

Sequence When a PPPoE Subscriber Logs In

In a PPPoE subscriber network, the router acts as a *remote access concentrator*, also known as a *PPPoE server*. For a PPPoE client to initiate a PPPoE session with a PPPoE server, it must first perform PPPoE Discovery to identify the Ethernet MAC address of the remote access concentrator that can service its request. Based on the network topology, there may be more than one remote access concentrator with which the client can communicate. The Discovery process enables a PPPoE client to find all remote access concentrators and then select one to connect to.

The following sequence occurs when a PPPoE subscriber logs in to the network. Steps 1 through 5 in this sequence are part of the PPPoE Discovery process.

1. The PPPoE client broadcasts a PPPoE Active Discovery Initiation (PADI) packet to all remote access concentrators in the network.
2. One or more remote access concentrators respond to the PADI packet by sending a PPPoE Active Discovery Offer (PADO) packet, indicating that they can service the client request. The PADO packet includes the name of the access concentrator from which it was sent.
3. The client sends a unicast PPPoE Active Discovery Request (PADR) packet to the access concentrator it selects.
4. On receipt of the PADR packet on the underlying interface associated with a PPPoE dynamic profile, the router uses the attributes configured in the dynamic profile to create the dynamic PPPoE logical interface.
5. The router sends a PPPoE Active Discovery Session (PADS) packet to confirm establishment of the PPPoE connection.

6. The PPP Link Control Protocol (LCP) negotiates the PPP link between the client and the PPPoE server.
7. The subscriber is authenticated using the PPP authentication protocol (CHAP or PAP) configured in the PPPoE dynamic profile.
8. The PPP Network Control Protocol (NCP) negotiates the IP routing protocol and network family.
9. The PPP server issues an IP access address for the client, and the router adds the client access route to its routing table.
10. The router instantiates the dynamic profile and applies the attributes configured in the profile to the dynamic PPPoE subscriber interface.
11. PPP NCP negotiation completes, enabling traffic flow between the PPPoE client and the PPPoE server.

Sequence When a PPPoE Subscriber Logs Out

The following sequence occurs when a PPPoE subscriber logs out of the network:

1. The client terminates the PPP connection and the router receives an LCP termination request.
2. The router removes the client access router from its routing table.
3. The router sends or receives a PPPoE Active Discovery Termination (PADT) packet to end the PPPoE connection.
4. The router deactivates the subscriber, gathers final statistics for the PPPoE session, and sends the RADIUS server an Acct-Stop accounting message.
5. The router de-instantiates the PPPoE dynamic profile and removes the PPPoE logical interface. The router does not reuse the PPPoE logical interface for future dynamic PPPoE sessions.

Related Documentation

- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Configuring PPPoE Service Name Tables on page 195

Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview

Creating a dynamic PPPoE subscriber interface over a static underlying Ethernet interface consists of two basic steps:

1. Configure a dynamic profile to define the attributes of the PPPoE logical interface.
2. Attach the dynamic profile to a statically created underlying Ethernet interface configured with PPPoE encapsulation.

This overview describes the concepts you need to understand to configure a dynamic PPPoE subscriber interface, and covers the following topics:

PPPoE Dynamic Profile Configuration

You use predefined dynamic variables in the PPPoE dynamic profile to represent information that varies from subscriber to subscriber, such as the logical unit number and underlying interface name. These variables are dynamically replaced with the values supplied by the network when the subscriber logs in. On receipt of traffic on an underlying Ethernet interface to which a dynamic profile is attached, the router creates the dynamic PPPoE logical interface, also referred to as a *dynamic PPPoE subscriber interface*, on the underlying interface and applies the properties configured in the dynamic profile.

To provide basic access for PPPoE subscribers, the dynamic profile must provide a minimal configuration for a **pp0** (PPPoE) logical interface that includes at least the following attributes:

- The logical unit number, represented by the **$junos-interface-unit** predefined dynamic variable
- The name of the underlying Ethernet interface, represented by the **$junos-underlying-interface** predefined dynamic variable
- Configuration of the router to act as a PPPoE server
- The PPP authentication protocol (PAP or CHAP)
- The unnumbered address for the **inet** (IPv4) or **inet6** (IPv6) protocol family

You can also optionally configure additional options for PPPoE subscriber access in the dynamic profile, including:

- The keepalive interval, or the option to disable sending keepalive messages
- The IPv4 or IPv6 address of the dynamic PPPoE logical interface
- The service sets and filters, input filters, and output filters to be applied to the dynamic PPPoE logical interface

PPPoE Underlying Interface Configuration

After you configure a dynamic profile to define the attributes of a dynamic PPPoE subscriber interface, you must attach the dynamic profile to the underlying Ethernet interface on which you want the router to dynamically create the PPPoE logical interface. The underlying interface for a dynamic PPPoE logical interface must be statically created and configured with PPPoE (**ppp-over-ether**) encapsulation. When a PPPoE subscriber logs in on the underlying interface, the router dynamically creates the PPPoE logical interface and applies the attributes defined in the profile to the interface.

In addition to attaching the dynamic profile to the interface, you can also configure the underlying interface with one or more of the following optional PPPoE-specific attributes:

- Prevention of another dynamic PPPoE logical interface from being activated on the underlying interface when a PPPoE logical interface for a client with the same MAC address is already active on that interface
- Maximum number of dynamic PPPoE logical interfaces (sessions) that the router can activate on the underlying interface
- An alternative access concentrator name in the AC-NAME tag in a PPPoE control packet

Address Assignment for Dynamic PPPoE Subscriber Interfaces

If the subscriber address for a dynamic PPPoE interface is not specified by means of the Framed-IP-Address (8) or Framed-Pool (88) RADIUS IETF attributes during authentication, the router allocates an IP address from the first IPv4 local address-assignment pool defined in the routing instance. For this reason, make sure that the local address assigned for the **inet** (IPv4) address family is in the same subnet as the addresses obtained from the first IPv4 local address-assignment pool.

The router allocates the IP address from the first IPv4 local address-assignment pool under either of the following conditions:

- RADIUS returns no address attributes.
- RADIUS authentication does not take place because only address allocation is requested.

If the first IPv4 local address-assignment pool has no available addresses, or if no IPv4 local address-assignment pools are configured, the router does not allocate an IP address to the dynamic PPPoE subscriber interface, and denies access to the associated subscriber. To avoid depletion of IP addresses, you can configure linked address-assignment pools on the first IPv4 local address-assignment pool to create one or more backup pools.

For more information, see *Configuring Address-Assignment Pools*.

Guidelines for Configuring Dynamic PPPoE Subscriber Interfaces

Observe the following guidelines when you configure dynamic PPPoE subscriber interfaces:

- You can configure dynamic PPPoE subscriber interfaces for the **inet** (IPv4) and **inet6** (IPv6) protocol families.
- When you configure the **pp0** (PPPoE) logical interface in a PPPoE dynamic profile, you must include the **pppoe-options** subhierarchy at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit”]** hierarchy level. At a minimum, the **pppoe-options** subhierarchy must include the name of the underlying Ethernet interface, represented by the **$junos-underlying-interface** predefined dynamic variable, and the **server** statement, which configures the router to act as a PPPoE server. If you omit the **pppoe-options** subhierarchy from the configuration, the **commit** operation fails.
- When you configure CHAP or PAP authentication in a PPPoE dynamic profile, you cannot configure additional options for the **chap** or **pap** statements. This is because the router supports only unidirectional authentication for dynamic interfaces; that is, the router always functions as the authenticator.
- When you attach the PPPoE dynamic profile to an underlying Ethernet interface, ensure that both of the following conditions are met:
  - The PPPoE dynamic profile has already been configured on the router.
  - The underlying Ethernet interface has already been statically configured on the router with PPPoE (**ppp-over-ether**) encapsulation.
- You cannot attach a PPPoE dynamic profile to an underlying Ethernet interface that is already associated with static PPPoE logical interfaces. Conversely, you cannot associate static PPPoE logical interfaces with an underlying Ethernet interface that already has a PPPoE dynamic profile attached.

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 129
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 142
- Understanding PPPoE Service Name Tables on page 188

Configuring Dynamic PPPoE Subscriber Interfaces

To enable the router to create a dynamic PPPoE subscriber interface on a PPPoE underlying interface, you define the attributes of the PPPoE logical interface in a dynamic profile, and then configure the underlying interface to use the dynamic profile.

To configure a dynamic PPPoE subscriber interface:

1. Configure a dynamic profile to define the attributes of the PPPoE logical interface.

   See "Configuring a PPPoE Dynamic Profile" on page 136.
2. Configure the underlying Ethernet interface to use the dynamic profile for PPPoE.

   See "Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces" on page 139.
3. (Optional) Assign a dynamic profile and routing instance to a service name or ACI/ARI pair in a PPPoE service name table to instantiate a dynamic PPPoE subscriber interface based on the information provided by the PPPoE client.

   See "Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation" on page 201.
4. (Optional) Verify the dynamic PPPoE configuration by displaying or clearing PPPoE session statistics, and displaying information about the underlying Ethernet interface and PPPoE logical interface.

   See "Verifying and Managing Dynamic PPPoE Configuration" on page 217.

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 129
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 142
- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 207

Configuring a PPPoE Dynamic Profile

You can configure a basic dynamic profile for PPPoE subscribers that defines the attributes of the dynamic PPPoE logical subscriber interface (pp0).

To configure a basic PPPoE dynamic profile:

1. Name the dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profiles basic-pppoe-profile
   ```
2. Specify that you want to configure the **pp0** logical interface in the dynamic profile.


```
[edit dynamic-profiles basic-pppoe-profile]
user@host# edit interfaces pp0
```

3. Specify **$junos-interface-unit** as the predefined variable to represent the logical unit number for the **pp0** interface.

   The **$junos-interface-unit** variable is replaced with the actual unit number supplied by the network when the subscriber logs in.

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

4. Configure PPPoE-specific options for the **pp0** interface.

   a. Specify the **$junos-underlying-interface** predefined variable to represent the name of the underlying Ethernet interface on which the router creates the dynamic PPPoE logical interface.

      The **$junos-underlying-interface** variable is replaced with the actual name of the underlying interface supplied by the network when the subscriber logs in.

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

   b. Configure the router to act as a PPPoE server, also known as a remote access concentrator.

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

5. Configure the PPP authentication protocol for the **pp0** interface.

   For dynamic interfaces, the router supports only unidirectional authentication; that is, the router always functions as the authenticator. When you configure PPP authentication in a dynamic profile, the **chap** and **pap** statements do not support any additional configuration options.

   - To configure CHAP authentication:

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

   - To configure PAP authentication:

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

6. Modify the keepalive interval, or configure the router to disable sending keepalive messages.

   - To modify the keepalive interval:

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

   - To disable sending keepalive messages:

```
[edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit
  "$junos-interface-unit"]
user@host# set no-keepalives
```

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

   a. Specify that you want to configure the **inet** (IPv4) or **inet6** (IPv6) protocol family.

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

   b. Specify the IPv4 or IPv6 address of the dynamic PPPoE logical interface.

   ```
   [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"
     family inet]
   user@host# set address 6.6.6.7/32
   ```

   c. Configure the unnumbered address for the protocol family.

   ```
   [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"
     family inet]
   user@host# set unnumbered-address lo0.0
   ```

   d. Specify the input and output service sets that you want to apply to the dynamic PPPoE logical interface.

   ```
   [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"
     family inet]
   user@host# set service input service-set inputService_100
   user@host# set service input post-service-filter postService_20
   user@host# set service output service-set outputService_200
   ```

   e. Specify the input and output filters that you want to apply to the dynamic PPPoE logical interface.

   To control the order in which filters are processed, you can optionally specify a precedence value for the input filter, output filter, or both.

   ```
   [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"
     family inet]
   user@host# set filter input pppoe-input-filter
   user@host# set filter output pppoe-output-filter precedence 50
   ```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 129
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 142
- Verifying and Managing Dynamic PPPoE Configuration on page 217

Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces

After you configure a dynamic profile to define the attributes of a dynamic PPPoE subscriber interface, you must attach the dynamic profile to a statically created underlying Ethernet interface.

Before you begin:

1. Configure the static underlying Ethernet interface on which you want the router to dynamically create the PPPoE logical interface.

   For information about configuring static Ethernet interfaces, see *Configuring Ethernet Physical Interface Properties*.

2. Configure a PPPoE dynamic profile.

   - See "Configuring a PPPoE Dynamic Profile" on page 136.

To configure an underlying Ethernet interface for a dynamic PPPoE subscriber interface:

1. Specify the name and logical unit number of the static underlying Ethernet interface to which you want to attach the PPPoE dynamic profile.

```
[edit]
user@host# edit interfaces ge-1/0/1 unit 0
```

2. Configure PPPoE encapsulation on the underlying interface.

```
[edit interfaces ge-1/0/1 unit 0]
user@host# set encapsulation ppp-over-ether
```

3. Specify that you want to configure PPPoE-specific options on the underlying interface.

```
[edit interfaces ge-1/0/1 unit 0]
user@host# edit pppoe-underlying-options
```

4. Attach a previously configured PPPoE dynamic profile to the underlying interface.

   You cannot attach a PPPoE dynamic profile to an underlying Ethernet interface that is already associated with static PPPoE logical interfaces. Conversely, you cannot associate static PPPoE logical interfaces with an underlying Ethernet interface that already has a PPPoE dynamic profile attached.

```
[edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
user@host# set dynamic-profile basic-pppoe-profile
```

5. (Optional) Enable duplicate protection to prevent another dynamic PPPoE logical interface from being activated on the underlying interface when a PPPoE logical interface for a client with the same MAC address is already active on that interface.

```
[edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
user@host# set duplicate-protection
```

6. (Optional) Specify the alternative name for the access concentrator, also known as the PPPoE server, in the AC-NAME tag in a PPPoE control packet

```
[edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
user@host# set access-concentrator server-east
```


Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 129
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 142
- *Configuring Ethernet Physical Interface Properties*

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.

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) 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***

Related Documentation

- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

- Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 145
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 151
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Dynamic Underlying VLAN Demux Interface over Aggregated Ethernet on page 156

Ignoring DSL Forum VSAs from Directly Connected Devices

When CPE devices are directly connected to a BNG, you may want the router to ignore any DSL Forum VSAs that it receives in PPPoE control packets because the VSAs can be spoofed by malicious subscribers. Spoofing is particularly serious when the targeted VSAs are used to authenticate the subscriber, such as Agent-Circuit-Id [26-1] and Agent-Remote-ID [26-2]. You can include the **direct-connect** statement to ignore DSL Forum VSAs on static or dynamic PPPoE interfaces or PPPoE underlying interfaces.

To configure the router to ignore DSL Forum VSAs on specific PPPoE interfaces:

1. Specify that you want to configure PPPoE-specific options on the interface:

   - For a PPPoE family in a dynamic profile for a VLAN demultiplexing (demux) logical interface:

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

   - For a PPPoE family in a dynamic profile:

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

   - For a PPPoE underlying interface in a dynamic profile:

     [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]
     user@host# **edit pppoe-underlying-options**

   - For a PPPoE family on an underlying interface:

     [edit interfaces *interface-name* unit *logical-unit-number*]
     user@host# **edit family pppoe**

   - For an underlying interface with PPPoE encapsulation:

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

2. Specify that the router ignores DSL forum VSAs received on a specific interface.

   [edit ... family pppoe]
   user@host# **set direct-connect**

   or

   [edit ... pppoe-underlying-options]
   user@host# **set direct-connect**

Related Documentation

- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140

Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface

This example shows how to configure a dynamic PPPoE subscriber interface on a statically configured Gigabit Ethernet VLAN underlying interface. When a PPPoE subscriber logs in on the underlying interface, the router creates the dynamic PPPoE subscriber interface with the attributes specified in the dynamic profile.

In this example, the dynamic PPPoE profile, **pppoe-profile-east**, defines options for PPPoE subscribers accessing the network, and includes the predefined dynamic variables **$junos-interface-unit**, which represents the logical unit number of the dynamic PPPoE logical interface, and **$junos-underlying-interface**, which represents the name of the underlying Ethernet interface. The **pppoe-profile-east** dynamic profile is assigned to the underlying Ethernet VLAN interface **ge-2/0/3.1** that is configured with PPPoE (**ppp-over-ether**) encapsulation.

When the router dynamically creates the PPPoE subscriber interface on **ge-2/0/3.1** in response to a subscriber login, the values of **$junos-interface-unit** and **$junos-underlying-interface** are dynamically replaced with the actual logical unit number and interface name, respectively, that are supplied by the network when the PPPoE subscriber logs in.

To configure a dynamic PPPoE subscriber interface:

1. Configure a dynamic profile to define the attributes of the dynamic PPPoE subscriber interface.

```
[edit]
dynamic-profiles {
  pppoe-profile-east {
    interfaces {
      pp0 {
        unit "$junos-interface-unit" {
          ppp-options {
            chap;
          }
          pppoe-options {
            underlying-interface "$junos-underlying-interface";
            server;
          }
          keepalives interval 30;
          family inet {
            filter {
              input pppoe-input-filter-east;
              output pppoe-output-filter-east precedence 20;
            }
            service {
```

```
                input {
                  service-set inputService-east;
                  post-service-filter postService-east;
                }
                output {
                  service-set outputService-east;
                }
              }
              address 6.6.6.1/32;
              unnumbered-address lo0.0;
            }
          }
        }
      }
    }
  }
```

2. Assign the dynamic PPPoE profile to the static underlying Ethernet interface, and define PPPoE-specific attributes for the underlying interface.

```
[edit]
interfaces {
  ge-2/0/3 {
    vlan-tagging;
    unit 1 {
      encapsulation ppp-over-ether;
      vlan-id 100;
      pppoe-underlying-options {
        access-concentrator server-east;
        duplicate-protection;
        dynamic-profile pppoe-profile-east;
        max-sessions 10;
      }
    }
  }
}
```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 129
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139

CHAPTER 15

Configuring PPPoE Subscriber Interfaces over Aggregated Ethernet Examples

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

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 148
- Verifying the demux0 Interface Configuration on page 149
- Verifying the pp0 Interface Configuration on page 150

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: 00:00:5e:00:53:d0, Hardware address: 00:00:5e:00:53:d0
  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: 00:00:5e:00:53:34,
      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 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Configuring the PPPoE Family for an Underlying Interface on page 140

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

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 154
- Verifying the demux0 Interface Configuration on page 155

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: 00:00:5e:00:53:d0, Hardware address: 00:00:5e:00:53:d0
  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 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 69
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Configuring a PPPoE Dynamic Profile on page 136

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 156
- Overview on page 156
- Configuration on page 157
- Verification on page 162

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 162

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: 00:00:5e:00:53:d0, Hardware address: 00:00:5e:00:53:d0
  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 60
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 79
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 69

- Configuring the PPPoE Family for an Underlying Interface on page 140
- Configuring a PPPoE Dynamic Profile on page 136

CHAPTER 16

Configuring PPPoE Session Limits

PPPoE Maximum Session Limit Overview

The maximum session limit for PPPoE subscriber interfaces specifies the maximum number of concurrent static or dynamic PPPoE logical interfaces (sessions) that the router can activate on the PPPoE underlying interface, or the maximum number of active static or dynamic PPPoE sessions that the router can establish with a particular service entry in a PPPoE service name table.

You can configure the PPPoE maximum session limit in one of two ways:

- On a per-interface basis.
- (Default) On a per-subscriber basis.

This overview describes the concepts you need to understand to configure the PPPoE maximum session limit, and covers the following topics:

Per-Interface Configuration for PPPoE Maximum Session Limit Using the CLI

When you configure the PPPoE maximum session limit for a particular interface, you can use the **max-sessions** statement to specify either or both of the following:

- The maximum number of concurrent PPPoE sessions that the router can activate on the PPPoE underlying interface
- The maximum number of active PPPoE sessions using either static or dynamic PPPoE interfaces that the router can establish with a particular named service entry, **empty** service entry, or **any** service entry in a PPPoE service name table

You can configure the PPPoE maximum session value from 1 through the platform-specific default for your router. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform. If the number of active PPPoE sessions exceeds the value configured, the router prohibits creation of any new PPPoE sessions, and the PPPoE application on the router returns a PPPoE Active Discovery Session (PADS) packet with an error to the PPPoE client.

Changing the PPPoE maximum session value has no effect on dynamic PPPoE subscriber interfaces that are already active.

Per-Subscriber Configuration for PPPoE Maximum Session Limit Using RADIUS

To configure the PPPoE maximum session limit for a particular subscriber, you can use the value returned by the RADIUS server in the Max-Clients-Per-Interface Juniper Networks VSA [26-143] during the subscriber authentication process. For PPPoE clients, the Max-Clients-Per-Interface VSA returns the maximum number of sessions (PPPoE subinterfaces) per PPPoE major interface.

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.

If you configure multiple subscribers on the same PPPoE underlying VLAN interface and RADIUS returns a different PPPoE maximum session value for each subscriber, the router uses the most recent PPPoE maximum session value returned by RADIUS to determine whether to override the current PPPoE maximum session value and create the new PPPoE session.

The following sequence describes how the router obtains the PPPoE maximum session value from RADIUS when a PPPoE subscriber logs in to initiate a session with the router. (In a PPPoE subscriber network, the router functions as a *remote access concentrator*, also known as a *PPPoE server*.)

1. The PPPoE client and the router participate in the PPPoE Discovery process to establish the PPPoE connection.
2. The PPP Link Control Protocol (LCP) negotiates the PPP link between the client and the router.
3. The PPP application sends the subscriber authentication request to the AAA application.
4. AAA sends the authentication request to an external RADIUS server.
5. The RADIUS server returns the PPPoE maximum session value for that subscriber to AAA in the Max-Clients-Per-Interface VSA as part of an Access-Accept message.

   NOTE: **The RADIUS server does not return the Max-Clients-Per-Interface VSA in Change of Authorization Request (CoA-Request) messages.**

6. AAA passes the response from RADIUS to PPP.

7. PPP validates the subscriber parameters and, if authentication succeeds, passes the PPPoE maximum session value returned by RADIUS to the PPPoE application.
8. PPPoE uses the maximum session value returned by RADIUS to determine whether to override the current PPPoE maximum session value and create or tear down the new PPPoE session.

Override of PPPoE Maximum Session Limit from RADIUS

You can configure the router to ignore (clear) the PPPoE maximum session value returned by the RADIUS server in the Max-Clients-Per-Interface VSA. Configuring the router to ignore the VSA restores the PPPoE maximum session value on the underlying interface to the value configured in the CLI.

Related Documentation

- Guidelines for Using PPPoE Maximum Session Limit from RADIUS on page 167
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- Limiting the Maximum Number of PPPoE Sessions on the Underlying Interface on page 168
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Guidelines for Using PPPoE Maximum Session Limit from RADIUS

Consider the following guidelines when you use the PPPoE maximum session value returned by RADIUS in the Max-Clients-Per-Interface vendor-specific attribute (VSA) [26-143]:

- If the current number of sessions (including newly created sessions) is *less than* the new PPPoE maximum session value returned by RADIUS, the PPPoE application overrides the current value and enables interface creation to proceed.
- If the current number of sessions (including newly created sessions) is *equal to* the new PPPoE maximum session value returned by RADIUS, the PPPoE application overrides the current value and enables interface creation to proceed.
- If the current number of sessions (including newly created sessions) is *greater than* the new PPPoE maximum session value returned by RADIUS, the PPPoE application overrides the current value and brings down the new interface.

To illustrate these guidelines, Table 9 on page 168 shows examples of how the router handles the PPPoE session when the current number of sessions is less than (first row), equal to (second row), and greater than (third row) the new PPPoE maximum session value returned by RADIUS when a new subscriber logs in.

Table 9: Sample PPPoE Maximum Session Values During Subscriber Login

New PPPoE Maximum Session Value from RADIUS	Current PPPoE Maximum Session Value	Existing Number of PPPoE Sessions	New PPPoE Maximum Session Value	New Number of PPPoE Sessions	Status of Session
10	5	4	10	5	PPPoE session up
5	5	4	5	5	PPPoE session up
3	5	4	3	4	PPPoE session down

Related Documentation

- PPPoE Maximum Session Limit Overview on page 165
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- Limiting the Maximum Number of PPPoE Sessions on the Underlying Interface on page 168
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Limiting the Maximum Number of PPPoE Sessions on the Underlying Interface

You can limit the number of concurrent static or dynamic PPPoE logical interfaces (sessions) that the router can activate on the PPPoE underlying interface, or the number of active static or dynamic PPPoE sessions that the router can establish with a particular service entry in a PPPoE service name table.

To configure the PPPoE maximum session limit:

1. Specify that you want to configure PPPoE-specific options on the underlying interface:
   - For a PPPoE family in a dynamic profile for a VLAN demultiplexing (demux) logical interface:

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

   - For a PPPoE family in a dynamic profile:

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

   - For a PPPoE underlying interface in a dynamic profile:

     [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]
     user@host# **edit pppoe-underlying-options**

   - For a PPPoE family on an underlying interface:

[edit interfaces *interface-name* unit *logical-unit-number*]
user@host# **edit** family **pppoe**

- For an underlying interface with PPPoE encapsulation:

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

- For an underlying interface established with a particular service entry in a PPPoE service name table:

  [edit protocols pppoe service-name-tables *table-name*]
  user@host# **edit** service ***service-name***

2. 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 to the platform-specific default for your router, use the **max-sessions** statement:

     [edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]
     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.

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

   [edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]
   user@host# **set** max-sessions-vsa-ignore

NOTE: You can issue the **max-sessions-vsa-ignore** statement at the same hierarchy levels as the **max-sessions** statement, with the exception of the **[edit protocols pppoe service-name-tables *table-name* service *service-name*]** hierarchy level.

Related Documentation

- PPPoE Maximum Session Limit Overview on page 165
- Guidelines for Using PPPoE Maximum Session Limit from RADIUS on page 167
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

CHAPTER 17

Configuring PPPoE Subscriber Session Lockout

PPPoE Subscriber Session Lockout Overview

PPPoE subscriber session lockout, also called *PPPoE encapsulation type lockout*, temporarily prevents (locks out) a failed or short-lived static or dynamic PPPoE subscriber session from reconnecting for a certain period of time. This time period, known as the *lockout period*, is derived from a formula and increases exponentially based on the number of successive reconnection failures.

You can configure PPPoE subscriber session lockout, also known as *short-cycle protection*, for VLAN, VLAN demultiplexing (demux), and PPP-over-Ethernet-over-ATM (PPPoE-over-ATM) dynamic subscriber interfaces.

This overview describes the concepts you need to understand to configure PPPoE subscriber session lockout, and covers the following topics:

Benefits of Using PPPoE Subscriber Session Lockout

PPPoE subscriber session lockout provides the following benefits:

- Reduces excessive loading on the router by:
  - Reducing the resources required to process PPPoE control packets to negotiate and terminate short-lived connections
  - Reducing the resources required to allocate and deallocate services, such as class of service (CoS) and firewall filters, for failed or short-lived subscriber sessions
  - Temporarily deferring failed or short-lived subscriber sessions in favor of sessions that can complete successfully.
- Reduces excessive loading on external authentication, authorization, and accounting (AAA) servers, such as RADIUS or Diameter:
  - As a result of failed or short-lived PPPoE subscriber sessions that occur repeatedly for the same subscriber
  - By reducing the resources required to authenticate and terminate these connections
- Enables lockout of a single failed or short-lived PPP session without disrupting other PPP sessions on the same PPPoE underlying interface

  Because PPPoE subscriber session lockout identifies each subscriber session by either its unique media access control (MAC) source address on the underlying interface or by its agent circuit identifier (ACI) value, the router can lock out only the offending PPP session while enabling other PPP sessions on the same underlying interface to successfully negotiate the connection.

Conditions That Cause Short-Lived PPPoE Subscriber Sessions

Conditions that can cause a short-lived subscriber session include:

- Authentication denials from external AAA servers, such as RADIUS, due to the absence of a corresponding entry in the RADIUS database or due to improper login attempts
- Configuration errors within a dynamic profile or RADIUS record
- Insufficient memory resources to create a dynamic PPPoE subscriber interface
- Protocol failure or error within the dynamic PPPoE subscriber interface
- Client logout shortly after a successful login; this action creates a complete dynamic PPPoE subscriber interface before the interface is torn down

How PPPoE Subscriber Session Lockout Works

PPPoE subscriber session lockout is disabled on the router by default. When you enable PPPoE subscriber session lockout, the router does the following:

1. Detects a short-lived subscriber session, also referred to as a *short-cycle event*.

   A short-lived subscriber session is detected, partially or completely created, and terminated by the router within 150 seconds. The router identifies each PPPoE subscriber session by its unique MAC source address on the PPPoE underlying interface or by its ACI value.

2. Tracks the time between repeated short-cycle events to determine whether to increase the lockout time for a subsequent short-cycle event.
3. Applies a time penalty for each short-cycle event based on a default or configured lockout period and the number of consecutive short-cycle events that occur repeatedly for the same subscriber.
4. Temporarily locks out the specified PPPoE subscriber by preventing connection to the router.

   During lockout, the router drops negotiation packets for the PPPoE subscriber session until the lockout period expires. When the lockout period expires, the PPPoE subscriber session and its associated MAC source address or ACI value resume normal negotiation of the connection.

PPPoE Subscriber Session Lockout on ACI-Based Interfaces

By default, the router identifies a subscriber session using the unique MAC source address on the PPPoE underlying interface. You can configure subscriber session lockout based on the ACI string of the underlying interface, which allows you to lock out all PPPoE subscriber sessions from the same household.

The ACI string is contained in the DSL Forum Agent-Circuit-ID VSA [26-1] (option 0x105) of PPPoE Active Discovery Initiation (PADI) and PPPoE Active Discovery Request (PADR) control packets. This option locks out all PPPoE subscriber sessions on the underlying interface that share the same ACI string in their PPPoE PADI and PADR control packets.

PPPoE subscriber session lockout based on the ACI value is useful when MAC source addresses are not unique on the PPPoE underlying interface. For example:

- PPPoE interworking function sessions in which the MAC addresses of all PPPoE inter-working function sessions contain the MAC address of the DSLAM device
- Configurations in which the access node (usually a DSLAM device) overwrites the MAC source address in PPPoE packets received from the customer premises equipment (CPE) with its own MAC address for security purposes
- Duplicate MAC source addresses across disparate households in an N:1 (service VLAN) configuration, which requires the router to use a combination of the MAC source address and the ACI value to uniquely identify a subscriber

PPPoE Subscriber Session Lockout and Duplicate Protection

Duplicate protection, which is disabled on the router by default, prevents the activation of another PPPoE subscriber session on the same PPPoE underlying interface when a PPPoE subscriber session with the same media access control (MAC) address is already active on that interface. When you configure PPPoE subscriber session lockout, we recommend that you enable duplicate protection to ensure that the MAC source address for each active PPPoE session is unique on the underlying interface.

With PPPoE subscriber session lockout configured, the router identifies subscriber sessions by their unique MAC source address. If the router detects a short-lived (short-cycle) subscriber session, it applies the default or configured lockout period to that MAC source address to temporarily prevent reconnection. If the MAC source address is not unique on the underlying interface, multiple PPPoE subscriber sessions with the same MAC source address might also be affected by the lockout.

Persistence of the Lockout Condition After Automatic Removal of Dynamic Subscriber VLANs

You can configure automatic removal of subscriber VLANs that have no PPPoE client sessions by issuing the **remove-when-no-subscribers** statement at the **[edit interfaces *interface-name* auto-configure]** hierarchy level. If PPPoE subscriber session lockout is also configured on the interface, the lockout condition persists even after the router has removed the dynamic VLAN or VLAN demux subscriber interface.

When you configure both PPPoE subscriber session lockout and automatic removal of subscriber VLANs with no client sessions, the lockout condition for the affected subscriber sessions persists until the lockout timer expires for each PPPoE client undergoing lockout on the underlying interface. If you create the VLAN or VLAN demux subscriber interface again before all timers expire, the lockout condition persists for the newly created subscriber interface.

Use of Encapsulation Type Identifiers to Clear or Display the Lockout Condition

You can clear the lockout condition for a specific MAC source address or ACI value, all MAC source addresses or ACI values, or for an ACI value that matches a UNIX-based regular expression by specifying VLAN or ATM encapsulation type identifier options in the **clear pppoe lockout vlan-identifier** or **clear pppoe lockout atm-identifier** command, respectively. Similarly, you can display information about the lockout condition and the status of affected subscriber sessions by including encapsulation type identifier options in the **show pppoe lockout vlan-identifier** or **show pppoe lockout atm-identifier** command. Specifying encapsulation type lockout identifiers enables you to clear or display the lockout condition when no underlying interface exists for the subscriber session.

For the VLAN encapsulation type on VLAN and VLAN demux subscriber interfaces, the identifier options include:

- Device name (physical interface or aggregated Ethernet bundle)
- S-VLAN ID (outer tag)
- VLAN ID (inner tag)

For the ATM encapsulation type on PPPoE-over-ATM subscriber interfaces, the identifier options include:

- Device name (physical interface or aggregated Ethernet bundle)
- Virtual path identifier (VPI)
- Virtual circuit identifier (VCI)

Termination of the Lockout Condition

When a PPPoE subscriber session identified by either an ACI value or a unique MAC source address is undergoing lockout, the lockout condition persists until all lockout timers have expired, *except* when either of the following occurs:

- You administratively clear the lockout condition by issuing the **clear pppoe lockout** operational command.
- You reset the interface module on which the subscriber session undergoing lockout is configured.

When you clear the lockout condition or reset the interface module, the router terminates lockout for all PPPoE subscriber sessions on the underlying interface, and clears the lockout history for all affected subscriber sessions.

Related Documentation

- Understanding the Lockout Period for PPPoE Subscriber Session Lockout on page 175
- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Understanding the Lockout Period for PPPoE Subscriber Session Lockout

When you configure PPPoE subscriber session lockout, the router applies a time penalty called the *lockout period* for each failed or short-lived subscriber session.

This overview describes how the router determines and applies the PPPoE subscriber session lockout period, and covers the following topics:

- Duration of PPPoE Subscriber Session Lockout Period on page 175
- How the Router Determines the PPPoE Subscriber Session Lockout Period on page 176

Duration of PPPoE Subscriber Session Lockout Period

The duration of the lockout period is based on a default or configured lockout time and the number of consecutive short-cycle (short-lived) events that occur repeatedly for the same subscriber. When you include the **short-cycle-protection** statement to configure PPPoE subscriber session lockout on a PPPoE underlying interface, you can use the default lockout time range of 1 through 300 seconds (5 minutes), or you can override the default lockout period by configuring a nondefault lockout time in the range 1 through 86,400 seconds (24 hours).

The lockout time penalty applied by the router for each short-cycle event differs depending on the event. For example, some short-cycle events represent normal subscriber behavior, such as a PPPoE subscriber logging in once per hour to check e-mail and logging out shortly thereafter. The router does not noticeably penalize a subscriber for these types of events.

By contrast, other short-cycle events are the result of repeated attempts to log in to the router for reasons such as an incorrectly typed password, customer premises equipment (CPE) that performs repeated auto-retries, or malicious attempts to access the Internet illegally. For these types of short-cycle events, the router applies a lockout time penalty that starts with a short time interval and increases exponentially. In these instances, the initial lockout time is short enough to avoid noticeably penalizing a subscriber who, for example, types a password incorrectly several times before entering the correct one.

For example, using the default lockout time range of 1 through 300 seconds, the increasing lockout period on the router is: 1 second, 2 seconds, 4 seconds, 8 seconds, 16 seconds, 32 seconds, 64 seconds, 128 seconds, 256 seconds, and finally, 300 seconds (5 minutes).

How the Router Determines the PPPoE Subscriber Session Lockout Period

The router uses the following rules to determine the PPPoE subscriber session lockout period for short-lived PPPoE subscriber sessions:

- The lockout period is derived from the following formula:

  (minimum lockout time) * (2 ^ *n*-1)

  where *n* represents the number of consecutive short-cycle events for the same subscriber. The router identifies a PPPoE subscriber session by its MAC source address, which should be unique on the underlying PPPoE interface, or ACI value.

- The router increments the value of *n* when the time between short-cycle events is either within 15 minutes or the maximum lockout time, whichever is greater.

- When the time between short-cycle events is greater than either 15 minutes or the maximum lockout time, the value of *n* reverts to 1. This condition is referred to as a *lockout grace period*.

- The lockout period never exceeds the maximum configured lockout time.

  For example, for a configured (nondefault) lockout time in the range 20 through 120 seconds, the increasing lockout period on the router is: 20 seconds, 40 seconds, 80 seconds, and finally, 120 seconds (2 minutes).

- A *short-cycle event* is detected, partially or completely created, and terminated by the router within 150 seconds. The router tracks the time between short-cycle events to determine whether to increase the lockout time for a subsequent short-cycle event for the same subscriber.

NOTE: When the calculated lockout time is equal to or exceeds the maximum lockout time, the router uses the maximum lockout time value until the time to the next short-cycle event exceeds the greater of 15 minutes or the maximum lockout time value. At that point, the lockout time reverts to the minimum lockout time value.

- The minimum lockout time value cannot exceed the maximum lockout time value.

  When the minimum and maximum lockout time values are equal, the lockout time becomes fixed at that value.

Related Documentation

- PPPoE Subscriber Session Lockout Overview on page 171
- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Configuring Lockout of PPPoE Subscriber Sessions

You can configure the router to temporarily lock out a failed or short-lived PPPoE subscriber session from reconnecting for a period of time. The PPPoE subscriber session can reside on a VLAN, VLAN demux, or PPPoE-over-ATM underlying interface.

Before you begin:

- Configure the PPPoE underlying interface.

  To configure the underlying interface for use with a PPPoE dynamic profile, see "Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces" on page 139.

  To configure the PPPoE family for an underlying interface, see "Configuring the PPPoE Family for an Underlying Interface" on page 140.

To configure temporary lockout of PPPoE subscriber sessions:

1. Specify that you want to configure PPPoE-specific options on the underlying interface:
   - For a PPPoE family in a dynamic profile for a VLAN demultiplexing (demux) logical interface:

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

   - For a PPPoE family in a dynamic profile:

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

- For a PPPoE underlying interface in a dynamic profile:

  [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]
  user@host# **edit** pppoe-underlying-options

- For a PPPoE family on an underlying interface:

  [edit interfaces *interface-name* unit *logical-unit-number*]
  user@host# **edit** family **pppoe**

- For an underlying interface with PPPoE encapsulation:

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

- For a PPPoE family in a dynamic profile for a PPPoE-over-ATM logical interface:

  [edit dynamic-profiles *profile-name* interfaces at-*fpc/pic/port* unit *logical-unit-number*]
  user@host# **edit** family **pppoe**

- For a PPPoE family on an underlying ATM logical interface:

  [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
  user@host# **edit** family **pppoe**

2. Enable duplicate protection to prevent negotiation of a dynamic or static PPPoE client session on the same underlying interface when a PPPoE client session with the same media access control (MAC) source address is already active on that interface.

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

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

3. Enable PPPoE subscriber session lockout using one of the following filtering mechanisms to identify the subscriber sessions for lockout:

   - Media access control (MAC)-address based subscriber session lockout (default)
     - To configure MAC-based subscriber session lockout with the default lockout period of 1 through 300 seconds:

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

     - To configure MAC-based 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***

   - Agent circuit identifier (ACI)-based subscriber session lockout
     - To configure ACI-based 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 filter aci**

For example, the following statement configures temporary lockout based on ACI information for subscriber sessions on a dynamic VLAN demux underlying interface. It uses the default lockout time range 1 through 300 seconds.

[edit dynamic-profiles my-demux-vlan-profile interfaces demux0 unit "$junos-interface-unit" family pppoe]
user@host# **set short-cycle-protection filter aci**

- To configure ACI-based 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* filter aci**

  For example, the following statement configures temporary lockout based on ACI information for subscriber sessions on a dynamic VLAN underlying interface. It specifies a nondefault lockout time in the range 20 through 120 seconds.

  [edit dynamic-profiles my-vlan-profile interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" pppoe-underlying options]
  user@host# **set short-cycle-protection lockout-time-min 20 lockout-time-max 120 filter aci**

NOTE: If the ACI value is not present in the PPPoE attributes when you configure ACI-based subscriber session lockout, the router uses MAC-based lockout by default. With ACI-based encapsulation type lockout, PPPoE clients without an ACI attribute are also locked out.

Related Documentation

- PPPoE Subscriber Session Lockout Overview on page 171
- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Clearing Lockout of PPPoE Subscriber Sessions

Purpose Clear the lockout condition for the PPPoE subscriber session associated with a unique MAC source address or ACI value.

Action

- To clear the lockout condition for PPPoE subscriber sessions associated with all MAC source addresses on all underlying interfaces:

  user@host> **clear pppoe lockout**

- To clear the lockout condition for the PPPoE subscriber session associated with the specified MAC source address:

  user@host> **clear pppoe lockout mac-address *mac-address***

- To clear the lockout condition for all PPPoE subscriber sessions on the specified underlying interface:

  user@host> **clear pppoe lockout underlying-interfaces *underlying-interface-name***

- To clear the lockout condition for the PPPoE subscriber session associated with the specified MAC source address on the specified underlying interface:

  user@host> **clear pppoe lockout mac-address *mac-address* underlying-interfaces *underlying-interface-name***

- To clear the ACI-based lockout condition for PPPoE subscriber sessions on all underlying interfaces:

  user@host> **clear pppoe lockout aci**

- To clear the ACI-based lockout condition for PPPoE subscriber sessions associated with the specified ACI value on the specified underlying interface:

  user@host> **clear pppoe lockout underlying-interfaces *underlying-interface-name* aci *agent-circuit-id***

- To clear the ACI-based lockout for a PPPoE subscriber session with the specified ATM encapsulation type identifiers where the ACI value matches a regular expression:

  user@host> **clear pppoe lockout atm-identifier device-name *device-name* vpi *vpi-identifier* vci *vci-identifier* aci "Relay-identifier atm 1/0:100\.*"**

- To clear the MAC-based lockout condition for a PPPoE subscriber session with the specified ATM encapsulation type identifiers:

  user@host> **clear pppoe lockout atm-identifier device-name *device-name* vpi *vpi-identifier* vci *vci-identifier* mac-address *mac-address***

- To clear the ACI-based lockout for a PPPoE subscriber session with the specified VLAN encapsulation type identifiers where the ACI value matches a regular expression:

  user@host> **clear pppoe lockout vlan-identifier device-name *device-name* svlan-id *svlan-identifier* vlan-id *vlan-identifier* aci "Relay-identifier atm 3/0:200\.*"**

- To clear the MAC-based lockout condition for a PPPoE subscriber session with the specified VLAN encapsulation type identifiers:

  user@host> **clear pppoe lockout vlan-identifier device-name *device-name* vlan-id *vlan-identifier* mac-address *mac-address***

- To verify that the lockout condition has been cleared:

  user@host> **show pppoe lockout**

Related Documentation

- PPPoE Subscriber Session Lockout Overview on page 171
- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- Verifying and Managing Dynamic PPPoE Configuration on page 217
- CLI Explorer

CHAPTER 18

Configuring MTU and MRU for PPP Subscribers

Understanding MTU and MRU Configuration for PPP Subscribers

The maximum payload allowed on an Ethernet frame is 1500 bytes. For a PPPoE interface, the PPPoE header uses 6 bytes and the PPP protocol ID uses 2 bytes. This restricts the maximum receive unit (MRU) size on a PPPoE interface to 1492 bytes, which can cause frequent fragmentation and reassembly of larger PPP packets received over the PPPoE interface. To prevent frequent fragmentation and reassembly for PPP packets over Ethernet, you can configure the maximum transmission unit (MTU) and MRU sizes for PPP subscribers.

NOTE: **For PPPoE subscribers, the PPP MRU or PPP MTU size can be greater than 1492 bytes if the PPP-Max-Payload tag is received in the PPPoE Active Discovery Request (PADR) packets.**

The configuration of MRU and MTU is supported for subscribers of the following PPP connections:

- PPP over Ethernet (PPPoE) subscribers
- PPP over Ethernet over ATM (PPPoE over ATM) subscribers
- PPP over ATM (PPPoA) subscribers
- Tunneled PPP LAC subscribers
- Tunneled PPP LNS subscribers

PPP essentially negotiates between two independent half-duplex links. While establishing a PPP connection, PPP end-points negotiate the MRU to determine the PPP payload MTU on a negotiated PPP connection. The terms used in this section are described here:

Peer MRU—MRU proposed by the peer to indicate the PPP payload size that it can accept.

PPP MRU—MRU proposed by the router to indicate the PPP payload size that it can accept

PPP MTU—PPP payload MTU (IP header + data) excluding any Layer 2 overhead.

By default, if the PPP MTU value is lower than 1492 bytes, the operational PPP MRU value is also set to the PPP MTU value. However, if the PPP MTU value is greater than 1492 bytes, Junos OS calculates the PPP MRU value based on the presence and value of the PPP-Max-Payload tag received in the PPPoE Active Discovery Request (PADR) packet. This default behavior can be changed by configuring the **mtu (*size*| use-lower-layer)** and **mru *size*** statements at the following hierarchy levels:

[edit access group-profile *group-profile-name* ppp ppp-options]
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options],
[edit interfaces pp0 unit *unit-number* ppp-options]
[edit interfaces si *interface-id* unit *unit-number* ppp-options]

PPP MTU and MRU for PPPoE Subscribers

For a PPPoE packet:

- Configured MTU is the MTU value configured using the **mtu *size*** statement.
- PPP lower-layer MTU is calculated as:
  interface MTU – [(Ethernet header payload) – (single-tagged VLANs) – (double-tagged VLANs) – (PPPoE header payload) – (PPP header)]

Junos OS determines the PPP MTU value for a terminated PPPoE interface based on the configured MTU, PPP lower-layer MTU, and the presence and value of the PPP-Max-Payload tag in the PADR packet.

1. If the PPP lower-layer MTU falls below 1492 bytes, then the PPP MTU value is the lesser of the PPP lower-layer MTU and the configured MTU value. The PPP-Max-Payload tag is ignored even if it is present in the PADR packet.
2. If the PPP lower-layer MTU is greater than 1492 bytes:
   - If the PPP-Max-Payload tag is not present in the PADR packet, then the PPP MTU value is the lesser of the configured MTU and the PPP lower-layer MTU value.
   - If the PPP-Max-Payload tag is present and its value is less than 1492 bytes, then the PPP MTU is the lesser of the configured MTU and the PPP lower-layer MTU value. Junos OS does not send out the PPP-Max-Payload tag in the PPPoE Active Discovery Session (PADS) packet to indicate that the router is not capable of supporting an MRU size greater than 1492 bytes.
   - If the PPP-Max-Payload tag is present and its value is greater than 1492 bytes but less than the configured MTU, the PPP MTU is the value received in the PPP-Max-Payload tag.
   - If the PPP-Max-Payload tag is present and its value is greater than 1492 bytes and also greater than the configured MTU, the PPP MTU is the lesser of the configured MTU and PPP lower-layer MTU value. Junos OS also returns the PPP-Max-Payload

tag in the PADS packet to indicate that the router is capable of supporting an MRU greater than 1492 bytes.

By default, a router uses the PPT MTU value for the PPP MRU value during link control protocol (LCP) negotiation on point-to-point connections. When you configure the MRU for a PPP subscriber for PPPoE by using the **mru *size*** statement, Junos OS determines the PPP MRU value based on the following:

- If the MRU is configured using the **ppp-options** option, the PPP MRU is the lesser of the configured MRU value and the PPP MTU value for that subscriber (PPP MTU value derived based on the configured MTU, PPP lower-layer MTU, and the PPP-Max-Payload value in the PADR packet).
- If the MRU is not configured, the PPP MRU remains the same as the PPP MTU and is sent during LCP negotiation. During LCP negotiation, the server receives the peer MRU value and offers the PPP MRU derived from the configuration and the PPP MTU.
- For a negotiated PPP connection, the INET MTU i.e PPP payload MTU (IP header + data) excluding any Layer 2 overhead, is set to the lesser of the PPP MTU and the received Peer MRU value.

PPP MTU and MRU for Tunneled Subscribers on LNS

For PPP subscribers on L2TP network server (LNS), the configured MTU can be either the explicit MTU size specified using the **mtu *size*** statement or the derived MTU using the **mtu use-lower-layer** statement.

- If the PPP MTU is configured as **use-lower-layer**, the PPP MTU is determined as: interface MTU – 58 bytes.

  NOTE: **58 bytes is the PPP overhead payload, which is calculated as the sum of the IP, UDP, L2TP, HDLC, and PPP header payloads.**

- If the PPP MTU is configured using the **mtu *size*** statement, the PPP MTU is the lesser of the configured MTU and the (interface MTU – 58 bytes) value.

When you configure an explicit MRU value by using the **mru *size*** statement, Junos OS determines the PPP MRU value for PPP subscribers on LNS interfaces based on the following scenarios:

- If the MRU value is not configured for PPP subscribers on the LNS and if the proxy LCP options are received from the L2TP access concentrator (LAC), the PPP MRU value offered in the LCP negotiation is the lesser of the PPP MTU and the proxy MRU value. If the LCP options are not received, PPP MTU is offered as MRU during LCP negotiation.
- If, however, the MRU value is configured for the PPP subscribers on the LNS, the PPP MRU is the lesser of the configured MRU and the PPP MTU value. Further, if the proxy LCP options are received from the LAC, the PPP MRU value sent during LCP negotiation is the lesser of the configured MRU or PPP MTU and the proxy MRU value.

- For a negotiated INET MTU on a PPP link i.e PPP payload MTU (IP header + data) excluding any Layer 2 overhead, the PPP MTU is set to the lesser of the PPP MTU and the received peer MRU value.

Related Documentation

- Configuring MTU and MRU for PPP Subscribers on page 184

Configuring MTU and MRU for PPP Subscribers

You can configure the maximum transmission unit (MTU) and maximum receive unit for Point-to-Point Protocol (PPP) subscribers. This configuration is supported for the following PPP subscribers:

- PPP over Ethernet (PPPoE) subscribers
- PPP over Ethernet over ATM (PPPoE over ATM) subscribers
- PPP over ATM (PPPoA) subscribers
- Tunneled PPP LAC subscribers
- Tunneled PPP LNS subscribers

The MTU configuration specifies the maximum allowable data unit size (in bytes) that can be transmitted over a PPP connection without fragmentation. This size excludes the lower-layer header size. With this configuration, you can choose to either configure an explicit MTU value or use the MTU value configured for the interface excluding the lower-layer header size.

The MRU configuration specifies the size of maximum receive unit (MRU) that the router uses during link control protocol (LCP) negotiation for dynamic and static PPP subscribers and L2TP tunneled subscribers.

To configure MTU and MRU values for PPP subscribers:

- (Optional) Configure the MTU and the MRU for dynamic PPP subscribers (includes dynamic PPPoE and PPPoE over ATM subscribers).

  [edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit” ppp-options],
  mru *size*;
  user@host# **mtu (*size* | use-lower-layer)**;

- (Optional) Configure the MTU and the MRU for static PPP subscribers (includes PPP over ATM subscribers).

  [edit interfaces pp0 unit *unit-number* ppp-options]
  mru *size*;
  user@host# **mtu (*size* | use-lower-layer)**;

- (Optional) Configure the MTU and the MRU for dynamic tunneled PPP subscribers for L2TP LNS.

  [edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit” ppp-options],
  mru *size*;

user@host# **mtu (*size* | use-lower-layer**);

- (Optional) Configure the MTU and the MRU for static tunneled PPP subscribers for L2TP LNS.

  [edit interfaces si *interface-id* unit *unit-number* ppp-options]
  mru *size*;
  user@host# **mtu (*size* | use-lower-layer**);

- Configure the MTU and the MRU for static and dynamic PPP subscribers associated with a group profile.

  [edit access group-profile *group-profile-name* ppp ppp-options]
  mru *size*;
  user@host# **mtu (*size* | use-lower-layer**);

Related Documentation

- Understanding MTU and MRU Configuration for PPP Subscribers on page 181

CHAPTER 19

Configuring PPPoE Service Name Tables

Understanding PPPoE Service Name Tables

On an MX Series router acting as a remote access concentrator (AC), also referred to as a *PPPoE server*, you can configure up to 32 PPPoE service name tables and assign the service name tables to PPPoE underlying interfaces. A *PPPoE service name table* defines the set of *services* that the router can provide to a PPPoE client. Service entries configured in a PPPoE service name table represent the *service name tags* transmitted between the client and the router in a PPPoE control packet.

This overview covers the following topics to help you understand and configure PPPoE service name tables:

Interaction Among PPPoE Clients and Routers During the Discovery Stage

In networks with mesh topologies, PPPoE clients are often connected to multiple PPPoE servers (remote ACs). During the PPPoE discovery stage, a PPPoE client identifies the Ethernet MAC address of the remote AC that can service its request, and establishes a unique PPPoE session identifier for a connection to that AC.

The following steps describe, at a high level, how the PPPoE client and the remote AC (router) use the PPPoE service name table to interact during the PPPoE discovery stage:

1. The PPPoE client broadcasts a PPPoE Active Discovery Initiation (PADI) control packet to all remote ACs in the network to request that an AC support certain services.

   The PADI packet must contain either, but not both, of the following:

   - One and only one nonzero-length service name tag that represents a specific client service
   - One and only one empty (zero-length) service name tag that represents an unspecified service

2. One or more remote ACs respond to the PADI packet by sending a PPPoE Active Discovery Offer (PADO) packet to the client, indicating that the AC can service the client request.

   To determine whether it can service a particular client request, the router matches the service name tag received in the PADI packet against the service name tags configured in its service name table. If a matching service name tag is found in the

PPPoE service name table, the router sends the client a PADO packet that includes the name of the AC from which it was sent. If no matching service name tag is found in the PPPoE service name table, the router drops the PADI request and does not send a PADO response to the client.

3. The PPPoE client sends a unicast PPPoE Active Discovery Request (PADR) packet to the AC to which it wants to connect, based on the responses received in the PADO packets.
4. The selected AC sends a PPPoE Active Discovery Session (PADS) packet to establish the PPPoE connection with the client.

Service Entries and Actions in PPPoE Service Name Tables

A PPPoE service name table can include three types of service entries: named services, an **empty** service, and an **any** service. For each service entry, you specify the action to be taken by the underlying interface when the router receives a PADI packet containing the specified service name tag.

You can configure the following services and actions in a PPPoE service name table:

- Named service—Specifies a PPPoE client service that an AC can support. For example, you might configure named services associated with different subscribers who log in to the PPPoE server, such as **user1-service** or **user2-service**, or that correspond to different ISP service level agreements, such as **premium** and **standard**. Each PPPoE service name table can include a maximum of 512 named service entries, excluding **empty** and **any** service entries. A named service is associated with the **terminate** action by default.
- **empty** service—A service tag of zero length that represents an unspecified service. Each PPPoE service name table includes one empty service. The **empty** service is associated with the **terminate** action by default.
- **any** service—Acts as a default service for non-empty service entries that do not match the named service entries or **empty** service entry configured in the PPPoE service name table. Each PPPoE service name table includes one **any** service. The **any** service is useful when you want to match the agent circuit identifier and agent remote identifier information for a PPPoE client, but do not care about the contents of the service name tag transmitted in the control packet. The **any** service is associated with the **drop** action by default.
- Action—Specifies the action taken by the underlying PPPoE interface assigned to the PPPoE service name table on receipt of a PADI packet from the client containing a particular service request. You can configure one of the following actions for the associated named service, **empty** service, **any** service, or agent circuit identifier/agent remote identifier (ACI/ARI) pair in the PPPoE service name table on the router:
  - **terminate**—(Default) Directs the router to immediately respond to the PADI packet by sending the client a PADO packet containing the name of the AC that can service the request. Named services, **empty** services, and ACI/ARI pairs are associated with the **terminate** action by default. Configuring the **terminate** action for a service enables

you to more tightly control which PPPoE clients can access and receive services from a particular PPPoE server.

- **delay**—Number of seconds that the PPPoE underlying interface waits after receiving a PADI packet from the client before sending a PADO packet in response. In networks with mesh topologies, you might want to designate a primary PPPoE server and a backup PPPoE server for handling a particular service request. In such a scenario, you can configure a delay for the associated service entry on the backup PPPoE server to allow sufficient time for the primary PPPoE server to respond to the client with a PADO packet. If the primary server does not send the PADO packet within the delay period configured on the backup server, then the backup server sends the PADO packet after the delay period expires.
- **drop**—Directs the router to drop (ignore) a PADI packet containing the specified service name tag when received from a PPPoE client, which effectively denies the client's request to provide the associated service. The **any** service is associated with the **drop** action by default. To prohibit the router from responding to PADI packets that contain **empty** or **any** service name tags, you can configure the **drop** action for the empty or **any** service. You can also use the **drop** action in combination with ACI/ARI pairs to accept specific service name tags only from specific subscribers, as described in the following information about ACI/ARI pairs.

ACI/ARI Pairs in PPPoE Service Name Tables

To specify agent circuit identifier (ACI) and agent remote identifier (ARI) information for a named service, **empty** service, or **any** service in a PPPoE service name table, you can configure an ACI/ARI pair. An ACI/ARI pair contains an agent circuit ID string that identifies the DSLAM interface that initiated the service request, and an agent remote ID string that identifies the subscriber on the DSLAM interface that initiated the service request. You can think of an ACI/ARI pair as the representation of one or more PPPoE clients accessing the router by means of the PPPoE service name table.

ACI/ARI specifications support the use of wildcard characters in certain formats. You can configure a combined maximum of 8000 ACI/ARI pairs, both with and without wildcards, per PPPoE service name table. You can distribute the ACI/ARI pairs in any combination among the service entries in the service name table.

You must specify the action—**terminate**, **delay**, or **drop**—taken by the underlying PPPoE interface when it receives a client request containing vendor-specific ACI/ARI information that matches the ACI/ARI information configured in the PPPoE service name table on the router. An ACI/ARI pair is associated with the **terminate** action by default.

For example, assume that for the **user1-service** named service, you configure the **drop** action for the service and the **terminate** action for the associated ACI/ARI pairs. In this case, the ACI/ARI pairs identify the DSLAM interfaces and associated subscribers authorized to access the PPPoE server. Using this configuration causes the router to drop PADI packets containing the **user1-service** tag *unless* the PADI packet also contains vendor-specific ACI/ARI information that matches the subscribers identified in one or more of the ACI/ARI pairs. For PADI packets containing matching ACI/ARI information, the router sends an immediate PADO response to the client indicating that it can provide the requested service for the specified subscribers.

You can also associate a PPPoE dynamic profile, routing instance, and static PPPoE interface with an ACI/ARI pair.

Dynamic Profiles and Routing Instances in PPPoE Service Name Tables

You can associate a previously configured PPPoE dynamic profile with a named service, **empty** service, or **any** service in the PPPoE service name table, or with an ACI/ARI pair defined for these services. The router uses the attributes defined in the profile to instantiate a dynamic PPPoE subscriber interface based on the service name, ACI, and ARI information provided by the PPPoE client during PPPoE negotiation. The dynamic profile configured for a service entry or ACI/ARI pair in a PPPoE service name table overrides the dynamic profile assigned to the PPPoE underlying interface on which the dynamic PPPoE interface is created.

To specify the routing instance in which to instantiate the dynamic PPPoE interface, you can associate a previously configured routing instance with a named service, **empty** service, or **any** service in the PPPoE service name table, or with an ACI/ARI pair defined for these services. Like dynamic profiles configured for service entries or ACI/ARI pairs, the routing instance configured for the PPPoE service name table overrides the routing instance assigned to the PPPoE underlying interface.

For information about configuring the PPPoE service name table to create a dynamic PPPoE subscriber interface, see "Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation" on page 201.

Maximum Sessions Limit in PPPoE Service Name Tables

To limit the number of PPPoE client sessions that can use a particular service entry in the PPPoE service name table, you can configure the maximum number of active PPPoE sessions using either dynamically-created or statically-created PPPoE interfaces that the router can establish with a particular named service, **empty** service, or **any** service. (You cannot configure the maximum sessions limit for an ACI/ARI pair.) The maximum sessions limit must be in the range 1 through the platform-specific maximum PPPoE sessions supported for your routing platform. The router maintains a count of active PPPoE sessions for each service entry to determine when the maximum sessions limit has been reached.

The router uses the maximum sessions value for a service entry in the PPPoE service name table in conjunction with both of the following:

- The maximum sessions (**max-sessions**) value configured for the PPPoE underlying interface
- The maximum number of PPPoE sessions supported on your routing platform

If your configuration exceeds either of these maximum session limits, the router cannot establish the PPPoE session.

Static PPPoE Interfaces in PPPoE Service Name Tables

To reserve a previously configured static PPPoE interface for use only by the PPPoE client with matching ACI/ARI information, you can specify a single static PPPoE interface for each ACI/ARI pair defined for a named service entry, **empty** service entry, or **any** service entry in a PPPoE service name table. (You cannot configure a static interface for a service entry that does not have an ACI/ARI pair defined.) The static PPPoE interface associated with an ACI/ARI pair takes precedence over the general pool of static PPPoE interfaces associated with the PPPoE underlying interface configured on the router.

When you configure a static interface in the PPPoE service name table, make sure there is a one-to-one correspondence between the PPPoE client and the static interface. For example, if two clients have identical ACI/ARI information that matches the information in the PPPoE service name table, the router reserves the static interface for exclusive use by the first client that logs in to the router. As a result, the router prevents the second client from logging in.

NOTE: **You cannot configure a static interface for an ACI/ARI pair already configured with a dynamic profile and routing instance. Conversely, you cannot configure a dynamic profile and routing instance for an ACI/ARI pair already configured with a static interface.**

PADO Advertisement of Named Services in PPPoE Service Name Tables

By default, the advertisement of named services in PADO control packets sent by the router to the PPPoE client is disabled. You can enable advertisement of named services in the PADO packet as a global option when you configure the PPPoE protocol on the router. Configuring PADO advertisement notifies PPPoE clients of the services that the router (AC) can offer.

If you enable advertisement of named services in PADO packets, make sure the number and length of all advertised service entries does not exceed the maximum transmission unit (MTU) size supported by the PPPoE underlying interface.

Limiting the subscriber sessions per AE or PFE Bundle in PPPoE Service Name Tables

The PPPoE Service-Name table functionality may be used to limit the number of PPPoE subscriber sessions per PFE or AE bundle. This is accomplished by configuring all PPPoE underlying VLAN interfaces over a specific PFE or AE bundle with a single Service-Name table. This Service-Name table should contain only the service “any” with a max-sessions value equal to the PPPoE subscriber session limit for the PFE or AE bundle. The each PFE or AE bundle must have its own unique Service-Name table to ensure that PPPoE subscribers from other PFE or AE bundles are not incorrectly counted against a PFE or AE-specific session limit.

To configure a service-name table for PPPoE sessions on underlying VLAN interfaces to limit the number of subscriber sessions per PFE or AFE bundle, include the set service-name-table <PFE/AE-table-name> service any max-sessions <PPPoE-subscriber-limit> statement at the **[edit protocols pppoe]** hierarchy level.

Related Documentation

- Evaluation Order for Matching Client Information in PPPoE Service Name Tables on page 193
- Benefits of Configuring PPPoE Service Name Tables on page 194
- Configuring PPPoE Service Name Tables on page 195
- Example: Configuring a PPPoE Service Name Table on page 204
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- *PPPoE Overview*

Evaluation Order for Matching Client Information in PPPoE Service Name Tables

When the router receives a service request from a PPPoE client, it evaluates the entries configured in the PPPoE service name table to find a match for the client's ACI/ARI information so it can take the appropriate action.

The order of evaluation is as follows:

1. The router evaluates the ACI/ARI information configured for the **any** service entry, and ignores the contents of the service name tag transmitted by the client.
2. If no match is found for the client information, the router evaluates the ACI/ARI information for the **empty** service entry and the named service entries. If an ACI/ARI pair is not configured for these service entries, the router evaluates the other attributes configured for the **empty** service and named services.
3. If there is still no match for the client information, the router evaluates the other attributes configured for the **any** service entry, and ignores both the ACI/ARI information for the **any** service and the contents of the service name tag transmitted by the client. If the **any** service is configured for the default action, **drop**, the router drops the PADR packet. If the **any** service is configured for a nondefault action (**terminate** or **delay**), the router evaluates the other attributes configured for the **any** service.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Benefits of Configuring PPPoE Service Name Tables on page 194
- Configuring PPPoE Service Name Tables on page 195
- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 207
- *PPPoE Overview*
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

Benefits of Configuring PPPoE Service Name Tables

This topic describes the benefits of configuring PPPoE service name tables.

Configuring PPPoE service name tables provides the following benefits:

- Enables support for multiple services requested by PPPoE clients, and configuration of an action for the underlying PPPoE interface to take (**delay**, **drop**, or **terminate**) upon receipt of a PPPoE Active Discovery Initiation (PADI) packet requesting that service.
- Provides tighter control over which PPPoE clients can log in to and receive services from a particular PPPoE server.
- Provides load balancing across a set of remote access concentrators (ACs) in a mesh topology by enabling you to configure agent circuit identifier/agent remote identifier (ACI/ARI) pairs for named, **empty**, and **any** service entries to specify the appropriate AC to receive and service a particular PPPoE client request.
- Offers a more targeted approach to configuration of PPPoE sessions based on the service name and ACI/ARI information provided by the PPPoE client during PPPoE negotiation.
- Supports creation of dynamic PPPoE subscriber interfaces in a specified routing instance based on configuration of a service entry or ACI/ARI pair in the PPPoE service name table.
- Enables you to reserve a specified static PPPoE interface for use only by the PPPoE client with matching ACI/ARI information.
- Enables you to specify the maximum number of PPPoE client sessions that can use a particular service entry in the PPPoE service name table.
- Provides redundancy across a set of remote ACs in a mesh topology by enabling you to configure a primary AC and a backup AC for handling a specific service request from a PPPoE client.

  For example, on the primary AC for handling a client service, you might configure the **terminate** action for the associated service to direct the primary AC to immediately send a PPPoE Active Discovery Offer (PADO) packet in response to a PADI packet containing that service name tag. On the backup AC for the client service, you might configure the **delay** action for the associated service to specify the number of seconds the backup AC waits after receiving a PADI packet from the client before sending a PADO packet in response. If the primary AC does not send a PADO packet to the client within the delay period configured on the backup AC, then the backup AC sends the PADO packet after the delay period expires.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Example: Configuring a PPPoE Service Name Table on page 204

- *PPPoE Overview*

- *Ethernet Interfaces Feature Guide for Routing Devices*

Creating a Service Name Table

You can create up to 32 PPPoE service name tables on the router. You can optionally create named services and add them to a service name table. By default, the **empty** service and the **any** service are present in each service name table.

A named service specifies a PPPoE client service that the router, functioning as an access concentrator or PPPoE server, can support. The **empty** service is a service tag of zero length that represents an unspecified service. The **any** service acts as a default service for non-empty service entries that do not match the named or **empty** service entries configured in the PPPoE service name table. Named services and the **empty** service are associated with the **terminate** action by default, and the **any** service is associated with the **drop** action by default.

To create a PPPoE service name table:

- Specify the table name.

  ```
  [edit protocols pppoe]
  user@host# set service-name-tables table1
  ```

Related Documentation

- Configuring PPPoE Service Name Tables on page 195
- Understanding PPPoE Service Name Tables on page 188
- *PPPoE Overview*

Configuring PPPoE Service Name Tables

To configure PPPoE service name tables:

1. Create a PPPoE service name table.

   See “Creating a Service Name Table” on page 195.
2. (Optional) Configure the action taken for the **empty** service.

   See “Configuring the Action Taken When the Client Request Includes an Empty Service Name Tag” on page 197.
3. (Optional) Configure the action taken for the **any** service.

   See “Configuring the Action Taken for the Any Service” on page 198.
4. Assign a named service to the service name table and optionally configure the action taken for the specified service name.

   See “Assigning a Service to a Service Name Table and Configuring the Action Taken When the Client Request Includes a Non-zero Service Name Tag” on page 199.
5. (Optional) Configure the action taken for an ACI/ARI pair associated with a service.

See “Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information” on page 200.

6. (Optional) Assign a dynamic profile and routing instance to a service name or ACI/ARI pair to instantiate a dynamic PPPoE subscriber interface.

   See “Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation” on page 201.

7. (Optional) Limit the number of active PPPoE sessions that the router can establish with the specified service.

   See “Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name” on page 203.

8. (Optional) Assign a static PPPoE interface to an ACI/ARI pair to reserve the interface for exclusive use by the PPPoE client with matching ACI/ARI information.

   See “Reserving a Static PPPoE Interface for Exclusive Use by a PPPoE Client” on page 204.

9. (Optional) Enable advertisement of named services in the PADO control packet sent by the router to the client.

   See “Enabling Advertisement of Named Services in PADO Control Packets” on page 213.

10. Assign a service name table to a PPPoE underlying interface.

    See “Assigning a Service Name Table to a PPPoE Underlying Interface” on page 196.

11. (Optional) Configure trace options for troubleshooting the configuration.

    See *Tracing PPPoE Operations*.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Benefits of Configuring PPPoE Service Name Tables on page 194
- Example: Configuring a PPPoE Service Name Table on page 204
- *PPPoE Overview*

Assigning a Service Name Table to a PPPoE Underlying Interface

You must assign the PPPoE service name table to a PPPoE underlying interface.

Before you begin:

- Specify PPPoE as the encapsulation method on the underlying interface.

  See *Setting the Appropriate Encapsulation on the PPPoE Interface* in *Configuring PPPoE*.

To assign a service name table to a PPPoE underlying interface:

- Specify the table name:

  [edit interfaces *interface-name* unit *logical-unit-number*]
  user@host# **set pppoe-underlying-options service-name-table table1**

Related Documentation

- Configuring PPPoE Service Name Tables on page 195
- Example: Configuring a PPPoE Service Name Table on page 204
- *PPPoE Overview*

Configuring the Action Taken When the Client Request Includes an Empty Service Name Tag

You can configure the action taken by the PPPoE underlying interface when it receives a PADI packet that includes a zero-length (empty) service name tag. The **empty** service is present by default in every PPPoE service name table.

To indicate that it can service the client request, the interface returns a PADO packet in response to the PADI packet. By default, the interface immediately responds to the request; this is the **terminate** action. Alternatively, you can configure the **drop** action to ignore (drop) the PADI packet, or the **delay** action to set a delay between receipt of the PADI packet and transmission of the PADO packet.

(Optional) To configure the action taken for the **empty** service in response to a PADI packet from a PPPoE client:

- Specify the action.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service empty drop
  ```

You can also accomplish the following optional tasks when you configure the **empty** service:

- Specify the agent circuit identifier (ACI) and agent remote identifier (ARI) information to determines the action taken by the PPPoE underlying interface when it receives a PADI packet with matching ACI/ARI information.
- Specify a dynamic profile and routing instance with which the router instantiates a dynamic PPPoE subscriber interface.
- Limit the number of active PPPoE sessions that the router can establish with the **empty** service.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information on page 200
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201
- Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name on page 203
- *PPPoE Overview*

Configuring the Action Taken for the Any Service

The **any** service acts as a default service for service name tags transmitted by the client that do not match any of the service entries configured in the PPPoE service name table on the router. By configuring an action for the **any** service, you specify the action taken by the PPPoE underlying interface when it receives a PADI control packet from a client that includes a non-empty service name tag that does not match any of the named service entries or **empty** service entry in the PPPoE service name table.

Each PPPoE service name table includes one **any** service entry associated by default with the **drop** action. The **drop** action ignores a PADI packet containing a nonmatching service name tag. Alternatively, you can configure the **terminate** action to immediately respond to the PADI packet with a PADO packet, or the **delay** action to specify a delay between receipt of the PADI packet and transmission of the PADO packet.

To configure the action taken for the **any** service in response to a PADI packet from a PPPoE client:

- Specify the action.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service any terminate
  ```

You can also accomplish the following optional tasks when you configure the **any** service:

- Specify the agent circuit identifier (ACI) and agent remote identifier (ARI) information to determine the action taken by the PPPoE underlying interface when it receives a PADI packet with matching ACI/ARI information.
- Specify a dynamic profile and routing instance with which the router instantiates a dynamic PPPoE subscriber interface.
- Limit the number of active PPPoE sessions that the router can establish with the **any** service.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information on page 200
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201
- Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name on page 203

- *PPPoE Overview*

Assigning a Service to a Service Name Table and Configuring the Action Taken When the Client Request Includes a Non-zero Service Name Tag

You can configure a maximum of 512 named service entries, excluding **empty** and **any** service entries, across all PPPoE service name tables on the router. A named service specifies a PPPoE client service that the router, functioning as an access concentrator or PPPoE server, can support. You can optionally configure the action taken by the PPPoE underlying interface when it receives a PADI packet that includes a matching named service (service name tag).

To indicate that it can service the client request, the interface returns a PADO packet in response to the PADI packet. By default, the interface immediately responds to the request; this is the **terminate** action. Alternatively, you can configure the **drop** action to ignore (drop) the PADI packet, or the **delay** action to set a delay between receipt of the PADI packet and transmission of the PADO packet.

(Optional) To configure a named service for a PPPoE service name table, do one of the following:

- Assign a service name to the table. The **terminate** action is applied to the service by default.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service gold-service
  ```

- Specify the action taken for a service in response to a PADI packet from a PPPoE client.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service gold-service delay 25
  ```

You can also accomplish the following optional tasks when you configure a named service:

- Specify the agent circuit identifier (ACI) and agent remote identifier (ARI) information to determines the action taken by the PPPoE underlying interface when it receives a PADI packet with matching ACI/ARI information.
- Specify a dynamic profile and routing instance with which the router instantiates a dynamic PPPoE subscriber interface.
- Limit the number of active PPPoE sessions that the router can establish with the specified named service.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information on page 200
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201

- Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name on page 203

- *PPPoE Overview*
- *Ethernet Interfaces Feature Guide for Routing Devices*

Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information

You can configure up to 8000 agent circuit identifier/agent remote identifier (ACI/ARI) pairs per PPPoE service name table, distributed in any combination among the named, **empty**, and **any** service entries in the service name table. You can optionally configure the action taken by the PPPoE underlying interface when it receives a PADI packet that includes a service name tag and the vendor-specific tag with ACI/ARI information that matches the ACI/ARI pair that you specify.

You can use an asterisk (*) as a wildcard character to match ACI/ARI pairs, the ACI alone, or the ARI alone. The asterisk can be placed only at the beginning, the end, or both the beginning and end of the identifier string. You can also specify an asterisk alone for either the ACI or the ARI. You cannot specify only an asterisk for both the ACI and the ARI. When you specify a single asterisk as the identifier, that identifier is ignored in the PADI packet.

For example, suppose you care about matching only the ACI and do not care what value the ARI has in the PADI packet, or even whether the packet contains an ARI value. In this case you can set the ***remote-id-string*** to a single asterisk. Then the interface ignores the ARI received in the packet and the interface takes action based only on matching the specified ACI.

To indicate that it can service the client request, the interface returns a PADO packet in response to the PADI packet. By default, the interface immediately responds to the request; this is the **terminate** action. Alternatively, you can configure the **drop** action to ignore (drop) the PADI packet, or the **delay** action to set a delay between receipt of the PADI packet and transmission of the PADO packet.

To configure an ACI/ARI pair for a named, **empty**, or **any** service, do one of the following:

- Assign an ACI/ARI pair to the service name. The **terminate** action is applied to the pair by default.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service gold-service agent-specifier aci DSLAM:3/0/1/101 ari *user*
  ```

- Specify the action taken for the ACI/ARI pair in response to a PADI packet from a PPPoE client.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service any agent-specifier aci velorum-ge-2/0/3 ari westford delay
    90
  ```

  In this example, an ACI/ARI pair and the **delay** action are configured for the **any** service. Configuring an ACI/ARI pair for the **any** service is useful when you want to match the agent circuit identifier and agent remote identifier information for a specific PPPoE client, but do not care about the contents of the service name tag transmitted by the client in the PADI packet.

You can also accomplish the following optional tasks when you configure an ACI/ARI pair:

- Specify a dynamic profile and routing instance with which the router instantiates a dynamic PPPoE subscriber interface.
- Reserve a specified static PPPoE interface for exclusive use by the PPPoE client with match ACI/ARI information.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201
- Reserving a Static PPPoE Interface for Exclusive Use by a PPPoE Client on page 204
- *PPPoE Overview*

Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation

You can create a dynamic PPPoE subscriber interface based on the service name, agent circuit identifier (ACI), and agent remote identifier (ARI) information provided by the PPPoE client during PPPoE negotiation. To do so, you assign a PPPoE dynamic profile to a named service, **empty** service, or **any** service entry in a PPPoE service name table, or to an ACI/ARI pair defined for these services.

Similarly, to specify the routing instance in which to instantiate the dynamic PPPoE subscriber interface, you can assign a routing instance to a named service, **empty** service, or **any** service in a PPPoE service name table, or to an ACI/ARI pair defined for these services.

Observe the following configuration guidelines when you assign a dynamic profile and routing instance to a PPPoE service name table to create a dynamic PPPoE subscriber interface:

- The dynamic profile or routing instance assigned to the PPPoE service name table overrides the dynamic profile or routing instance assigned to the PPPoE underlying interface on which the dynamic subscriber interface is created.
- You cannot configure a dynamic profile or routing instance for an ACI/ARI pair already configured with a static interface (by using the **static-interface** statement). Conversely, you cannot configure a static interface for an ACI/ARI pair already configured with a dynamic profile or routing instance.

Before you begin:

1. Configure a PPPoE dynamic profile.

To configure a basic PPPoE dynamic profile, see "Configuring a PPPoE Dynamic Profile" on page 136.

2. Configure the routing instance in which you want the router to instantiate the dynamic profile.

   For information about configuring routing instances, see *Routing Instances Overview*.

3. Create the PPPoE service name table on the router.

   See "Creating a Service Name Table" on page 195.

To create a dynamic PPPoE subscriber interface based on the service name and, optionally, associated ACI/ARI pair configured in a PPPoE service name table, do one of the following:

- Assign a previously configured dynamic profile and routing instance to a named, **empty**, or **any** service.

```
[edit protocols pppoe service-name-tables table1]
user@host# set service premium dynamic-profile premiumProfile routing-instance
  premiumRI
```

- Assign a previously configured dynamic profile and routing instance to the ACI/ARI pair defined for a named, **empty**, or **any** service.

```
[edit protocols pppoe service-name-tables table1]
user@host# set service any agent-specifier aci west-ge-3/0/3 ari sunnyvale
  dynamic-profile standardProfile routing-instance standardRI
```

Related Documentation

- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 207
- Subscriber Interfaces and PPPoE Overview on page 129
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Configuring PPPoE Service Name Tables on page 195

Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name

To limit the number of PPPoE client sessions that can use a particular service entry in the PPPoE service name table, you can configure the maximum number of PPPoE sessions using static or dynamic PPPoE interfaces that the router can establish with the specified named service, **empty** service, or **any** service. You cannot configure a maximum sessions limit for an ACI/ARI pair in the service name table.

The maximum sessions limit must be in the range 1 through the platform-specific maximum PPPoE sessions supported for your routing platform. The router maintains a count of active PPPoE sessions for each service entry to determine when the maximum sessions limit has been reached.

To limit the number of PPPoE client sessions for a particular named, **empty**, or **any** service:

- Configure the maximum sessions limit for the specified service:

```
[edit protocols pppoe service-name-tables tableEast]
user@host# set service premium-service max-sessions 100
```

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- *PPPoE Overview*

Reserving a Static PPPoE Interface for Exclusive Use by a PPPoE Client

To reserve a static PPPoE interface for exclusive use by the PPPoE client with matching agent circuit identifier/agent remote identifier (ACI/ARI) information, you can assign a static PPPoE interface to an ACI/ARI pair defined for a named service entry, **empty** service entry, or **any** service entry in a PPPoE service name table. You cannot assign a static PPPoE interface directly to a service entry that does not have an ACI/ARI pair defined.

Observe the following guidelines when you configure a static PPPoE interface for an ACI/ARI pair:

- You can specify only one static PPPoE interface per ACI/ARI pair.
- If the ACI/ARI pair represents an individual PPPoE client, make sure there is a one-to-one correspondence between the client and the static PPPoE interface.
- The static interface associated with the ACI/ARI pair takes precedence over the general pool of static interfaces associated with the PPPoE underlying interface.
- You cannot configure a static interface for an ACI/ARI pair already configured with a dynamic profile and routing instance. Conversely, you cannot configure a dynamic profile and routing instance for an ACI/ARI pair already configured with a static interface.

Before you begin:

- Configure the static PPPoE interface.

  See *Configuring PPPoE*.

To reserve a static PPPoE interface for exclusive use by the PPPoE client with matching ACI/ARI information:

- Assign a previously configured static PPPoE interface to the ACI/ARI pair defined for a named, **empty**, or **any** service entry:

  ```
  [edit protocols pppoe service-name-tables tableEast]
  user@host# set service any agent-specifier aci velorum-ge-2/0/3 ari westford
    static-interface pp0.100
  ```

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- *PPPoE Overview*

Example: Configuring a PPPoE Service Name Table

This example shows how you can configure a PPPoE service name table on an MX Series router with service entries that correspond to different client services. By configuring the appropriate actions (**delay**, **terminate**, or **drop**) and agent circuit identifier/agent remote identifier (ACI/ARI) pairs for the service entries, you can provide load balancing and redundancy across a set of remote access concentrators (ACs) in a mesh topology, and determine how best to allocate service requests from PPPoE clients to the servers in your network.

In this example, the PPPoE service name table, Table1, contains the following service entries:

- **user1-service**—Named service representing the subscriber service for user1.
- **user2-service**—Named service representing the subscriber service for user2.
- **empty** service—Represents an unspecified service.

To configure a PPPoE service name table with service entries that correspond to different subscriber services:

1. Create the PPPoE service name table and define the services and associated actions.

```
[edit protocols pppoe]
service-name-tables Table1 {
  service empty {
    drop;
  }
  service user1-service {
    terminate;
    agent-specifier {
      aci "east*" ari "wfd*" delay 10;
      aci "west*" ari "svl*" delay 10;
    }
  }
  service user2-service {
    delay 20;
  }
}
```

This example creates a PPPoE service name table named Table1 with three service entries, as follows:

- The **empty** service is configured with the **drop** action. This action prohibits the router (AC) from responding to PADI packets from the client that contain empty service name tags.
- The **user1-service** named service is configured with both the **terminate** action, and two ACI/ARI (agent-specifier) pairs:
  - The **terminate** action directs the router to immediately respond to PADI packets from the client that contain the **user1-service** tag, and is the default action for named services.
  - The 10-second delay configured for each ACI/ARI pair applies only to PADI packets from the client that contains a vendor-specific tag with matching ACI and ARI information. In this example, configuring the **delay** action indicates that the **east** or **west** server is considered the backup AC for handling these client requests, and that you expect an AC other than **east** or **west** to handle the request as the primary server. If the primary AC does not respond to the client with a PADO packet within 10 seconds, then the **east** or **west** backup AC sends the PADO packet after the 10-second delay expires.

- The **user2-service** named service is configured with a 20-second delay, indicating that you expect an AC other than the one on which this PPPoE service name table is configured to be the primary AC for handling this client request. If the primary AC does not respond to the client with a PADO packet within 20 seconds, then the backup AC (that is, the router on which you are configuring the service name table) sends the PADO packet after the 20-second delay expires.

2. Assign the PPPoE service name table to a PPPoE underlying interface configured with PPPoE encapsulation.

```
[edit interfaces]
ge-2/0/3 {
  vlan-tagging;
  unit 0 {
    vlan-id 100;
    encapsulation ppp-over-ethernet;
    pppoe-underlying-options {
      service-name-table Table1;
    }
  }
}
```

3. (Optional) Verify the PPPoE service name table configuration.

```
user@host> show pppoe service-name-tables Table1
Service Name Table: Table1
  Service Name: <empty>
  Service Action: Drop

  Service Name: user1-service
  Service Action: Terminate
    ACI: east*
    ARI: wfd*
      ACI/ARI Action: Delay 10 seconds
    ACI: west*
    ARI: svl*
      ACI/ARI Action: Delay 10 seconds

  Service Name: user2-service
  Service Action: Delay 20 seconds
```

4. (Optional) Verify whether the PPPoE service name table has been properly assigned to the underlying PPPoE interface, and whether packet transfer between the router (AC) and PPPoE client is working correctly.

```
user@host>show pppoe underlying-interfaces ge-2/0/3.0 extensive
ge-2/0/3.0 Index 72
  State: Static, Dynamic Profile: None,
  Max Sessions: 4000, Active Sessions: 2,
  Service Name Table: Table1, Duplicate Protection: Off,
  AC Name: east
  PacketType                        Sent         Received
    PADI                               0                2
    PADO                               2                0
    PADR                               0                2
    PADS                               2                0
    PADT                               0                1
    Service name error                 0                0
    AC system error                    0                0
```



```
Generic error                    0                0
Malformed packets                0                0
Unknown packets                  0                0
```

Examine the command output to ensure the following:

- The **Service Name Table** field displays the name of the correct PPPoE service name table. This field displays **none** if no service name table has been associated with the specified interface.
- The **Sent** and **Received** values for the **Service name error** field are 0 (zero). For example, a nonzero value in the **Received** field for **Service name error** indicates that there are errors in the control packets received from PPPoE clients, such as a PADI packet that does not contain a service name tag.

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195
- Troubleshooting PPPoE Service Name Tables on page 210
- *PPPoE Overview*

Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation

This example shows how to configure a PPPoE service name table to create a dynamic PPPoE subscriber interface based on the service name, agent circuit identifier (ACI), and agent remote identifier (ARI) information provided by PPPoE clients during PPPoE negotiation.

In this example, PPPoE service name table **TableDynamicPPPoE** includes an **any** service entry, **empty** service entry, and two named service entries: **Premium** and **Standard**. The PPPoE underlying interfaces configured for **TableDynamicPPPoE** are **ge-2/0/0.1** and **ge-2/0/0.2**. Only **ge-2/0/0.1** is configured for dynamic profile assignment and creation of dynamic PPPoE subscriber interfaces.

Following the configuration example, Table 10 on page 209 explains how the router evaluates the entries in **TableDynamicPPPoE** to create a dynamic PPPoE subscriber interface in a specified routing instance for each of several sample clients.

To configure a PPPoE service name table to create dynamic PPPoE subscriber interfaces:

1. Configure the PPPoE service name table.

```
protocols {
  pppoe {
    service-name-tables TableDynamicPPPoE {
      service any {
        terminate;
        max-sessions 100;
        dynamic-profile AnyProfile;
        agent-specifier {
          aci "broadway-ge-1/0/1.0" ari "london" {
```

```
                terminate;
                dynamic-profile LondonProfile;
                routing-instance LondonRI;
            }
            aci "groton-ge-4/0/3.32" ari "paris" {
                delay 5;
                dynamic-profile ParisProfile;
                routing-instance ParisRI;
            }
        }
    }
    service empty {
        drop;
        agent-specifier {
            aci "dunstable-ge-1/0/0.1" ari "kanata" {
                dynamic-profile BasicPppoeProfile;
                delay 10;
            }
        }
    }
    service Premium {
        terminate;
        dynamic-profile PremiumProfile;
    }
    service Standard {
        terminate;
        max-sessions 10;
        dynamic-profile StandardProfile;
        agent-specifier {
            aci "dunstable-ge-1/0/0.1" ari "kanata" {
                dynamic-profile BasicPppoeProfile;
                delay 10;
            }
        }
    }
  }
 }
}
```

2. Configure the PPPoE underlying interface for the service name table.

```
interfaces {
    ge-2/0/0 {
        vlan-tagging;
        unit 1 {
            vlan-id 1;
            pppoe-underlying-options {
                dynamic-profile BasicPppoeProfile;
                service-name-table TableDynamicPPPoE;
            }
        }
        unit 2 {
            vlan-id 2;
            pppoe-underlying-options {
                service-name-table TableDynamicPPPoE;
            }
```

```
        }
      }
    }
```

Table 10 on page 209 lists the service name, ACI value, and ARI value provided in several sample PPPoE client requests, and the name of the PPPoE underlying interface on which the router received each client request. The Results column describes the dynamic PPPoE subscriber interface created by the router based on *both* of the following:

- The values received from each PPPoE client during PPPoE negotiation
- The sequence in which the router evaluates the entries configured in the PPPoE service name table to find a match for the client's service name and ACI/ARI information, as described in "Evaluation Order for Matching Client Information in PPPoE Service Name Tables" on page 193

Table 10: Dynamic PPPoE Subscriber Interface Creation Based on PPPoE Client Request Values

PPPoE Client	Service Name	ACI Value	ARI Value	Receiving Underlying Interface	Results
Client 1	Premium	broadway-ge-1/0/1.1	london	ge-2/0/0.1	Matches ACI/ARI pair configured for **any** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **LondonProfile** dynamic profile and **LondonRI** routing instance assigned to **any** service.
Client 2	Premium	dunstable-ge-1/0/1.0	toronto	ge-2/0/0.1	Matches base **Premium** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **PremiumProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.
Client 3	empty	dunstable-ge-1/0/0.1	kanata	ge-2/0/0.1	Matches ACI/ARI pair configured for **empty** service and **Standard** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** after a delay of 10 seconds. Router uses **BasicPPPoEProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.
Client 4	empty	slinger-ge-1/0/0.1	chicago	ge-2/0/0.2	Because receiving underlying interface **ge-2/0/0.2** is *not* associated with a dynamic profile, router does not create a dynamic PPPoE subscriber interface, and drops any PADI or PADR control packets received from this client.

Table 10: Dynamic PPPoE Subscriber Interface Creation Based on PPPoE Client Request Values *(continued)*

PPPoE Client	Service Name	ACI Value	ARI Value	Receiving Underlying Interface	Results
Client 5	Standard	slinger-ge-1/0/0.1	chicago	ge-2/0/0.1	Matches base **Standard** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **StandardProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.

Related Documentation

- Evaluation Order for Matching Client Information in PPPoE Service Name Tables on page 193
- Subscriber Interfaces and PPPoE Overview on page 129
- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195

Troubleshooting PPPoE Service Name Tables

Problem

Description: A misconfiguration of a PPPoE service name table can prevent PPPoE services from being properly activated. Configuration options for PPPoE service name tables are simple, which should simplify discovering where a misconfiguration exists. PPPoE clients cannot connect if the service name table contains no match for the service name tag carried in the PADI packet.

Symptoms: The symptom of a service name table misconfiguration is that the client connection process stops at the negotiation stage and the PADI packets are ignored. You can use the **show pppoe statistics** command to examine the PPPoE packet counts for a problem.

When the service name table is properly configured, packets sent and received increment symmetrically. The following sample output shows a PADO sent count equal to the PADI received count, and PADS sent count equal to the PADR received count. This output indicates that the PPPoE negotiation is proceeding successfully and that the service name table is not misconfigured.

```
user@host> show pppoe statistics ge-2/0/3.1

 Active PPPoE sessions: 2
    PacketType                       Sent          Received
      PADI                              0                16
      PADO                             16                 0
      PADR                              0                16
      PADS                             16                 0
      PADT                              0                 0
      Service name error                0                 0
      AC system error                   0                 0
      Generic error                     0                 0
```



```
      Malformed packets                 0                0
      Unknown packets                   0                0
```

When the service name table is misconfigured, the output of the **show pppoe statistics** command indicates that the number of PADI packets received on the underlying interface is increasing, but the number of PADO packets sent remains at zero. The following sample output shows a PADI count of 100 and a PADO count of 0.

user@host> **show pppoe statistics ge-2/0/3.1**

```
Active PPPoE sessions: 0
    PacketType                        Sent           Received
      PADI                              0              100
      PADO                              0                0
      PADR                              0                0
      PADS                              0                0
      PADT                              0                0
      Service name error                0                0
      AC system error                   0                0
      Generic error                     0                0
      Malformed packets                 0                0
      Unknown packets                   0                0
```

When you believe a misconfiguration exists, use the **monitor traffic interface** command on the underlying interface to determine which service name is being requested by the PPPoE client. The following sample output shows that the client is requesting Service1 in the service name tag.

user@host> **monitor traffic interface ge-2/0/3.1 print-hex print-ascii**

```
 Listening on ge-2/0/3.1, capture size 96 bytes

 11:49:41.436682  In PPPoE PADI [Service-Name "Service1"] [Host-Uniq UTF8]
[TAG-0x120 UTF8] [Vendor-Specific UTF8]
 0x0000   ffff ffff ffff 0090 1a42 0ac1 8100 029a     .........B......
 0x0010   8863 1109 0000 00c9 0101 0008 5365 7276     .c..........Serv
 0x0020   6963 6531 0103 0004 1200 9c43 0120 0002     ice1.......C....
 0x0030   044a 0105 00ab 0000 0de9 0124 783a 3132     .J.........$x:12
 0x0040   3030 3963                                   009c
```

You can then use the **show pppoe service-name-tables** command to determine whether you have misspelled the name of the service or perhaps not configured the service at all.

Cause Typical misconfigurations appear in the service name table configurations.

Solution Use the appropriate statements to correct the misconfiguration.

Related Documentation

- Configuring PPPoE Service Name Tables on page 195
- **show pppoe service-name-tables on page 729**
- **show pppoe statistics on page 734**
- **show pppoe underlying-interfaces on page 736**
- *PPPoE Overview*
- *Ethernet Interfaces Feature Guide for Routing Devices*

CHAPTER 20

Changing the Behavior of PPPoE Control Packets

Enabling Advertisement of Named Services in PADO Control Packets

You can enable advertisement of named services in PADO control packets sent by the router to the PPPoE client to indicate the services that the router can offer. By default, advertisement of named services in PADO packets is disabled. You can enable PADO advertisement as a global option on the router when you configure the PPPoE protocol.

NOTE: **Make sure the combined number and length of all named services advertised in the PADO packet does not exceed the MTU size of the PPPoE underlying interface.**

To enable advertisement of named services in PADO packets:

- Configure the PPPoE protocol to enable PADO advertisement:

```
[edit protocols pppoe]
user@host# set pado-advertise
```

Related Documentation

- Understanding PPPoE Service Name Tables on page 188
- Configuring PPPoE Service Name Tables on page 195

- *PPPoE Overview*

Disabling the Sending of PPPoE Access Concentrator Tags in PADS Packets

By default, a router that functions as an access concentrator (AC) sends the AC-Name and AC-Cookie tags, along with the Service-Name, Host-Uniq, Relay-Session-Id, and PPP-Max-Payload tags, in the PPPoE Active Discovery Session (PADS) packet when it confirms a session with a PPPoE client. The AC-Name and AC-Cookie tags are defined as follows:

- AC-Name—String that uniquely identifies the particular AC
- AC-Cookie—Tag used by the AC to help protect against denial-of-service (DoS) attacks

If it is necessary for compatibility with your network equipment, you can prevent the router from sending the AC-Name and AC-Cookie tags in the PADS packet.

To prevent the router from transmitting the AC-Name and AC-Cookie tags in the PADS messages:

- Specify that PADS messages with AC-Name and AC-Cookie tags are not sent.

  ```
  [edit protocols pppoe]
  user@host# set no-send-pads-ac-info
  ```

  The **no-send-pads-ac-info** statement affects PADS packets sent only on PPPoE interfaces configured on the router after you configure this statement. It has no effect on PADS packets sent on previously created PPPoE interfaces.

Related Documentation

- *PPPoE Overview*

Discarding PADR Messages to Accommodate Abnormal CPE Behavior

This topic describes how to avoid a situation where certain CPEs respond inappropriately to normal router behavior.

During PPPoE session negotiation, the router returns PADS messages in response to PADR messages when it accepts or rejects the PPPoE session. The router adds an error tag to the PADS message when it detects a problem.

AC-System-Error is one such tag. This tag is inserted when the router imposes automatic throttling in response to excessive CPU consumption, excessive subscriber connections, or physical interfaces cycling up and down.

When the CPE receives a PADS message with this tag, the typical behavior is to retry sending PADR messages to the router or to restart session negotiation by sending PADI messages. However, some CPEs may respond inappropriately with the result that their subscribers are never connected until the CPE is rebooted.

To avoid this situation when such CPEs have access to your network, you can configure the router to silently discard PADR messages in situations where the PADS would include the AC-System-Error tag. The consequence is that the CPE resends PADR messages. When the conditions that result in the AC-System-Error tag are no longer present, the router once again evaluates PADR packets to determine whether to accept or reject the session.

To silently discard PADR packets:

- Specify that PADS messages with AC-System-Error tags are not sent.


```
[edit protocols pppoe]
user@host# set no-send-pads-error
```

Related Documentation

- *PPPoE Overview*

CHAPTER 21

Monitoring and Managing Dynamic PPPoE for Subscriber Access

Verifying and Managing Dynamic PPPoE Configuration

Purpose View or clear information about dynamic PPPoE logical interfaces, underlying interfaces for dynamic PPPoE logical interfaces, and PPPoE statistics.

Action

- To display information about the properties of all PPPoE underlying interfaces associated with a dynamic PPPoE profile:

  user@host> **show pppoe underlying-interfaces**

- To display information about the PPPoE properties of a specified underlying interface associated with a dynamic PPPoE profile:

  user@host> **show pppoe underlying-interfaces *interface-name***

- To display session-specific information about PPPoE interfaces, including whether the interface was dynamically created or statically created:

  user@host> **show pppoe interfaces**

- To display information for a specified PPPoE service name table, including the assigned dynamic profile and routing instance, if configured:

  user@ host> **show pppoe service-name-tables *table-name***

- To display information about all active PPPoE sessions on the router:

  user@host > **show pppoe sessions**

- To display information for all active PPPoE sessions established for a specified service name:

  user@host > **show pppoe sessions service *service-name***

- To display information for all active PPPoE sessions established for a specified agent circuit identifier (ACI) or agent remote identifier (ARI) string:

  user@host > **show pppoe sessions aci "west-ge-2/0/3"**
  user@host > **show pppoe sessions ari "sunnyvale"**

- To display PPPoE control packet statistics for all PPPoE sessions:

user@host> show pppoe statistics

- To display PPPoE control packet statistics for a specified PPPoE underlying interface:

  user@host> show pppoe statistics ***interface-name***

- To clear (reset) PPPoE control packet statistics for all PPPoE sessions:

  user@host> clear pppoe statistics

- To clear (reset) PPPoE control packet statistics for a specified underlying Ethernet interface:

  user@host> clear pppoe statistics ***underlying-interface-name***

- To display summary information about PPPoE subscriber sessions currently undergoing lockout or currently in a lockout grace period on all PPPoE underlying interfaces:

  user@host> show pppoe lockout

- To display summary information about PPPoE subscriber sessions currently undergoing lockout or currently in a lockout grace period on the specified PPPoE underlying interface:

  user@host> show pppoe lockout ***underlying-interface-name***

- To display information about the lockout condition or lockout grace period for all PPPoE subscriber sessions associated with the specified ATM encapsulation type identifiers:

  user@host> show pppoe lockout atm-identifier device-name *device-name* vpi *vpi-identifier* vci *vci-identifier*

- To display information about the lockout condition or lockout grace period for all PPPoE subscriber sessions associated with the specified VLAN encapsulation type identifiers:

  user@host> show pppoe lockout vlan-identifier **device-name *device-name* svlan-id *svlan-identifier* vlan-id *vlan-identifier***

Related Documentation

- CLI Explorer

PART 4

Configuring MLPPP for Subscriber Access

CHAPTER 22

MLPPP Support for LNS and PPPoE Subscribers Overview

MLPPP Overview

Multilink Point-to-Point Protocol (MLPPP) aggregates multiple PPP physical links into a single virtual connection, or logical bundle. More specifically, MLPPP bundles multiple link-layer channels into a single network-layer channel. Peers negotiate MLPPP during the initial phase of Link Control Protocol (LCP) option negotiation. Each router indicates that it is multilink capable by sending the multilink option as part of its initial LCP configuration request.

An MLPPP bundle can consist of multiple physical links of the same type—such as multiple asynchronous lines—or can consist of physical links of different types—such as leased synchronous lines and dial-up asynchronous lines.

Packets received with an MLPPP header are subject to fragmentation, reassembly, and sequencing. Packets received without the MLPPP header cannot be sequenced and can be delivered only on a first-come, first-served basis.

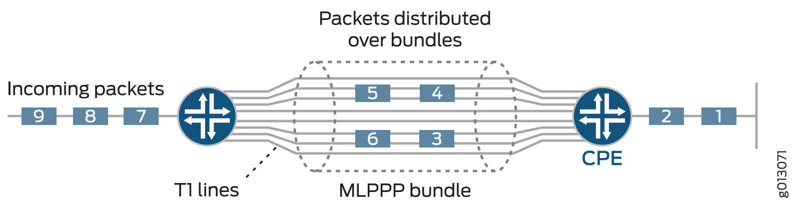
MLPPP for subscriber access is supported starting in Junos OS Release 14.1.

This section contains the following topics:

Traditional MLPPP Application

MLPPP is used to bundle multiple low speed links to create a higher bandwidth pipe such that the combined bandwidth is available to traffics from all links, and to support link fragmentation and interleaving (LFI) support on the bundle to reduce the transmission delay of high priority packets. LFI interleaves voice packets with fragmented data packets to ensure timely delivery of voice packets. Figure 5 on page 222 shows how incoming packets are distributed and aggregated into an MLPPP bundle.

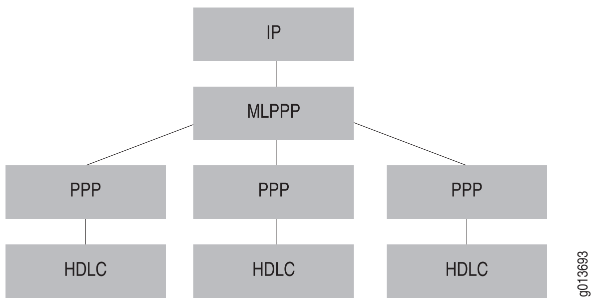
Figure 5: MLPPP Aggregation of Traffic Into Single Bundle



Because MLPPP aggregates multiple link-layer channels onto a single network-layer IP interface, protocol layering within the router is different than for non-multilink PPP.

Figure 6 on page 222 illustrates interface stacking with MLPPP.

Figure 6: Structure of MLPPP



MLPPP LCP Negotiation Option

Multilink PPP adds the multilink maximum received reconstructed unit (MRRU) option for LCP negotiation. The MRRU option has two functions:

- It informs the other end of the link the maximum reassembled size of the PPP packet payload that the router can receive.
- It informs the other end that the router supports MLPPP.

When you enable multilink on your router, the router includes the MRRU option in LCP negotiation with the default value set to 1500 bytes (user-configurable option) for PPP. If the remote system rejects this option, the local system determines that the remote system does not support multilink PPP and it terminates the link without negotiation.

NOTE: The router does not bring up a link if the MRU value received from a peer device differs from the MRRU value received from the peer.

Release History Table

Release	Description
14.1	MLPPP for subscriber access is supported starting in Junos OS Release 14.1.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Supported Features for MLPPP LNS and PPPoE Subscribers on the MX Series on page 226
- Understanding MLPPP Link Fragmentation and Interleaving on page 229

MLPPP Support for LNS and PPPoE Subscribers Overview

Starting in Junos OS Release 14.1, multilink PPP (MLPPP) support is provided to LNS (L2TP network server) and PPPoE (Point-to-Point Protocol over Ethernet) terminated and tunneled subscribers running on MX Series with access-facing MPC2s.

For customers with both MLPPP and single link PPP clients, the router needs to determine client capability during link control protocol (LCP) negotiation and support either multilink or single link access modules accordingly (mixed mode support).

This section contains the following topics:

Single Member Link MLPPP Bundle Support

MLPPP running on the MX Series provides link fragmentation and interleaving (LFI) support for a single-link bundle. Each bundle contains a single member link only; configuration of multiple member links belonging to the same bundle are rejected. However, LFI enables the single subscriber session to send small, high priority packets interleaving with large packets without introducing unacceptable transmission delay for high priority small packets. LFI interleaves voice packets with fragmented data packets to ensure timely delivery of voice packets and to guarantee voice quality.

Customers with lower bandwidth subscribers benefit from the MLPPP LFI support. With the traditional non-MLPPP application, the CPE (customer premises equipment) device performs the fragmentation prior to the PPP encapsulation and then relies on the application at the far end to perform the reassembly. With the MLPPP solution, the burden to reassemble the packets on the customer servers and the far-end application is removed, and control is given to the service provider for fragmentation and reassembly.

NOTE: **A maximum of 8000 MLPPP bundles is supported.**

Member Link and Bundle Configuration

An MLPPP subscriber consists of two IFLs (logical interfaces), a member link, and a bundle. For MLPPP subscribers, you can configure the member link and bundle statically, or dynamically using dynamic profiles.

- Static MLPPP Subscribers—You must configure both member link and bundle IFLs manually before the member link IFL can start LCP (link control protocol) negotiation either for an LNS session or for a PPPoE session.
- Dynamic MLPPP Subscribers—You configure dynamic member IFLs using dynamic profiles. The member link dynamic profile includes the **family mlppp** statement containing the bundle dynamic profile and the service interface (**si**), or a pool of service interfaces. This information is then used to create the dynamic bundle IFL.

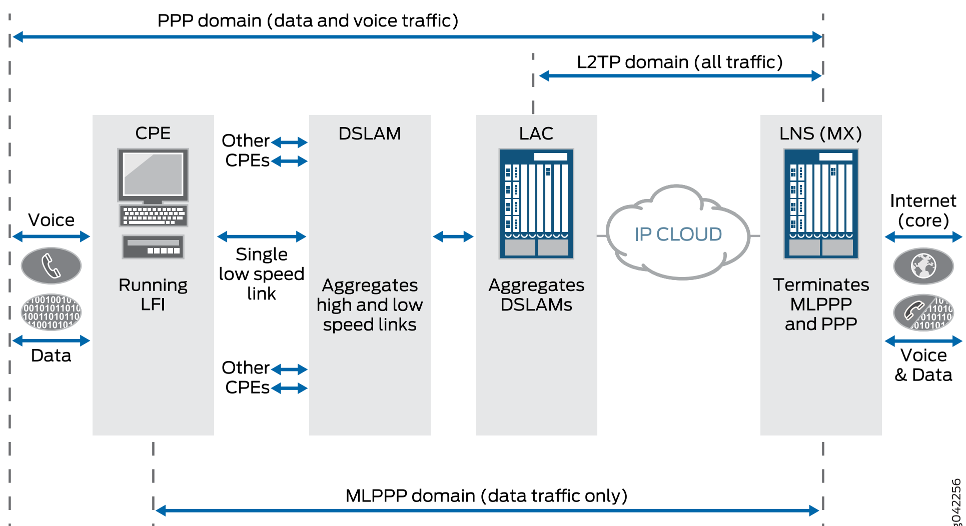
Each bundle accepts only one member link. If more than one member link attempts to join the same bundle, the system fails the new member session.

Dual-stack is supported for the bundle.

LNS Subscribers and MX Series

Figure 7 on page 224 shows a network diagram with the MX Series functioning as the LNS. Both PPP and MLPPP bundles are terminated at the LNS.

Figure 7: MLPPP Bundles Terminated at MX Series as the LNS Network



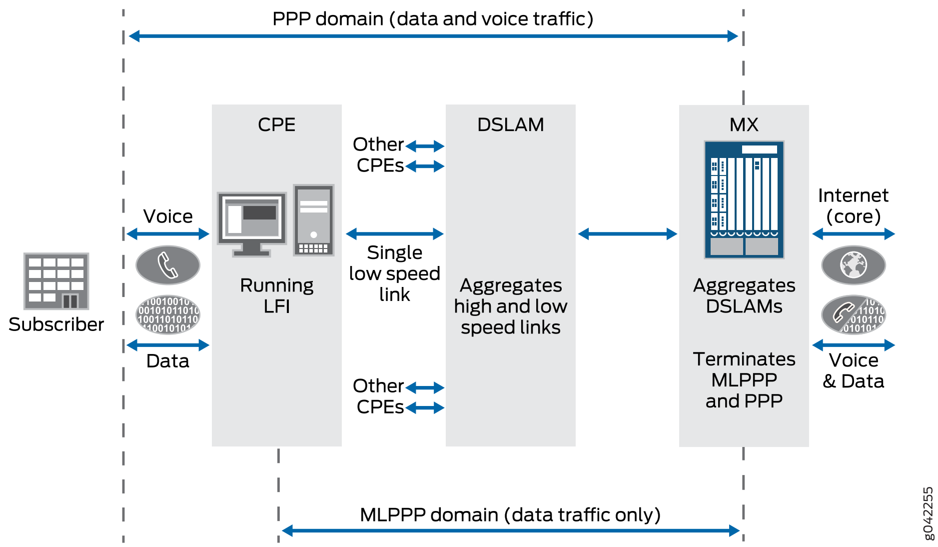
The following three domains are shown passing traffic through the LNS network:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only
- L2TP domain—Contains all types of traffic

PPPoE Subscribers and MX Series

Figure 8 on page 225 shows a network diagram with the MX Series terminating PPPoE sessions that include both the PPP and MLPPP bundles.

Figure 8: PPPoE Sessions Terminated at MX Series



The following two domains are shown passing traffic through the network:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, multilink PPP (MLPPP) support is provided to LNS (L2TP network server) and PPPoE (Point-to-Point Protocol over Ethernet) terminated and tunneled subscribers running on MX Series with access-facing MPC2s.

Related Documentation

- MLPPP Overview on page 221
- Supported Features for MLPPP LNS and PPPoE Subscribers on the MX Series on page 226
- Mixed Mode Support for MLPPP and PPP Subscribers Overview on page 227
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239

Supported Features for MLPPP LNS and PPPoE Subscribers on the MX Series

Starting in Junos OS Release 14.1, the following features are supported for multilink PPP (MLPPP) for L2TP network server (LNS) and Point-to-Point Protocol over Ethernet (PPPoE, terminated and tunneled) subscribers on the MX Series:

- Supports MLPPP for static and dynamic LNS subscribers and PPPoE subscribers.
- Supports each MLPPP bundle containing a single member link.
- Anchors the bundle logical interface (IFL) on the inline services **si** interface.
- Runs the bundle IFL on an MX Series that enables shaping and queuing at the bundle to minimize fragment reordering.
- Supports configurable service device pools for load-balancing bundle IFLs.
- Supports the co-existence for member link IFL and the bundle IFL on different lookup engines.
- Supports fragmentation maps for both static and dynamic **si** interfaces, and supports multiple forwarding classes pointing to a single queue for **si** interface attachments.
- Provides fragmentation of low-priority packets towards the subscriber, and reassembly of low-priority packets towards the core, and availability of per-bundle fragmentation and reassembly statistics.
- Supports bundle **family inet** and **family inet6**, including DHCPv6 prefix delegation over MLPPP bundle for both LNS and PPPoE MLPPP subscribers.
- Supports lawful intercept over MLPPP bundles.
- Provides mixed mode (PPP and MLPPP) support for subscribers.
- Maintains existing LNS and PPPoE subscriber management functionalities.
- Supports graceful Routing Engine switchover (GRES).

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, the following features are supported for multilink PPP (MLPPP) for L2TP network server (LNS) and Point-to-Point Protocol over Ethernet (PPPoE, terminated and tunneled) subscribers on the MX Series:

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Mixed Mode Support for MLPPP and PPP Subscribers Overview on page 227
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239

Mixed Mode Support for MLPPP and PPP Subscribers Overview

Existing customer edge subscriber services separate MLPPP and PPP support for subscribers. However, if a subscriber interface is configured for MLPPP and the customer premises equipment (CPE) does not support MLPPP, then the subscriber login fails.

In an environment where MLPPP and PPP subscribers are mixed and you cannot easily manage the subscriber types by classifying them into separate groups using dynamic profiles, the MX Series needs the capability to renegotiate Link Control Protocol (LCP) in PPP if the CPE rejects LCP negotiation in MLPPP. This capability is known as *mixed mode support*.

Mixed mode uses common configuration and flexibility to support PPP and MLPPP. If you configure a subscriber interface using the **family mlppp** and **family inet/inet6** statements for PPP-only CPE, mixed mode support enables additional LCP negotiation exchanges to successfully negotiate LCP in PPP. Mixed mode supports static and dynamic PPPoE (terminated and tunneled) and LNS (L2TP network server) subscribers.

This section contains the following topics:

PPPoE Terminated and Tunneled Subscribers

If you do not configure the **family mlppp** statement for a subscriber interface, the MX Series negotiates LCP in PPP as it currently does, and any LCP request that contains MLPPP options is rejected.

However for PPPoE subscribers, if you configure the **family mlppp** statement for a subscriber interface, the MX Series negotiates LCP in MLPPP with the CPE. If the CPE rejects MLPPP, then the MX Series renegotiates LCP in PPP with the CPE.

Mixed mode operation for a LAC (tunneled PPPoE) subscriber is the same as for a terminated PPPoE subscriber. The authentication phase has no effect on LAC mixed mode operation because LCP negotiation must be completed prior to authentication.

LNS Subscribers

For LNS subscribers, the MX Series negotiates LCP as follows:

- If proxy data from the LAC indicates that MLPPP was negotiated, and the proxy data is acceptable, and the **lcp-renegotiation** statement is not configured, then the proxy is accepted and the subscriber is MLPPP.
- If proxy data from the LAC indicates that PPP was negotiated, or if there was no proxy data from LAC, or if the **lcp-renegotiation** statement is configured for the LAC, then the MX Series starts LCP negotiation in MLPPP with the CPE.

  If the CPE rejects MLPPP, then the MX Series renegotiates LCP in PPP with the CPE.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Supported Features for MLPPP LNS and PPPoE Subscribers on the MX Series on page 226
- Configuring L2TP Client Access to Support MLPPP for Static Subscribers on page 245
- Example: Configuring Dynamic LNS MLPPP Subscribers on page 273

CHAPTER 23

Configuring MLPPP Link Fragmentation and Interleaving

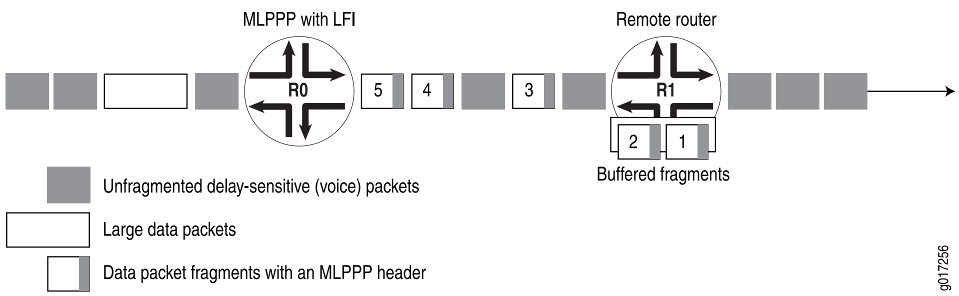
Understanding MLPPP Link Fragmentation and Interleaving

Priority scheduling on a multilink (MLPPP) bundle determines the order in which an output interface transmits traffic from an output queue. The queues are serviced in a weighted round-robin fashion. But when a queue containing large packets starts using the MLPPP bundle, small and delay-sensitive packets must wait their turn for transmission. Because of this delay, some slow links can become useless for delay-sensitive traffic.

Link fragmentation and interleaving (LFI) solves this problem by reducing delay and jitter on links by fragmenting large packets and interleaving delay-sensitive packets with the resulting smaller packets for simultaneous transmission across multiple links of a MLPPP bundle.

Figure 9 on page 229 shows how LFI processes packets.

Figure 9: LFI Packet Processing



Device R0 and Device R1 have LFI enabled. When Device R0 receives large and small packets, such as data and voice packets, it divides them into two categories:

- All voice packets and any other packets configured to be treated as voice packets are categorized as LFI packets and transmitted without fragmentation or an MLPPP header.
- The remaining non-LFI (data) packets are fragmented or unfragmented based on the configured fragmentation threshold. Packets larger than the fragmentation threshold are fragmented. An MLPPP header (containing a multilink sequence number) is added to all non-LFI packets, fragmented and unfragmented.

Fragmentation is performed according to the fragmentation threshold that you configure. For example, if you configure a fragmentation threshold of 128 bytes, all packets greater than 128 bytes are fragmented. When Device R1 receives the packets, it sends the unfragmented voice packets immediately but buffers the packet fragments until it receives the last fragment for a packet. In this example, when Device R1 receives fragment 5, it reassembles the fragments and transmits the whole packet.

The unfragmented data packets are treated as a single fragment. Device R1 transmits the unfragmented data packets as it receives them and does not buffer them.

Related Documentation

- Understanding MLPPP and Fragmentation-Maps on page 230
- Understanding Fragmented Packet Queuing on page 233
- Understanding Sequenced Packet Fragment Drops on page 237

Understanding MLPPP and Fragmentation-Maps

You enable link fragmentation and interleaving (LFI) on inline service (**si**) interface bundles by configuring **fragmentation-maps**. For multilink PPP (MLPPP) bundle support, you must configure **fragmentation-maps** in **class-of-services** and reference them in either the bundle dynamic-profile or bundle logical interface (IFL) configuration.

BEST PRACTICE: For MX Series and class-of-service (CoS) implementation, you can configure a fragmentation map to have two forwarding classes pointing to the same queue. However, if you assign multiple forwarding classes to a single queue, you must also reference all of those forwarding classes in a fragmentation map to enable the expected behavior.

If you reference only one of the forwarding classes assigned to a queue, then the other forwarding classes in that queue can clog that queue with large packets. For previous existing fragmentation-map implementations, this condition did not occur because the other forwarding classes inherited this fragmentation behavior assigned to that queue.

If you assign multiple forwarding classes to a queue, create a fragmentation map that addresses each of those forwarding classes. This results in fragmentation-map behavior that more closely reflects the expected behavior based on the fragmentation CLI, while the existing fragmentation-map behavior remains unchanged.

This section contains the following topics:

Fragmentation-Map Settings

By setting **fragmentation-maps** under **class-of-service**, you can configure the fragmentation properties on a particular forwarding class, as shown in the following sample output:

```
class-of-service {
 fragmentation-maps {
  map-name {
   forwarding-class class-name {
    fragment-threshold bytes;
    no-fragmentation;
   }
  }
 }
}
```

NOTE: **The per-forwarding class drop-timeout statement enabling you to change the resequencing interval in milliseconds for each fragmentation class is not supported in the fragmentation map.**

You can configure the following settings for **fragmentation-maps**:

- (Optional) **fragment-threshold**—Sets a per-forwarding class fragmentation threshold in bytes. **fragment-threshold** sets the maximum size of each multilink fragment. An extra MLPPP header is prepended to these multilink fragments. This same header is also prepended to packets of these forwarding classes that are smaller than the fragmentation threshold.
  - For MLPPP bundle interface configuration, you can set the **fragment-threshold** for all forwarding classes. Any fragmentation threshold defined by a **fragmentation-map** and applied to that interface takes precedence for the forwarding classes referenced by that **fragmentation-map**.
  - For **si** bundle IFL configuration, the **fragment-threshold** applies to all forwarding classes. The **fragment-threshold** setting in **fragmentation-maps** for a particular forwarding class, if configured, overrides the threshold configured in **si** bundle IFL for that class. If no **fragment-threshold** is configured anywhere, packets are still fragmented if the threshold exceeds the smallest MTU or MRRU of all links in the bundle.

    NOTE: **The per-forwarding class multilink-class statement enabling you to map a forwarding class into a multiclass MLPPP is not supported for si MLPPP bundles.**

- (Required) **no-fragmentation**—Sets traffic on a particular forwarding class to be interleaved rather than fragmented. The **no-fragmentation** setting is required to define high priority traffic and indicates that an extra fragmentation header is not prepended to the packets of this forwarding class

NOTE: For a given forwarding class, you can include either the **fragment-threshold** setting or the **no-fragmentation** setting; they are mutually exclusive.

Understanding Fragmentation-Map Bindings

Using MLPPP in this manner generates two subscriber interfaces for each subscriber:

- The inline services (**si**) bundle interface IFL.
- The PPP member link IFL.

The data plane traffic destined for the subscriber exits through the (**si**) bundle interface IFL, and passes through the PPP member link IFL. Queuing is provided for both of these IFLs, which then requires the ability to define class of service.

When you are creating the two subscriber interfaces, the MX Series authenticates only a single user, and the RADIUS server only provides a single set of class-of-service (CoS) attributes. These CoS RADIUS attributes are then applied to both the (**si**) bundle interface IFL and the PPP member link IFL.

NOTE: For this scenario to succeed, you must have already configured the dynamic profiles for these IFLs to accept CoS RADIUS attributes enabling both the (si) bundle interface IFL and the PPP member link IFL to have the same CoS attributes.

To apply different CoS to the (**si**) bundle interface IFL and the PPP member link IFL, you can set CoS RADIUS attributes to specify the Transmission Control Protocol (TCP) name to which the attribute is intended. The dynamic profile associated with the (**si**) bundle interface IFL contains the CoS TCP for that IFL, and the dynamic profile associated with the PPP member link IFL contains the CoS TCP for that IFL.

The RADIUS attributes each include a target TCP. When configured, two sets of CoS RADIUS attributes are retrieved with the member link authentication; one set with the (**si**) bundle interface IFL TCP specified, and the other set with the PPP member link IFL TCP specified.

Related Documentation

- **fragmentation-maps on page 469**
- Understanding MLPPP Link Fragmentation and Interleaving on page 229
- Understanding Fragmented Packet Queuing on page 233
- Understanding Sequenced Packet Fragment Drops on page 237

Understanding Fragmented Packet Queuing

Fragmented Multilink PPP (MLPPP) packets have a multilink header containing a multilink sequence number. The sequence numbers on these fragments must be preserved so that the remote device receiving these fragments can correctly reassemble them into a complete packet. To accommodate this requirement, Junos OS queues all packets on member links of a multilink bundle with a MLPPP header into a single queue (q0) by default.

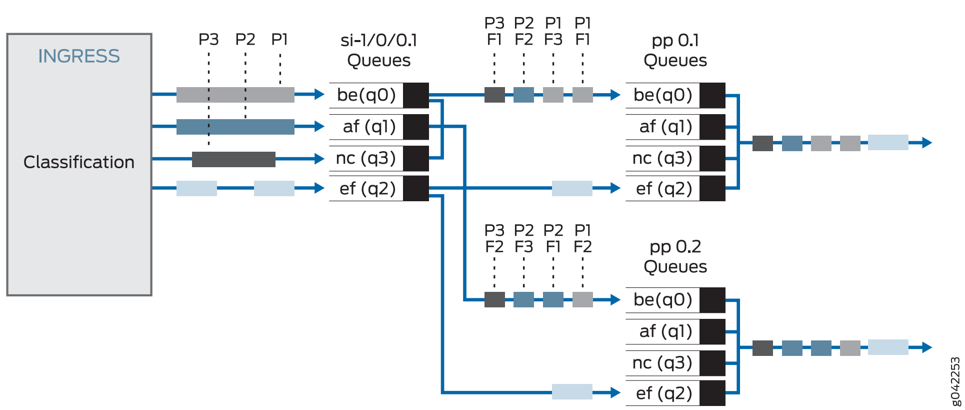
- Traffic flows of a forwarding class that has MLPPP fragmentation configured are distributed from the inline services **si** bundle interface queues to the member link queues (queue 0) following a round-robin method.
- Traffic flows of a forwarding class without MLPPP fragmentation are distributed from the **si** bundle interface queues to the member link queues based on a hashing algorithm computed from the destination address, source address, and IP protocol of the packet.

  If the IP payload contains TCP or UDP traffic, the hashing algorithm also includes the source and destination ports. As a result, all traffic belonging to one traffic flow is queued to one member link.

Figure 10 on page 234 shows how traffic is queued on an MLPPP multilink bundle and its member links. Packet flows in the figure use the notation P*x*,F*x*; for example, P1,F1 represents Packet 1, Fragment 1.

- There are four queues.
- Forwarding classes be, af, and nc are mapped to queues q0, q1, and q3, respectively, on the multilink bundle. These are fragmented.
- Forwarding class ef contains voice traffic, and is mapped to q2 and is not fragmented.
- Interface **si-1/0/0.1** is the bundle, and **pp0.1** and **pp0.2** are the member links for that bundle.

Figure 10: Queuing on Member Links



Queuing on member links proceeds as follows:

1. The packet fragments of forwarding classes be, af, and nc on the multilink bundle are mapped to q0 on Member Links 1 and 2. These packets are distributed from the **si** queues to the member links using a round-robin method.
2. The packets of forwarding class ef (voice) from the multilink bundle are mapped to q2 on the member links. This forwarding class is not fragmented. The packets are distributed from the **si** queues to the member links based on a hashing algorithm.
3. The network control packets from the multilink bundle are mapped to q0 on the member links. The bundle network control traffic is queued with the data flows on the member link. However, q3 on the member links transmits network control packets that exchange protocol information related to member links, such as packets exchanging hello messages on member links.

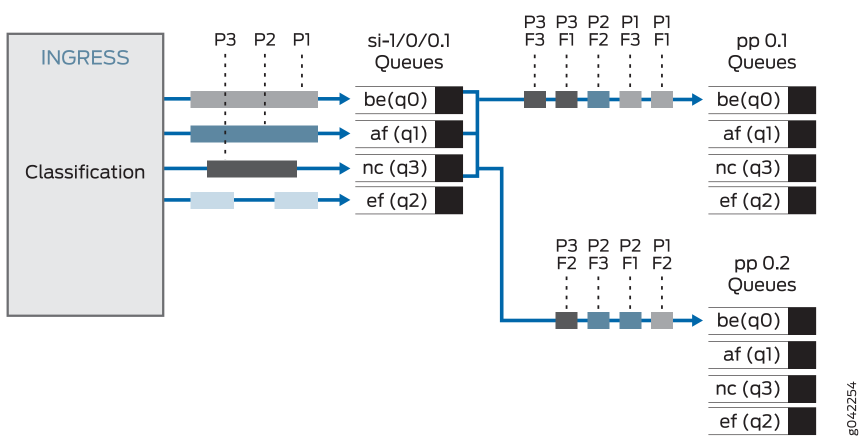
This section contains the following topics:

Queuing of Fragmented Packets to Member Links

On a multilink bundle, packet fragments from all forwarding classes with fragmentation enabled are transmitted to q0 on member links. On the q0 queues of member links, packets are queued using a round-robin method to enable per-fragment load balancing.

Figure 11 on page 235 shows how fragmented packet queuing is performed on the member links. Packet flows in the figure use the notation P*x*,F*x*; for example, P1,F1 represents Packet 1, Fragment 1.

Figure 11: Queuing of Fragmented Packets on Member Links



Packet fragments from the multilink bundle are queued to member links one by one using a round-robin method:

- Packet P1,F1 from q0 on the multilink bundle is queued to q0 on Member Link 1.
- Packet P1,F2 from q0 on the multilink bundle is queued to q0 on Member Link 2.

- Packet P1,F3 from q0 on the multilink bundle is queued to q0 on Member Link 1.
- Packet P2,F1 from q1 on the multilink bundle is queued to q0 on Member Link 2, and so on.

NOTE: **Packets that are part of the fragmented forwarding class, but are not fragmented, follow the same procedure.**

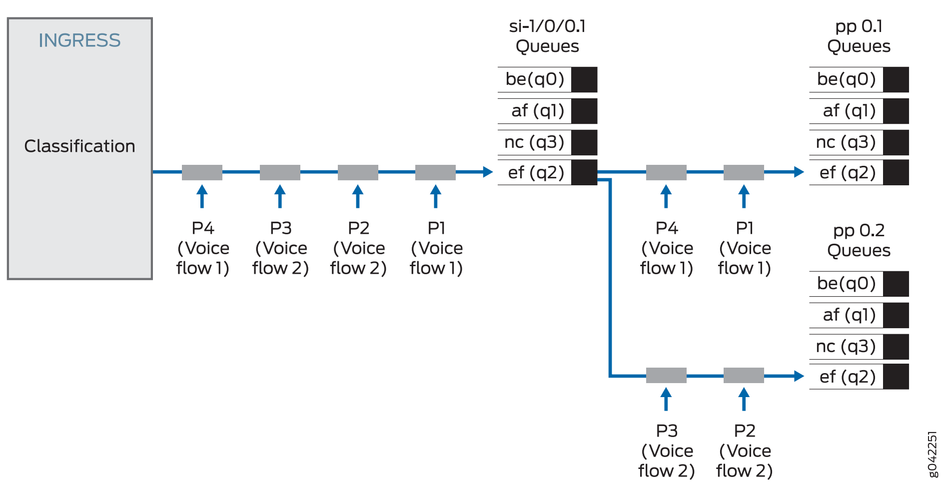
After exiting the **si** interface, Microcode adds a header of approximately 40 bytes to the MLPPP packets. When configuring the class-of-service shaping, you may need to adjust bytes to account for this.

Queuing of LFI Packets to Member Links

On a multilink bundle, all non-MLPPP encapsulated traffic [link fragmenting and interleaving (LFI) traffic] from the multilink bundle are queued to the queue as defined by the forwarding class of that packet.

Figure 12 on page 236 shows how LFI packet queuing is performed on the member links.

Figure 12: Queuing of LFI Packets on Member Links



The packets are distributed from the **si** interface to the member links based on a hashing algorithm computed from the source address, destination address, and IP protocol of the packet.

If the IP payload contains TCP or UDP traffic, the hashing algorithm also includes the source and destination ports. As a result, all traffic belonging to one traffic flow is queued to one member link.

Related Documentation

- Understanding MLPPP Link Fragmentation and Interleaving on page 229
- Understanding MLPPP and Fragmentation-Maps on page 230
- Understanding Sequenced Packet Fragment Drops on page 237

Understanding Sequenced Packet Fragment Drops

Multilink PPP (MLPPP) link fragmentation and interleaving (LFI) provides buffering at the receiver side of a link to reassemble MLPPP fragmented packets. Dropping of the packet fragments is a concern because the packet fragments' remainder consumes valuable bandwidth and buffer space, only to have it eventually being dropped.

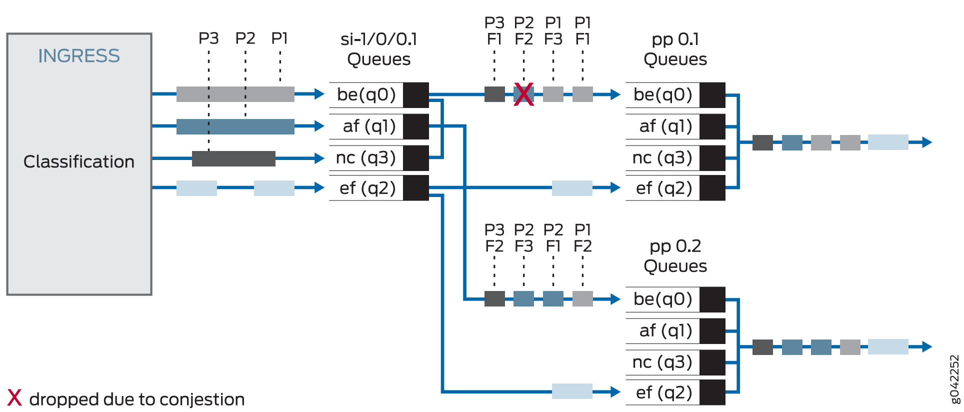
The MX Series provides two stages of queuing for packets exiting an MLPPP bundle:

- The first stage of queuing is performed at the inline services **si** interface.
- The second stage is performed by adding member link scheduler queues.

During the first stage of queuing at the **si** interface, when exiting from these queues, LFI packets are fragmented and assigned a sequence number. These fragmented packets are then distributed to the member links where they are queued for the second time.

Congestion at the member link queues can result in MLPPP packet fragments being dropped, as shown in Figure 13 on page 237. Packet flows in the figure use the notation P*x*,F*x*; for example, P1,F1 represents Packet 1, Fragment 1.

Figure 13: Dropped Sequenced Packet Fragment



Data packet and fragment P2,F2 is dropped due to congestion at the **pp0.1** queues. This occurs after the sequence numbers have been assigned for packet P2.

In a Broadband Remote Access Server (B-RAS) implementation, the bundle member links share the physical interface with other bundle member links, as well as with PPP subscriber interfaces, causing the physical interface to be oversubscribed and most likely creating congestion.

During the second stage of queuing, member link scheduler queues are added to provide a degree of protection against the port traffic congestion causing fragmented MLPPP packets to be dropped. See Figure 14 on page 238 and Figure 15 on page 238 for member link scheduler hierarchies.

NOTE: All MLPPP packets are sent to queue 0 (be).

Figure 14: si Bundle Interface Scheduler Hierarchy

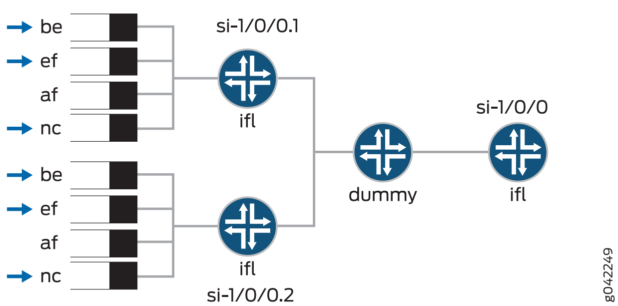
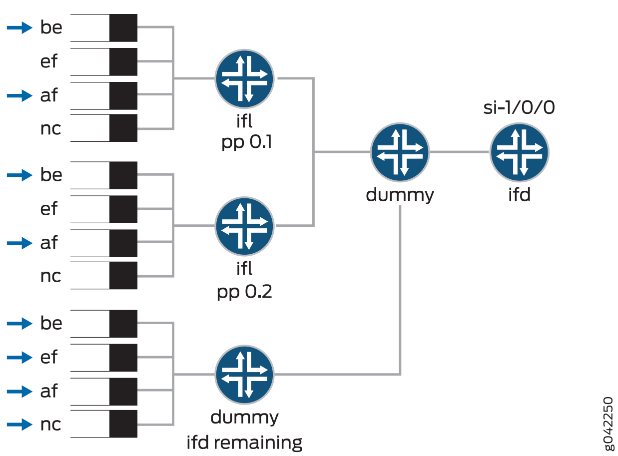


Figure 15: MLPPP Member Link Scheduler Hierarchy



Related Documentation

- Understanding MLPPP Link Fragmentation and Interleaving on page 229
- Understanding MLPPP and Fragmentation-Maps on page 230
- Understanding Fragmented Packet Queuing on page 233

CHAPTER 24

Configuring Inline Service Interfaces for LNS and PPPoE Subscribers

MLPPP Bundles and Inline Service Logical Interfaces Overview

Each MLPPP bundle for LNS or PPPoE (terminated and tunneled) subscribers is represented by an inline service (**si**) logical interface (IFL).

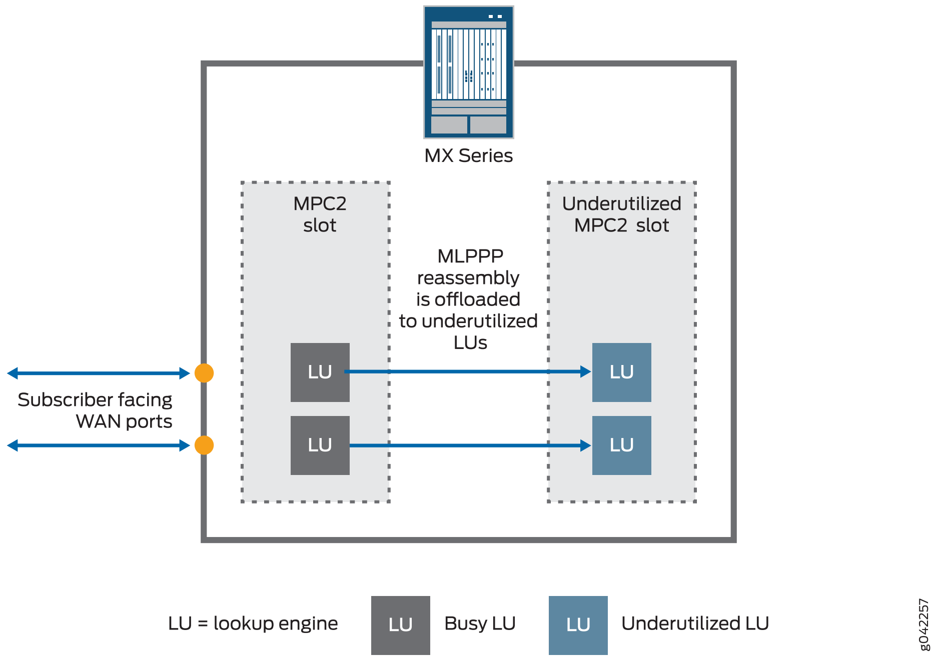
This topic contains the following sections:

Distribution of Reassembly Processing

L2TP network server (LNS) can sustain a throughput of approximately 67 percent of line rate for 64-byte packets. Additionally, MLPPP reassembly must be performed on a subset of these L2TP sessions. By introducing an **si** interface for the bundle, some of the MLPPP reassembly processing can be offloaded to another lookup engine different from the one that is performing the LNS processing.

For example, Figure 16 on page 240 shows a typical MX Series containing two access-facing MPC2 slots, with each slot containing two lookup engines. One or two of the lookup engines are underutilized within the MPC2 slots. The underutilized lookup engines are available to host **si** interfaces to offload MLPPP reassembly processing.

Figure 16: Distribution of MLPPP Reassembly Processing



NOTE: To minimize fragment reordering, the MLPPP si interface must be on an MPC2 where shaping and queuing is performed at the bundle.

Aggregation Point for True Multilink PPP

You can map each link of a multilink bundle to a different lookup engine for LNS processing. Using an **si** interface for the bundle guarantees that all fragments belonging to the same bundle arrive at a single lookup engine for reassembly.

LAC Subscriber Bundle

After a subscriber is tunneled, the bundle is no longer involved in both the control plane and the forwarding path, and both MLPPP bundle IFL and session ID are noted in the graphical user interface.

Related Documentation

- Enabling Inline Service Interfaces for PPPoE and LNS Subscribers on page 241
- Configuring Inline Service Interface for PPPoE and LNS Subscribers on page 242
- Understanding MLPPP Link Fragmentation and Interleaving on page 229

Enabling Inline Service Interfaces for PPPoE and LNS Subscribers

The inline service (**si**) interface is a virtual physical interface that resides on lookup engines. The **si** interface, referred to as an *anchor* interface, makes it possible to support multilink PPP (MLPPP) bundles without a special services PIC. The **si** interface is supported on MLPPP on the MX Series.

Four inline service interfaces are configurable per MPC-occupied chassis slot. The following MPC2 slots are supported:

- The MPC2-3D contains two lookup engines, each with two **si** interfaces.
- The MPC1-3D contains only one lookup engine and it hosts all four **si** interfaces.

You can configure the following inline service interfaces as anchor interfaces for MLPPP bundles: **si-slot/0/0**, **si-slot/1/0**, **si-slot/2/0**, and **si-slot/3/0**.

- For MLPPP over PPPoE subscribers, **family mlppp** is supported in **pp0** member link IFL, and the bundle is an **si** IFL.
- For MLPPP over LNS subscribers, **family mlppp** is supported in **si-** member link IFL, and the bundle is an **si** IFL.

You enable inline services for PICs 0 to 3 individually by setting the **inline-services** statement at the **[edit chassis]** hierarchy level for the FPCs.

The following example shows how to enable inline services for PIC 0 on MPC slot 1, and PIC 1 on MPC on slot 5, and set 10g as the bandwidth for tunnel traffic. As a result, both **si-1/0/0** and **si-5/0/0** are created for the specified PICs as well.

To enable inline service interfaces:

1. Access an MPC-occupied slot and the PIC where the interface is to be enabled.

   [edit chassis]
   user@host# **edit fpc *slot-number* pic *number***

2. Enable the interface and specify the amount of bandwidth reserved on each lookup engine for tunnel traffic using inline services.

   [edit chassis fpc *slot-number* pic *number*]
   user@host# **set inline-services *bandwidth***

The following shows sample output:

```
chassis {
    fpc 1 {
        pic 0 {
            inline-services {
                bandwidth 10g;
            }
        }
    }
    fpc 5 {
        pic 1 {
```

```
            inline-services {
                bandwidth 10g;
            }
        }
    }
}
```

Related Documentation

- Configuring Inline Service Interface for PPPoE and LNS Subscribers on page 242
- Configuring Service Device Pools for Load Balancing PPPoE and LNS Subscribers on page 243
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239

Configuring Inline Service Interface for PPPoE and LNS Subscribers

The inline service (**si**) interface is a virtual physical interface that resides on lookup engines. The **si** interface, referred to as an *anchor* interface, makes it possible to support multilink PPP (MLPPP) bundles without a special services PIC. The **si** interface is supported on MLPPP on the MX Series. Four inline service interfaces are configurable per MPC-occupied chassis slot.

For existing Layer 2 and Layer 3 services, the **si** interface **unit 0** is currently used to store the unilist next-hop information. However, you must reserve and configure **si** interface **unit 0** and set **family inet** for both PPPoE and LNS subscribers because the **si** interface implements the bundle functionality. Setting **family inet6** is ignored by the system.

The following example shows how to configure inline services for PIC 0 on MPC slot 1, and PIC 1 on MPC on slot 5, and set **unit 0 family inet** for both.

To configure inline service interfaces:

1. Access the service interface.

   [edit interfaces]
   user@host# **edit si-*slot/pic/port***

2. (Optional; for per-session shaping only) Enable the inline service interface for hierarchical schedulers and limit the number of scheduler levels to two.

   [edit interfaces si-*slot/pic/port*]
   user@host# **set hierarchical-scheduler maximum-hierarchy-levels 2**

3. (Optional; for per-session shaping only) Configure services encapsulation for inline service interface.

   [edit interfaces si-*slot/pic/port*]
   user@host# **set encapsulation generic-services**

4. Reserve and configure the IPv4 family (**inet**) on the reserved **unit 0** logical interface for PPPoE and LNS subscribers and bundle functionality.

   [edit interfaces si-*slot/pic/port*]
   user@host# **set unit 0 family inet**

The following shows sample output:

```
interfaces {
    si-1/0/0 {
        hierarchical-scheduler maximum-hierarchy-levels 2;
        encapsulation generic-services;
        unit 0 {
            family inet;
        }
    }
    si-5/1/0 {
        hierarchical-scheduler maximum-hierarchy-levels 2;
        encapsulation generic-services;
        unit 0 {
            family inet;
        }
    }
}
```

Related Documentation

- Configuring Service Device Pools for Load Balancing PPPoE and LNS Subscribers on page 243
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239
- Enabling Inline Service Interfaces for PPPoE and LNS Subscribers on page 241

Configuring Service Device Pools for Load Balancing PPPoE and LNS Subscribers

With dynamic L2TP network server (LNS) configuration, you can replace the **services-interfaces** with a **service-device-pool** in the tunnel-group for load balancing LNS subscribers. Optionally, you can use the **service-device-pool** statement for load balancing to dynamically select the inline services (**si**) interface for both bundle (PPPoE or LNS subscribers), and LNS member link, respectively.

NOTE: **The service-device-pool configuration enables interface overlap, which can result in over usage of the overlapped interfaces.**

Before you begin, enable the inline service interfaces for all FPC slots and PICs. See "Enabling Inline Service Interfaces for PPPoE and LNS Subscribers" on page 241.

The following example shows how to configure two service device pools (pool1 and pool2) for inline services for load balancing bundle and LNS member link.

To configure two service device pools:

1. Create the tunnel group.

   [edit services l2tp]
   user@host# **set tunnel-group** ***name***

2. Define the service device pools to assign **si** interfaces for load balancing.

   [edit services l2tp]
   user@host# **set service-device-pool** ***pool-name***

The following shows sample output when all referenced FPC slots and PICs had been enabled for inline services:

```
services {
    service-device-pools {
        pool pool1 {
            interface si-1/0/0;
            interface si-1/1/0;
            interface si-3/0/0;
        }
        pool pool2 {
            interface si-1/1/0;
            interface si-2/1/0;
            interface si-5/1/0;
        }
    }
}
```

Related Documentation

- Configuring Inline Service Interface for PPPoE and LNS Subscribers on page 242
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239
- Example: Configuring Dynamic LNS MLPPP Subscribers on page 273

CHAPTER 25

Configuring L2TP Access Client for MLPPP Subscribers

Configuring L2TP Client Access to Support MLPPP for Static Subscribers

To enable MLPPP over LT2P network server (LNS) support for MX Series, you must indicate whether MLPPP is supported for static subscribers from a particular L2TP client (LAC) by configuring the **multilink** statement currently supported in **access profile**. Access profiles define how to validate Layer 2 Tunneling Protocol (L2TP) connections and session requests. Within each L2TP access profile, you configure one or more clients (LACs). You can configure multiple access profiles and multiple clients within each profile.

With mixed mode support, the **multilink** statement enables MLPPP but does not set it. However, if you do not configure the **multilink** statement, MLPPP is not supported for static LAC subscribers.

The following two examples show L2TP access profile configurations for an MLPPP-capable static L2TP client and non-multilink (single link) static L2TP client.

To configure an L2TP access profile for MLPPP-capable static L2TP clients:

1. Create the access profile.

   [edit access]
   user@host# **edit profile** ***access-profile-name***

2. Configure characteristics for one or more clients (LACs).

   [edit access profile *access-profile-name*]
   user@host# **client** ***client-name***

3. Associate a group profile containing PPP attributes to apply for the PPP sessions being tunneled from this LAC client.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set user-group-profile** ***group-profile-name***

4. Configure the LNS to renegotiate the link control protocol (LCP) with the PPP client.

   [edit access profile *access-profile-name* client *client-name*] user@host# **set l2tp lcp-renegotiation**

5. Configure the maximum number of sessions allowed in a tunnel from the client (LAC).

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp maximum-sessions-per-tunnel *number***

6. Configure the tunnel password used to authenticate the client (LAC).

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp shared-secret *shared-secret***

7. (Optional) Specify a local access profile that overrides the global access profile and the tunnel group AAA access profile to configure RADIUS server settings for the client.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp aaa-access-profile**

8. Specify that the L2TP client is MLPPP-capable for static subscribers.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp multilink**

MLPPP is first negotiated with static subscribers coming from the LAC peer group profile, **ce-lac-1-gp**, but then switches to PPP if the subscriber rejects MLPPP. The following shows sample output for MLPPP-capable static L2TP client:

```
access profile {
        ce-l2tp-profile1 {
        client ce-lac-1 {
            user-group-profile ce-lac-1-gp;
            l2tp {
                interface-id not-used;
                lcp-renegotiation;
                maximum-sessions-per-tunnel 2000;
                shared-secret "$9$2wgUHQF/9pB";
                aaa-access-profile ce-aaa-profile;
                multilink;
            }
        }
    }
}
```

To configure an L2TP access profile for non-MLPPP, or single link static L2TP clients, repeat Step 1 through Step 7 for configuring an L2TP access profile for multilink-capable static L2TP clients. Do not **set l2tp multilink**.

Only PPP is negotiated with static subscribers from the LAC peer group profile, **ce-lac-2-gp**, and an LCP configuration request from the customer premises equipment (CPE) with maximum received reconstructed unit (MRRU) option is rejected. The following shows sample output for single link static L2TP client:

```
access profile {
        ce-l2tp-profile1 {
        client ce-lac-2 {
            user-group-profile ce-lac-1-gp;
            l2tp {
                interface-id not-used;
                maximum-sessions-per-tunnel 1000;
                shared-secret "$9$2aBcXyz/2lP";
                aaa-access-profile ce-aaa-profile;
```



```
                                                    ## multilink not entered,
static subscriber is single link only
            }
        }
    }
}
```

Related Documentation

- Mixed Mode Support for MLPPP and PPP Subscribers Overview on page 227
- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Example: Configuring Static LNS MLPPP Subscribers on page 249

Configuring L2TP Client Access to Support MLPPP for Dynamic Subscribers

To enable support for MLPPP over LT2P network server (LNS) you configure the **family mlppp** statement in the **dynamic profile** name, which indicates that MLPPP is supported for dynamic subscribers from a particular L2TP client (LAC).

NOTE: **The multilink statement used to enable MLPPP for static LNS subscribers is ignored for dynamic LNS subscribers if it is configured.**

You can configure a dynamic profile name for the LAC using **access profile** from the **l2tp** statement. If you specify a dynamic profile name in the L2TP client access profile, it overrides the **dynamic-profile** ***name*** specified in the **tunnel-group** used to create the dynamic subscriber interface. If you do not configure a dynamic profile name in the L2TP client access profile, then the **dynamic-profile** ***name*** specified in the **tunnel-group** is used.

The following example shows an L2TP access profile configuration with a dynamic profile name for dynamic LNS subscribers.

To configure an L2TP access profile configuration with a dynamic profile name for dynamic LNS subscribers:

1. Create the access profile.

   [edit access]
   user@host# **edit profile *access-profile-name***

2. Configure characteristics for one or more clients (LACs).

   [edit access profile *access-profile-name*]
   user@host# **client *client-name***

3. Associate a group profile containing PPP attributes to apply for the PPP sessions being tunneled from this LAC client.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set user-group-profile *group-profile-name***

4. Configure the maximum number of sessions allowed in a tunnel from the client (LAC).

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp maximum-sessions-per-tunnel *number***

5. Configure the tunnel password used to authenticate the client (LAC).

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp shared-secret *shared-secret***

6. (Optional) Specify a local access profile that overrides the global access profile and the tunnel group AAA access profile to configure RADIUS server settings for the client.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp aaa-access-profile**

7. Specify the dynamic profile name for the dynamic LNS subscriber.

   [edit access profile *access-profile-name* client *client-name*]
   user@host# **set l2tp dynamic-profile *name***

If the **family mlppp** statement is configured in **dynamic-profile**, MLPPP is negotiated first; otherwise, only PPP is negotiated. The following shows sample output for an L2TP access profile configuration with a dynamic profile name for dynamic LNS subscribers:

```
access profile {
        ce-l2tp-profile2 {
        client ce-lac-3 {
            user-group-profile ce-lac-1-gp;
            l2tp {
                interface-id not-used;
                maximum-sessions-per-tunnel 2000;
                shared-secret "$9$2wgUHQF/9pB";
                aaa-access-profile ce-aaa-profile;
                dynamic-profile ml-lns-member-prof;
            }
        }
    }
}
```

Related Documentation

- *Configuring a Dynamic Profile for Dynamic LNS Sessions*
- Example: Configuring Dynamic LNS MLPPP Subscribers on page 273
- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223

CHAPTER 26

Configuring Static MLPPP Subscribers for MX Series

Example: Configuring Static LNS MLPPP Subscribers

This example shows how to configure static L2TP network server (LNS) multilink (MLPPP) subscribers.

Requirements

This example uses the following hardware and software components:

- MX Series with MPC2s installed
- Junos OS Release 13.3 or later

Before you configure static L2TP network server (LNS) multilink (MLPPP) subscribers, be sure you have:

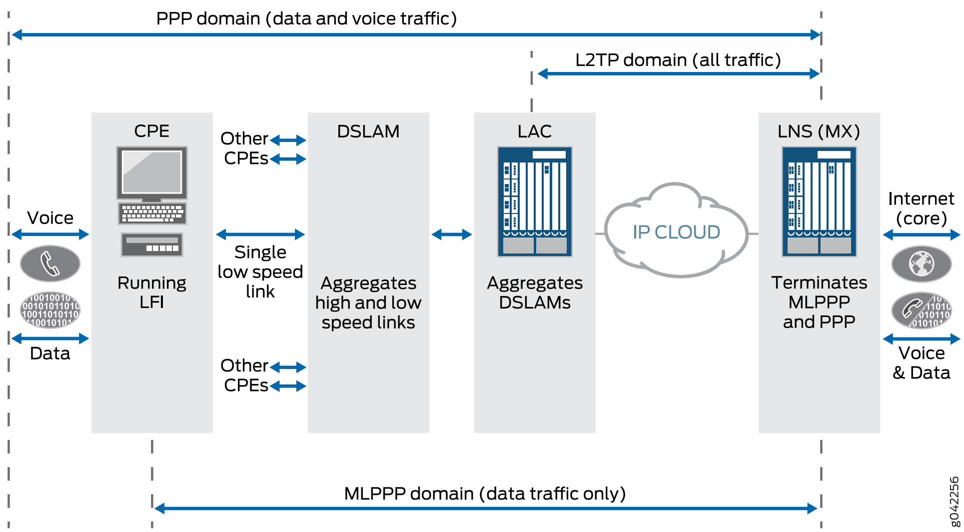
- Enabled the inline service (**si**) interface for LNS subscribers. See "Enabling Inline Service Interfaces for PPPoE and LNS Subscribers" on page 241.
- Configured the inline service (**si**) interface for LNS subscribers. See "Configuring Inline Service Interface for PPPoE and LNS Subscribers" on page 242.

Overview

An MLPPP subscriber consists of two IFLs (logical interfaces), a member link, and a bundle. For static MLPPP subscribers, you configure the member link and bundle statically. For static LNS MLPPP subscribers, you configure both member link and bundle IFLs manually. After you configure the subscriber's interface using the **family mlppp** setting, before the member link IFL can start LCP (link control protocol) negotiation for an LNS, you must also fully configure the member link's bundle IFL. Figure 17 on page 250 shows how the different types of traffic traverse through a network where the MX Series device is acting as the LNS to terminate MLPPP bundles.

Topology

Figure 17: MLPPP Bundles Terminated at MX Series as the LNS Network



The following three domains are shown passing traffic through the LNS network:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only
- L2TP domain—Contains all types of traffic

Configuration

To configure static L2TP network server (LNS) multilink (MLPPP) subscribers, perform these tasks:

- Configuring a Tunnel Group with Inline Service Interface and L2TP Access Profile Attributes on page 251
- Configuring a Static LNS Member Link IFL on page 253
- Configuring a Static Inline Services MLPPP Bundle IFL on page 254
- Results on page 255

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.

```
[edit]
```

```
set access profile ce-l2tp-profile1 client ce-lac-1 user-group-profile ce-lac-1-gp
set access profile ce-l2tp-profile1 client ce-lac-1 l2tp lcp-renegotiation
set access profile ce-l2tp-profile1 client ce-lac-1 l2tp maximum-sessions-per-tunnel 2000
set access profile ce-l2tp-profile1 client ce-lac-1 l2tp shared-secret "password"
set access profile ce-l2tp-profile1 client ce-lac-1 l2tp multilink
set services l2tp tunnel-group lns1 l2tp-access-profile ce-l2tp-profile1
set services l2tp tunnel-group lns1 aaa-access-profile ce-authenticator
set services l2tp tunnel-group lns1 local-gateway address 10.1.1.2
set services l2tp tunnel-group lns1 service-interface si-1/0/0

[edit]
set interfaces si-1/0/0.1
set interfaces si-1/0/0.1 dial-options l2tp-interface-id not used dedicated
set interfaces si-1/0/0.1 family mlppp bundle si-5/1/0.100
set interfaces si-1/0/0.1 family inet unnumbered-address lo0.0
set interfaces si-1/0/0.2
set interfaces si-1/0/0.2 dial-options l2tp-interface-id not used dedicated
set interfaces si-1/0/0.2 family mlppp bundle si-5/1/0.101
set interfaces si-1/0/0.2 family inet

[edit]
set interfaces si-5/0/0 unit 100
set interfaces si-5/0/0 unit 100 encapsulation multilink-ppp
set interfaces si-5/0/0 unit 100 mrru 1500
set interfaces si-5/0/0 unit 100 fragment-threshold 640
set interfaces si-5/0/0 unit 100 short-sequence
set interfaces si-5/0/0 unit 100 ppp-options dynamic-profile l2l3-service-prof
```

Configuring a Tunnel Group with Inline Service Interface and L2TP Access Profile Attributes

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure a tunnel group with inline service interface (**si**) and L2TP access profile attributes for static LNS MLPPP subscribers:

1. Create the access profile.

   ```
   [edit access]
   user@host# set profile ce-l2tp-profile1
   ```

2. Configure an L2TP (LAC) access client.

   ```
   [edit access profile ce-l2tp-profile1]
   user@host# set client ce-lac-1
   ```

3. Associate a group profile containing PPP attributes to apply for the PPP sessions being tunneled from this LAC client.

   ```
   [edit access profile ce-l2tp-profile1 client ce-lac1ce-lac1]
   user@host# set user-group-profile ce-lac-1-gp
   ```

4. Configure the following L2TP access profile attributes for this example:

- Link control protocol (LCP) with the PPP client.
- Maximum number of sessions allowed in a tunnel from the client (LAC).
- Tunnel password used to authenticate the client (LAC).
- L2TP client is MLPPP-capable for static subscribers. The **multilink** statement determines whether MLPPP is supported for subscribers coming in from the LAC peer.

[edit access profile ce-l2tp-profile1 client ce-lac1ce-lac1]
user@host# **set l2tp lcp-renegotiation**
user@host# **set l2tp maximum-sessions-per-tunnel 2000**
user@host# **set l2tp shared-secret *password***
user@host# **set l2tp multilink**

NOTE: Do not specify a dynamic profile name in the L2TP access client profile for static LNS MLPPP subscribers.

5. Create the tunnel group.

   [edit services l2tp]
   user@host# **set tunnel-group lns1**

6. Set the tunnel access profile equal to the setting you defined for the access profile.

   [edit services l2tp tunnel-group lns1]
   user@host# **set l2tp-access-profile ce-l2tp-profile1**

7. Set the L2TP AAA access profile.

   NOTE: You can specify the L2TP AAA access profile at either the **[edit access]** or **[edit services]** hierarchy levels, using the LNS access client profile or **tunnel-group** statements, respectively. An L2TP AAA access profile defined using the **[edit access]** hierarchy level overrides the L2TP AAA access profile defined for the **tunnel-group** using the **[edit services]** hierarchy level.

   [edit services l2tp tunnel-group lns1]
   user@host# **set aaa-access-profile ce-authenticator**

8. Set the local gateway address for the L2TP tunnel.

   [edit services l2tp tunnel-group lns1]
   user@host# **set local-gateway address 10.1.1.2**

9. Specify the inline services interface (**si**) for the static LNS MLPPP subscribers.

   [edit services l2tp tunnel-group lns1]
   user@host# **set service-interface si-1/0/0**

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

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

Configuring a Static LNS Member Link IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the static LNS member link IFL, you specify the static bundle using the **family mlppp** statement.

You must also configure the **family inet** statement in the subscriber (**si**) interface. The **family inet** setting enables the L2TP long route to be installed and supported for the lookup engine to steer control packets to the Routing Engine; and also enables mixed mode support, if required.

The following example shows that both PPP and MLPPP subscribers can log in successfully using the **si-1/0/0.1** interface, whereas only MLPPP subscribers can log in successfully using the **si-1/0/0.2** interface.

1. Create the **si-1/0/0.1** and **si-1/0/0.2** interfaces.

   [edit interfaces]
   user@host# **set si-1/0/0.1**
   user@host# **set si-1/0/0.2**

2. For the **si-1/0/0.1** interface, set the L2TP dial options to specify that the logical interface can host one session at a time (dedicated).

   [edit interfaces si-1/0/0.1]
   user@host# **set dial-options l2tp-interface-id not used dedicated**

3. Enable MLPPP support and configure the static bundle inline interface (IFL).

   [edit interfaces si-1/0/0.1]
   user@host# **set family mlppp bundle si-5/1/0.100**

4. Enable LNS support and mixed mode support.

   [edit interfaces si-1/0/0.1]
   user@host# **set family inet unnumbered-address lo0.0**

5. For the **si-1/0/0.2** interface, set the L2TP dial options to specify that the logical interface can host one session at a time (dedicated).

   [edit interfaces si-1/0/0.2]
   user@host# **set dial-options l2tp-interface-id not used dedicated**

6. Enable MLPPP support and configure the static bundle inline interface (IFL).

   [edit interfaces si-1/0/0.2]
   user@host# **set family mlppp bundle si-5/1/0.101**

7. Enable LNS long route support.

[edit interfaces si-1/0/0.2]
user@host# **set family inet**

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

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

Configuring a Static Inline Services MLPPP Bundle IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the static inline services (**si**) interface MLPPP bundle IFL, you specify the **encapsulation multilink-ppp** statement within the **si** interface. The **si** interface anchors the bundle interface.

You can also set these optional MLPPP parameters: MRRU, short sequence, and fragment-threshold. The following example shows how to configure the static (**si**) interface MLPPP bundle IFL.

1. Create the static (**si**) interface MLPPP bundle IFL **si-5/0/0** with a unit of 100.

   [edit interfaces]
   user@host# **set si-5/0/0 unit 100**

2. Configure the **encapsulation multilink-ppp** statement to enable MLPPP bundling for the **si-5/0/0.100** interface.

   [edit interfaces si-5/0/0.100]
   user@host# **set encapsulation multilink-ppp**

3. Configure the following MLPPP options for this example:

   - **mrru**—Specifies the maximum received reconstructed unit value ranging from 1500 through 4500 bytes.
   - **fragment-threshold**—Applies to all packets and forwarding classes, ranging from 128 through 16,320 bytes.
   - **short-sequence**—Determines the header format for the MLPPP. Default is **long-sequence**.

   [edit interfaces si-5/0/0.100]
   user@host# **set mrru 1500**
   user@host# **set fragment-threshold 640**
   user@host# **set short-sequence**

4. Enable support for static (**si**) interface IFL dynamic services by configuring the **ppp-options dynamic profile** setting.

   [edit interfaces si-5/0/0.100]
   user@host# **set ppp-options dynamic-profile l2l3-service-prof**

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

   [edit]

user@host# **commit**

Results

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

user@host# **show access profile ce-l2tp-profile1**

```
access profile {
     ce-l2tp-profile1 {
        client ce-lac-1 {
            user-group-profile ce-lac-1-gp;
            l2tp {
                interface-id not-used;
                lcp-renegotiation;
                maximum-sessions-per-tunnel 2000;
                shared-secret "$9$2wgUHQF/9pB";
                multilink;
            }
        }
     }
}
```

user@host# **show services l2tp tunnel-group lns1**

```
services l2tp {
    tunnel-group lns1 {
        l2tp-access-profile ce-l2tp-profile1;
        aaa-access-profile ce-authenticator;
        local-gateway {
            address 10.1.1.2;
        }
        service-interface si-1/0/0;
    }
}
```

user@host# **show interfaces si-1/0/0**

```
interfaces {
    si-1/0/0 {
        unit 1 {
            dial-options {
                l2tp-interface-id not-used;
                dedicated;
            }
            family mlppp {
                 bundle si-5/1/0.100;
            }
            family inet {
                unnumbered-address lo0.0;
            }
        }
        unit 2 {
            dial-options {
                l2tp-interface-id not-used;
                dedicated;
            }
            family mlppp {
                bundle si-5/1/0.101;
            }
            family inet;
```



```
            }
        }
    }
```

user@host# **show interfaces si-5/1/0**

```
interfaces {
    si-5/1/0 {
        unit 100 {
            encapsulation multilink-ppp;
            mrru 1500;
            fragment-threshold 640;
            short-sequence;
            ppp-options {
                dynamic-profile l2l3-service-prof;
            }
        }
    }
}
```

Verification

Confirm that the configuration is working properly.

Verifying the Inline Services Interface Information

Purpose Verify that the inline services (**si**) interface is configured.

Action `root@haverhillt>` **show interfaces si-1/0/0 extensive**

```
Physical interface: si-1/0/0, Enabled, Physical link is Up
  Interface index: 143, SNMP ifIndex: 569, Generation: 146
  Type: Adaptive-Services, Link-level type: Adaptive-Services, MTU: 9192,
  Clocking: Unspecified, Speed: 10000mbps
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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  :                 6068                    0 bps
   Output bytes  :              1072104                  352 bps
   Input  packets:                  126                    0 pps
   Output packets:                12185                    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
```

Meaning The (**si**) interface is enabled with its physical link up and running with Point-to-Point interface flags set. It is shared between LNS subscribers, LNS MLPPP member links, and MX Series MLPPP bundles.

Verifying the Bundle IFL Information

Purpose Verify that the bundle IFL information is correct for MLPPP over LNS subscribers.

Action `root@haverhill>` **show interfaces si-5/1/0.1073756926 extensive**

```
Logical interface si-5/1/0.1073756926 (Index 102) (SNMP ifIndex 607)
(Generation 167)
 Flags: Up Point-To-Point SNMP-Traps 0x84000 Encapsulation: Multilink-PPP
 Last flapped: 2011-04-08 14:13:21 PDT (00:41:48 ago)
 Bandwidth: 10000mbps
 Bundle links information:
   Active bundle links       1
   Removed bundle links      0
   Disabled bundle links     0
 Bundle options:
   MRRU                               1504
   Remote MRRU                        1504
   Drop timer period                  0
   Inner PPP Protocol field compression disabled
   Sequence number format             long (24 bits)
   Fragmentation threshold            500
   Links needed to sustain bundle     1
   Interleave fragments               Enabled
   Multilink classes                  0
   Link layer overhead                4.0 %
 Bundle status:
   Received sequence number       0xffffff
   Transmit sequence number       0xffffff
   Packet drops                   0 (0 bytes)
   Fragment drops                 0 (0 bytes)
   MRRU exceeded                  0
   Fragment timeout               0
   Missing sequence number        0
   Out-of-order sequence number   0
   Out-of-range sequence number   0
   Packet data buffer overflow    0
   Fragment data buffer overflow  0
 Statistics        Frames        fps         Bytes          bps
 Bundle:
   Multilink:
     Input :            3          0           270          0
     Output:            3          0           285          0
   Network:
     Input :            3          0           252          0
     Output:            3          0           276          0
 IPV6 Transit Statistics         Packets       Bytes
   Network:
     Input :                     0             0
     Output:                     0             0
 Link:
   si-1/0/0.1073756925
     Up time: 00:06:37
     Input :          126          0          9596          0
     Output:          126          0          1226          0
 Multilink detail statistics:
 Bundle:
   Fragments:
     Input :            0          0             0          0
     Output:            0          0             0          0
   Non-fragments:
     Input :            0          0             0          0
     Output:            0          0             0          0
   LFI:
```



```
       Input :             0          0             0            0
       Output:             0          0             0            0
 NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
   Protocol inet, MTU: 1500, Generation: 154, Route table: 0
     Flags: Sendbcast-pkt-to-re
     Addresses, Flags: Is-Primary
       Destination: Unspecified, Local: 80.80.80.1, Broadcast: Unspecified,
Generation: 150
```

Meaning Due to the particulars of implementation, the following error counts associated with a bundle always display 0: packet drops (bytes), fragment drops (bytes), fragment timeout, missing sequence number, out-of-order sequence number, out-of-range sequence number, packet data buffer overflow and fragment data buffer overflow, and MRRU exceeded.

Verifying the Member Link IFL Information

Purpose Verify that the member link IFL information is correct for subscribers.

Action `root@haverhill>` **show interfaces si-1/0/0.1073756925 extensive**

```
  Logical interface si-5/1/0.1073756925 (Index 80) (SNMP ifIndex 3286)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: Adaptive-Services
    Last flapped: 2011-04-08 14:13:21 PDT (00:41:48 ago)
    Traffic statistics:
     Input  bytes  :               228
     Output bytes  :                 0
     Input  packets:                 3
     Output packets:                 0
    Local statistics:
     Input  bytes  :               228
     Output bytes  :                 0
     Input  packets:                 3
     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 mlppp, Multilink bundle: si-5/1/0.1073756926
Service interface: si-1/0/0, Dynamic profile: ml-bundle-prof
MTU: 9188, Generation: 15538, Route table: 0
```

Meaning Multilink bundle **si-5/1/0.1073756926** has been configured using the family **mlppp** protocol.

Verifying the Subscriber Information

Purpose Verify that the subscriber information for static MLPPP over LNS is correct.

Action root@haverhill> **show subscribers extensive**

```
  Type: L2TP
User Name: user@test.com
IP Address: 10.80.80.10
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: si-1/0/0.1
Interface type: Static
State: Active
Radius Accounting ID: 1
Session ID: 1
Bundle Session ID: 2
Login Time: 2011-04-11 07:55:59 PDT

Type: MLPPP
User Name: user@test.com
IP Address: 10.80.80.10
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: si-5/1/0.100
Interface type: Static
State: Active
Radius Accounting ID: 2
Session ID: 2
Underlying Session ID: 1
Login Time: 2011-04-11 07:55:59 PDT
```

Meaning Subscriber information for interface **si-5/1/0.100** has been configured for MLPPP with interface type of static.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Configuring L2TP Client Access to Support MLPPP for Static Subscribers on page 245
- Example: Configuring Static PPPoE MLPPP Subscribers on page 260

Example: Configuring Static PPPoE MLPPP Subscribers

This example shows how to configure static Point-to-Point Protocol over Ethernet (PPPoE) MLPPP for terminated and tunneled subscribers.

- Requirements on page 260
- Overview on page 261
- Configuration on page 262
- Verification on page 268

Requirements

This example uses the following hardware and software components:

- MX Series with MPC2s installed

- Junos OS Release 13.3 or later

Before you configure static PPPoE MLPPP for terminated and tunneled subscribers, be sure you have:

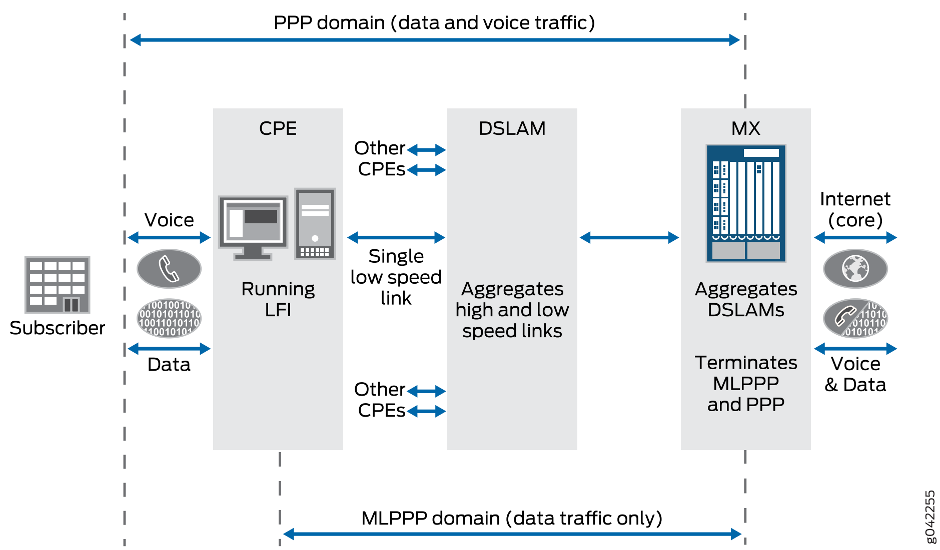
- Enabled the inline service (**si**) interface for LNS subscribers. See “Enabling Inline Service Interfaces for PPPoE and LNS Subscribers” on page 241.
- Configured the inline service (**si**) interface for LNS subscribers. See “Configuring Inline Service Interface for PPPoE and LNS Subscribers” on page 242.

Overview

An MLPPP subscriber consists of two IFLs (logical interfaces), a member link, and a bundle. For static MLPPP subscribers, you configure both member link and bundle IFLs manually. After you configure the subscriber’s interface using the **family mlppp** statement, before the member link IFL can start LCP (link control protocol) negotiation PPPoE session, you must also fully configure the member link’s bundle IFL. Figure 18 on page 261 shows how the different types of traffic traverse through a network where the MX Series terminates PPPoE sessions.

Topology

Figure 18: PPP and MLPPP Traffic Terminated at MX Series



The following two domains are shown terminating traffic at the MX Series:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only

Configuration

To configure static PPPoE MLPPP for terminated and tunneled subscribers, perform these tasks:

- Configuring a Static pp0 Member Link IFL on page 263
- Configuring a Static Inline Services MLPPP Bundle IFL on page 266
- Results on page 267

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.

```
[edit]
set interfaces ge-3/0/0 vlan-tagging
set interfaces ge-3/0/0 unit 1 encapsulation ppp-over-ether vlan-id 1
set interfaces ge-3/0/0 unit 2 encapsulation ppp-over-ether vlan-id 2
set interfaces ge-3/0/0 unit 3 encapsulation ppp-over-ether vlan-id 3
set interfaces pp0
set interfaces pp0 unit 1 keepalives interval 30
set interfaces pp0 unit 1 pppoe-options underlying interface ge-3/0/0.1 server
set interfaces pp0 unit 1 ppp-options pap chap dynamic-profile pp0-l2l3-service prof
set interfaces pp0 unit 1 family mlppp bundle si-1/0/0.1
set interfaces pp0 unit 1 family inet unnumbered-address lo0.0
set interfaces pp0 unit 1 family inet6 address 2001:db8:204::1:1:2/64
set interfaces pp0 unit 2 keepalives interval 30
set interfaces pp0 unit 2 pppoe-options underlying-interface ge-3/0/0.2 server
set interfaces pp0 unit 2 ppp-options pap dynamic-profile pp0-l2l3-service prof
set interfaces pp0 unit 2 family mlppp bundle si-1/0/0.2
set interfaces pp0 unit 3 keepalives interval 30
set interfaces pp0 unit 3 pppoe-options underlying interface ge-3/0/0.3 server
set interfaces pp0 unit 3 ppp-options pap chap dynamic-profile pp0-l2l3-service prof
set interfaces pp0 unit 3 family mlppp bundle si-1/0/0.3
set interfaces pp0 unit 3 family inet
```

```
[edit]
set interfaces si-5/0/0 unit 100
set interfaces si-5/0/0 unit 100 encapsulation multilink-ppp
set interfaces si-5/0/0 unit 100 mrru 1500
set interfaces si-5/0/0 unit 100 fragment-threshold 640
set interfaces si-5/0/0 unit 100 short-sequence
set interfaces si-5/0/0 unit 100 ppp-options dynamic-profile l2l3-service-prof
```


Configuring a Static pp0 Member Link IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the static PPPoE member link, you specify the static bundle using the **family mlppp** statement. PPPoE sessions are supported over the following underlying interfaces: Ethernet interfaces, static and dynamic VLAN, VLAN demultiplexing (demux) over Ethernet interfaces, and VLAN demux over aggregated Ethernet interfaces.

You must also configure the **family inet** statement in the **pp0** interface for tunneled subscribers. The **family inet** statement enables the L2TP long route to be installed and supported for the lookup engine to steer control packets to the Routing Engine.

The following example shows how to configure **pp0** member link IFL over static VLAN to support the following different types of subscribers:

- **si-1/0/0.1**—Both terminated and tunneled PPP and MLPPP subscribers can log in successfully.
- **si-1/0/0.2**—Only terminated MLPPP subscribers can log in successfully.
- **si-1/0/0.3**—Terminated and tunneled MLPPP subscribers can log in successfully.

1. Create the Gigabit Ethernet underlying interface for the PPPoE session, **ge-3/0/0**, and enable VLAN tagging.

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

2. For the **ge-3/0/0** interface, configure PPP over Ethernet encapsulation for three VLANs.

   [edit interfaces ge-3/0/0]
   user@host# **set unit 1 encapsulation ppp-over-ether vlan-id 1**
   user@host# **set unit 2 encapsulation ppp-over-ether vlan-id 2**
   user@host# **set unit 3 encapsulation ppp-over-ether vlan-id 3**

3. Configure the dynamic PPPoE **pp0** subscriber interface to support PPPoE sessions.

   [edit interfaces]
   user@host# **set pp0**

4. Configure the first of three logical interfaces.

   a. Configure the first logical interface for the **pp0** subscriber interface on the MX Series and set an interval of 30 seconds for the keepalive value.

      [edit interfaces pp0]
      user@host# **set unit 1 keepalives interval 30**

   b. Configure the underlying interface **ge-3/0/0.1** and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

      [edit interfaces pp0 unit 1]
      user@host# **set pppoe-options underlying-interface ge-3/0/0.1 server**

c. Configure PPP-specific interface properties in a dynamic profile: **pap** and **chap**, and set the **dynamic-profile** to the services dynamic profile.

> NOTE: The dynamic profile is applied when Link Control Protocol (LCP) is negotiated in PPP.

[edit interfaces pp0 unit 1]
user@host# **set ppp-options pap chap dynamic-profile pp0-l2l3-service prof**

d. Configure the static bundle for the PPPoE member link for MLPPP subscribers using the **family mlppp** statement.

> NOTE: The **family mlppp** statement determines whether MLPPP is supported for subscribers coming in from the underlying interface.

[edit interfaces pp0 unit 1]
user@host# **set family mlppp bundle si-1/0/0.1**

e. Configure the **family inet** statement and the unnumbered address for the protocol family required for PPP subscribers for tunneled PPP and for MLPPP subscribers.

[edit interfaces pp0 unit 1]
user@host# **set family inet unnumbered-address lo0.0**

f. (Optional) Enable the **family inet6** statement and address for the mixed mode support for PPP and MLPPP subscribers.

[edit interfaces pp0 unit 1]
user@host# **set family inet6 address 2001:db8:204::1:1:2/64**

5. Configure the second of three logical interfaces.

a. Configure the second logical interface for the **pp0** subscriber interface on the MX Series and set an interval of 30 seconds for the keepalive value.

[edit interfaces pp0]
user@host# **set unit 2 keepalives interval 30**

b. Configure the underlying interface **ge-3/0/0.2** and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

[edit interfaces pp0 unit 2]
user@host# **set pppoe-options underlying interface ge-3/0/0.2 server**

c. Configure PPP-specific interface properties in a dynamic profile: **pap**, and set the **dynamic-profile** to the services dynamic profile.

NOTE: The dynamic profile is applied when Link Control Protocol (LCP) is negotiated in PPP.

[edit interfaces pp0 unit 2]
user@host# **set ppp-options pap dynamic-profile pp0-l2l3-service prof**

d. Configure the static bundle for the PPPoE member link for MLPPP subscribers using the **family mlppp** statement.

NOTE: The **family mlppp** statement determines whether MLPPP is supported for subscribers coming in from the underlying interface.

[edit interfaces pp0 unit 2]
user@host# **set family mlppp bundle si-1/0/0.2**

6. Configure the last of three logical interfaces.

a. Configure the third logical interface for the **pp0** subscriber interface on the MX Series and set an interval of 30 seconds for the keepalive value.

[edit interfaces pp0]
user@host# **set unit 3 keepalives interval 30**

b. Configure the underlying interface **ge-3/0/0.3** and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

[edit interfaces pp0 unit 3]
user@host# **set pppoe-options underlying interface ge-3/0/0.3 server**

c. Configure PPP-specific interface properties in a dynamic profile: **pap** and **chap**, and set the **dynamic-profile** to the services dynamic profile.

NOTE: The dynamic profile is applied when Link Control Protocol (LCP) is negotiated in PPP.

[edit interfaces pp0 unit 3]
user@host# **set ppp-options pap chap dynamic-profile pp0-l2l3-service prof**

d. Configure the static bundle for the PPPoE member link for MLPPP subscribers using the **family mlppp** statement.

NOTE: The **family mlppp** statement determines whether MLPPP is supported for subscribers coming in from the underlying interface.

```
[edit interfaces pp0 unit 3]
user@host# set family mlppp bundle si-1/0/0.3
```

e. Configure tunneled subscribers.

```
[edit interfaces pp0 unit 3]
user@host# set family inet
```

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

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

Configuring a Static Inline Services MLPPP Bundle IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the static inline services (**si**) interface MLPPP bundle IFL, you specify the **encapsulation multilink-ppp** statement within the **si** interface. The **si** interface anchors the bundle interface.

You can also set these optional MLPPP parameters: MRRU, short sequence, and fragment-threshold. The following example shows how to configure the static **si** interface MLPPP bundle IFL:

1. Create the static (**si**) interface MLPPP bundle IFL **si-5/0/0** with a unit of 100.

   ```
   [edit interfaces]
   user@host# set si-5/0/0 unit 100
   ```

2. Configure the **encapsulation multilink-ppp** statement to enable MLPPP bundling for the **si-5/0/0.100** interface.

   ```
   [edit interfaces si-5/0/0.100]
   user@host# set encapsulation multilink-ppp
   ```

3. Configure the following MLPPP options for this example:

   - **mrru**—Specifies the maximum received reconstructed unit value ranging from 1500 through 4500 bytes.
   - **fragment-threshold**—Applies to all packets and forwarding classes, ranging from 128 through 16,320 bytes.
   - **short-sequence**—Determines the header format for the MLPPP. Default is **long-sequence**.

   ```
   [edit interfaces si-5/0/0.100]
   user@host# set mrru 1500
   user@host# set fragment-threshold 640
   user@host# set short-sequence
   ```

4. Enable support for static **si** interface IFL dynamic services by configuring the **ppp-options dynamic profile** statement.

[edit interfaces si-5/0/0.100]
user@host# **set ppp-options dynamic-profile l2l3-service-prof**

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

   [edit]
   user@host# commit

Results

From configuration mode, confirm your configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

user@host# show interfaces ge-3/0/0

```
interfaces {
        ge-3/0/0 {
        vlan-tagging;
        unit 1 {
            encapsulation ppp-over-ether;
            vlan-id 1;
        }
        unit 2 {
            encapsulation ppp-over-ether;
            vlan-id 2;
        }
        unit 3 {
            encapsulation ppp-over-ether;
            vlan-id 3;
        }
    }
    pp0 {
        unit 1 {
            keepalives interval 30;
            pppoe-options {
                underlying-interface ge-3/0/0.1;
                server;
            }
            ppp-options {
                pap;
                chap;
                dynamic-profile pp0-l2l3-service-prof;
            }
            family mlppp {
                bundle si-1/0/0.1;
            }
            family inet {
                unnumbered-address lo0.0;
            }
            family inet6 {
                address 2001:db8:204::1:1:2/64;
            }
        }
        unit 2 {
            keepalives interval 30;
            pppoe-options {
                underlying-interface ge-3/0/0.2;
                server;
            }
```

```
                ppp-options {
                    pap;
                    dynamic-profile pp0-1213-service-prof;
                }
                family mlppp {
                    bundle si-1/0/0.2;
                }
            }
            unit 3 {
                keepalives interval 30;
                pppoe-options {
                    underlying-interface ge-3/0/0.3;
                    server;
                }
                ppp-options {
                    pap;
                    chap;
                    dynamic-profile pp0-1213-service-prof;
                }
                family mlppp {
                    bundle si-1/0/0.3;
                }
                family inet;
            }
        }
    }
```

user@host# **show interfaces si-5/1/0**

```
    interfaces {
        si-5/1/0 {
             unit 100 {
                encapsulation multilink-ppp;
                mrru 1500;
                fragment-threshold 640;
                short-sequence;
                ppp-options {
                    dynamic-profile 1213-service-prof;
                }
             }
        }
    }
```

Verification

Confirm that the configuration is working properly.

- Verifying the Bundle IFL Information on page 268
- Verifying the Member Link IFL Information on page 270
- Verifying the Subscriber Information on page 271

Verifying the Bundle IFL Information

Purpose Verify that the bundle IFL information is correct for PPPoE MLPPP subscribers.

Action `root@haverhill>` **show interfaces si-5/1/0.1073756926 extensive**

```
Logical interface si-5/1/0.1073756926 (Index 102) (SNMP ifIndex 607)
(Generation 167)
 Flags: Up Point-To-Point SNMP-Traps 0x84000 Encapsulation: Multilink-PPP
 Last flapped: 2011-04-08 14:13:21 PDT (00:41:48 ago)
 Bandwidth: 10000mbps
 Bundle links information:
   Active bundle links       1
   Removed bundle links      0
   Disabled bundle links     0
 Bundle options:
   MRRU                                 1504
   Remote MRRU                          1504
   Drop timer period                    0
   Inner PPP Protocol field compression disabled
   Sequence number format               long (24 bits)
   Fragmentation threshold              500
   Links needed to sustain bundle       1
   Interleave fragments                 Enabled
   Multilink classes                    0
   Link layer overhead                  4.0 %
 Bundle status:
   Received sequence number        0xffffff
   Transmit sequence number        0xffffff
   Packet drops                    0 (0 bytes)
   Fragment drops                  0 (0 bytes)
   MRRU exceeded                   0
   Fragment timeout                0
   Missing sequence number         0
   Out-of-order sequence number    0
   Out-of-range sequence number    0
   Packet data buffer overflow     0
   Fragment data buffer overflow   0
 Statistics          Frames        fps         Bytes          bps
 Bundle:
   Multilink:
     Input :              3          0           270           0
     Output:              3          0           285           0
   Network:
     Input :              3          0           252           0
     Output:              3          0           276           0
 IPV6 Transit Statistics         Packets        Bytes
   Network:
     Input :                       0              0
     Output:                       0              0
 Link:
   pp0.1073756925
     Up time: 00:06:37
     Input :            126          0          9596           0
     Output:            126          0          1226           0
 Multilink detail statistics:
 Bundle:
   Fragments:
     Input :              0          0             0           0
     Output:              0          0             0           0
   Non-fragments:
     Input :              0          0             0           0
     Output:              0          0             0           0
   LFI:
```

```
       Input :             0          0             0            0
       Output:             0          0             0            0
 NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
   Protocol inet, MTU: 1500, Generation: 154, Route table: 0
     Flags: Sendbcast-pkt-to-re
     Addresses, Flags: Is-Primary
       Destination: Unspecified, Local: 10.80.80.1, Broadcast: Unspecified,
Generation: 150
```

Meaning Due to the particulars of implementation, the following error counts associated with a bundle always display 0: packet drops (bytes), fragment drops (bytes), fragment timeout, missing sequence number, out-of-order sequence number, out-of-range sequence number, packet data buffer overflow and fragment data buffer overflow, and MRRU exceeded.

Verifying the Member Link IFL Information

Purpose Verify that the member link IFL information is correct for subscribers.

Action `root@haverhill>` **show interfaces extensive pp0.1073756923**

```
  Logical interface pp0.1073756923 (Index 484) (SNMP ifIndex 708)
   (Generation 15544)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 38,
      Session AC name: haverhill, Remote MAC address: 00:00:5e:00:53:42,
      Underlying interface: ge-1/0/0.50 (Index 423)
    Bandwidth: 1000mbps
    Traffic statistics:
     Input  bytes  :                 609
     Output bytes  :                 489
     Input  packets:                  21
     Output packets:                  22
    Local statistics:
     Input  bytes  :                 133
     Output bytes  :                 377
     Input  packets:                   7
     Output packets:                   8
    Transit statistics:
     Input  bytes  :                 476                    0 bps
     Output bytes  :                 112                    0 bps
     Input  packets:                  14                    0 pps
     Output packets:                  14                    0 pps
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  LCP state: Opened
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls:
  Not-configured
  CHAP state: Success
  PAP state: Closed
    Protocol mlppp, Multilink bundle: si-1/0/0.1073756924
    Service interface: si-1/0/0, Dynamic profile: ml-bundle-service-prof
    MTU: 1526, Generation: 15535, Route table: 0
```

Meaning Logical interface **pp0.1073756923** has been configured with PPPoE, multilink bundle **si-1/0/0.1073756924**, and protocol **mlppp**.

Verifying the Subscriber Information

Purpose Verify that the subscriber information for static MLPPP over PPPoE is correct.

Action

```
root@host> show subscribers detail
Type: PPPoE
User Name: user
IP Address: 10.4.1.2
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: pp0.20
Interface type: Static
MAC Address: 00:00:5e:00:53:32
State: Active
Radius Accounting ID: 4
Session ID: 4
Bundle Session ID: 5
Login Time: 2012-02-28 10:32:24 PST

Type: MLPPP
User Name: user
IP Address: 10.4.1.2
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-1/0/0.1020
Interface type: Static
State: Active
Radius Accounting ID: 5
Session ID: 5
Underlying Session ID: 4
Login Time: 2012-02-28 10:32:24 PST
```

Meaning

Subscriber information has been configured for static PPPoE with interface **pp0.20**, and static MLPPP with interface **si-1/0/0.1020**.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239
- Example: Configuring Dynamic PPPoE MLPPP Subscribers on page 291

CHAPTER 27

Configuring Dynamic MLPPP Subscribers for MX Series

Example: Configuring Dynamic LNS MLPPP Subscribers

This example shows how to configure dynamic L2TP network server (LNS) multilink (MLPPP) subscribers.

Requirements

This example uses the following hardware and software components:

- MX Series with MPC2s installed
- Junos OS Release 13.3 or later

Before you configure dynamic LNS MLPPP subscribers, be sure you have:

- If configuring a tunnel group using an inline service (**si**) interface, enabled the inline service (**si**) interface for LNS subscribers. See “Enabling Inline Service Interfaces for PPPoE and LNS Subscribers” on page 241.
- Configured the inline service (**si**) interface for LNS subscribers. See “Configuring Inline Service Interface for PPPoE and LNS Subscribers” on page 242.
- If configuring a tunnel group using a pool of service interfaces, configured service device pools for LNS subscribers. See “Configuring Service Device Pools for Load Balancing PPPoE and LNS Subscribers” on page 243.

Overview

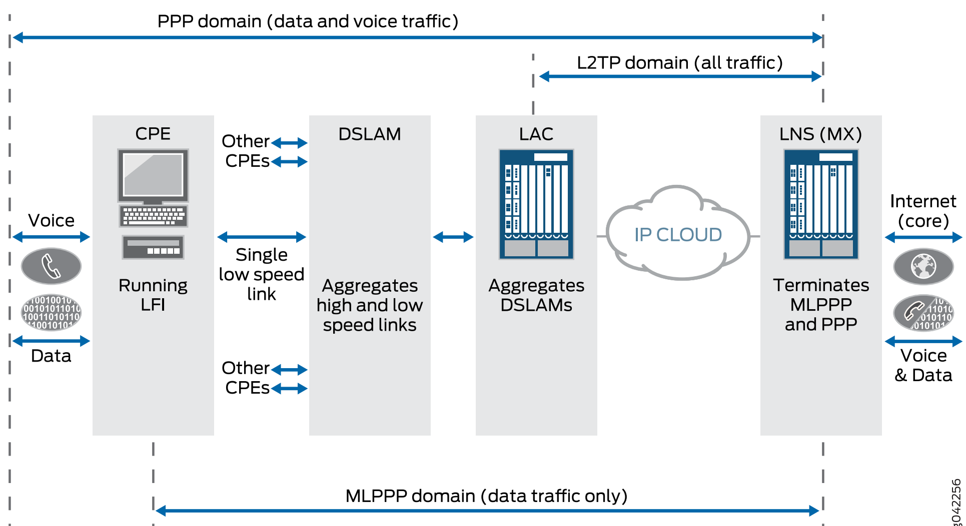
An MLPPP subscriber consists of two IFLs (logical interfaces), a member link, and a bundle. For dynamic LNS MLPPP subscribers, you configure the dynamic member link IFLs using dynamic profiles. The member link dynamic profile includes the **family mlppp** statement containing the bundle dynamic profile and the service interface (**si**), or a pool of service interfaces. This information is then used to create the dynamic bundle IFL.

Each dynamic bundle accepts only one dynamic member link. If more than one dynamic member link attempts to join the same dynamic bundle, the system fails the new member session.

Figure 19 on page 274 shows how the different types of traffic traverse through a network where the MX Series is acting as the LNS to terminate MLPPP bundles.

Topology

Figure 19: MLPPP Bundles Terminated at MX Series as the LNS Network



The following three domains are shown passing traffic through the LNS network:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only
- L2TP domain—Contains all types of traffic

Configuration

To configure dynamic LNS MLPPP subscribers, perform these tasks:

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.

```
[edit]
set access profile ce-l2tp-profile2 client ce-lac-3 user-group-profile ce-lac-1-gp
set access profile ce-l2tp-profile2 client ce-lac-3 l2tp multilink
set access profile ce-l2tp-profile2 client ce-lac-3 l2tp maximum-sessions-per-tunnel
  2000
set access profile ce-l2tp-profile2 client ce-lac-3 l2tp shared-secret “password”
set access profile ce-l2tp-profile2 client ce-lac-3 l2tp dynamic-profile ml-lns-member-prof
set services l2tp tunnel-group dyn-l2tp-tunnel-group l2tp-access-profile ce-l2tp-profile2
set services l2tp tunnel-group dyn-l2tp-tunnel-group aaa-access-profile ce-authenticator
set services l2tp tunnel-group dyn-l2tp-tunnel-group local-gateway address 10.1.1.1
set services l2tp tunnel-group dyn-l2tp-tunnel-group service-device-pool pool1
set services l2tp tunnel-group dyn-l2tp-tunnel-group dynamic-profile ml-lns-member-prof

[edit]
set dynamic-profiles mlp-lns-member-profile
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit”
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit” dial-options l2tp-interface-id dont care dedicated
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit” family mlppp bundle “$junos-bundle-interface-name”
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit” family mlppp service-device-pool pool1
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit” family mlppp dynamic-profile ml-bundle-prof
set dynamic-profiles mlp-lns-member-profile interfaces “$junos-interface-ifd-name”
  unit “$junos-interface-unit” family inet

[edit]
set dynamic-profiles ml-bundle-prof
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name"
```



```
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix next-hop $junos-framed-route-nexthop
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix metric $junos-framed-route-cost
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix preference $junos-framed-route-distance
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" access-internal route $junos-subscriber-ip-address
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" access-internal route $junos-subscriber-ip-address
  qualified-next-hop $junos-interface-name
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit”
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” encapsulation multilink-ppp
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” mrru 1500
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” short-sequence
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” fragment-threshold 320
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family inet
set class-of-service traffic-control-profiles tcp2
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  scheduler-map "$junos-cos-scheduler-map”
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  shaping-rate "$junos-cos-shaping-rate"
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  guaranteed-rate "$junos-cos-guaranteed-rate"
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  delay-buffer-rate “$junos-cos-delay-buffer-rate”
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  “$junos-interface-ifd-name” unit "$junos-interface-unit"
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  “$junos-interface-ifd-name” unit "$junos-interface-unit" output-traffic-control-profile
  tcp2
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  “$junos-interface-ifd-name” unit "$junos-interface-unit" fragmentation-map fragmap-2
```

Configuring a Tunnel Group with a Pool of Service Interfaces and L2TP Access Profile Attributes

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure a tunnel group with a pool of service interfaces and L2TP access profile attributes for dynamic LNS MLPPP subscribers:

1. Create the access profile.

   [edit access]
   user@host# **set profile ce-l2tp-profile2**

2. Configure an L2TP (LAC) access client.

   [edit access profile ce-l2tp-profile2]
   user@host# **set client ce-lac-3**

3. Associate a group profile containing PPP attributes to apply for the PPP sessions being tunneled from this LAC client.

   [edit access profile ce-l2tp-profile2 client ce-lac-3]
   user@host# **set user-group-profile ce-lac-1-gp**

4. Configure the following L2TP access profile attributes for this example:

   - L2TP client is multilink (MLPPP)-capable for subscribers. The **multilink** statement in the L2TP access client profile determines whether MLPPP is supported for subscribers coming in from the LAC peer.
   - Maximum number of sessions allowed in a tunnel from the client (LAC).
   - Tunnel password used to authenticate the client (LAC).
   - Dynamic profile name in the L2TP access client profile for dynamic LNS MLPPP subscribers.

   NOTE: If the **dynamic-profile** ***name*** is defined in the L2TP access client profile, it is used to create the dynamic LNS MLPPP member link; otherwise, the **dynamic-profile** ***name*** defined in the tunnel group is used. If neither profile contains the **family mlppp** statement, then the incoming LNS session fails.

   [edit access profile ce-l2tp-profile2 client ce-lac-3]
   user@host# **set l2tp multilink**
   user@host# **set l2tp maximum-sessions-per-tunnel 2000**
   user@host# **set l2tp shared-secret** ***password***
   user@host# **set dynamic-profile ml-lns-member-prof**

5. Create the tunnel group.

   [edit services l2tp]

user@host# **set tunnel-group dyn-l2tp-tunnel-group**

6. Set the tunnel access profile equal to the setting you defined for the access profile.

   [edit services l2tp tunnel-group dyn-l2tp-tunnel-group]
   user@host# **set l2tp-access-profile ce-l2tp-profile2**

7. Set the L2TP AAA access profile.

   NOTE: You can specify the L2TP AAA access profile in either the **[edit access]** or **[edit services]** hierarchy levels, using the LNS access client profile or **tunnel-group** statements, respectively. An L2TP AAA access profile defined using the **[edit access]** hierarchy level overrides the L2TP AAA access profile defined for the **tunnel-group** using the **[edit services]** hierarchy level.

   [edit services l2tp tunnel-group dyn-l2tp-tunnel-group]
   user@host# **set aaa-access-profile ce-authenticator**

8. Set the local gateway address for the L2TP tunnel.

   [edit services l2tp tunnel-group dyn-l2tp-tunnel-group]
   user@host# **set local-gateway address 10.1.1.1**

9. Specify the pool of service interfaces for the dynamic LNS MLPPP subscribers.

   [edit services l2tp tunnel-group dyn-l2tp-tunnel-group]
   user@host# **set service-device-pool pool1**

10. Specify the dynamic profile used to create the dynamic LNS MLPPP member link.

    [edit services l2tp tunnel-group dyn-l2tp-tunnel-group]
    user@host# **set dynamic-profile ml-lns-member-prof**

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

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

Configuring a Dynamic Profile for Dynamic LNS Member Link IFL Without Mixed Mode Support

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

You can configure the **dynamic-profile *name*** used to create the dynamic LNS member link IFL in either the L2TP client access profile or in the tunnel-group. See "Configuring a Tunnel Group with a Pool of Service Interfaces and L2TP Access Profile Attributes" on page 277.

The following example shows **dynamic-profile** configuration for LNS MLPPP and PPP subscribers. The **family mlppp** statement contains the **dynamic-profile *name***, and either the **service-interface** or the **service-device-pool**, used to create the dynamic bundle IFL. If you configure a **service-device-pool**, an inline services (**si**) interface is selected from the pool to create the dynamic bundle IFL using a round-robin method.

You must also configure the **family inet** statement in the **si** member link dynamic profile interface for tunneled subscribers. The **family inet** statement enables the L2TP long route to be installed and supported for the lookup engine to steer control packets to the Routing Engine.

NOTE: **Optionally, you can configure the dynamic profile to support mixed mode to enable PPP subscribers to successfully log in using the dynamic profile. See "Configuring a Dynamic Profile for Dynamic LNS Member Link IFL With Mixed Mode Support" on page 281 for the additional configuration commands required.**

1. Specify the dynamic profile that you used to create the dynamic LNS MLPPP member link previously in "Configuring a Tunnel Group with a Pool of Service Interfaces and L2TP Access Profile Attributes" on page 277.

   [edit dynamic-profiles]
   user@host# **set ml-lns-member-prof**

2. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

NOTE: The interface setting for a dynamic profile for PPPoE sessions can use either of the following code formats:

- **set interfaces pp0**

  or

- **set interfaces "$junos-interface-ifd-name"**

This example uses **set interfaces "$junos-interface-ifd-name"**.

[edit dynamic-profiles ml-lns-member-prof]
user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

3. For the *$junos-interface-ifd-name* interface, set the L2TP interface dial options to specify that the logical interface can host one session at a time (dedicated).

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set dial-options l2tp-interface-id dont care dedicated**

4. Enable MLPPP support for LNS MLPPP subscribers and configure the dynamic bundle interface (IFL) by setting the predefined dynamic bundle interface variable *$junos-bundle-interface-name*.

   NOTE: The **family mlppp** statement determines whether MLPPP is supported for subscribers coming in from the underlying interface.

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set family mlppp bundle "$junos-bundle-interface-name"**

5. Specify the pool of service interfaces for the dynamic LNS MLPPP subscribers.

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family mlppp]
   user@host# **set service-device-pool pool1**

6. Specify the dynamic profile name for the bundle.

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family mlppp]
   user@host# **set dynamic-profile ml-bundle-prof**

7. Enable support for LNS subscribers and the LNS long route.

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set family inet**

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

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

Configuring a Dynamic Profile for Dynamic LNS Member Link IFL With Mixed Mode Support

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

Optionally, you can configure the dynamic profile to support mixed mode to enable PPP subscribers to successfully log in using the dynamic profile.

The following example shows the additional configurations required to support mixed mode for dynamic profiles.

NOTE: **The following configuration commands are not included in the** “CLI Quick Configuration” on page 275 **section.**

1. Specify the dynamic profile that you used to create the dynamic LNS MLPPP member link previously in “Configuring a Tunnel Group with a Pool of Service Interfaces and L2TP Access Profile Attributes” on page 277.

   [edit dynamic-profiles]
   user@host# **set ml-lns-member-prof**

2. When the customer premises equipment (CPE) is for a dynamic virtual routing and forwarding (VRF) PPP subscriber, you must configure the routing instance and its interface.

   [edit dynamic-profiles ml-lns-member-prof]
   user@host# **set routing-instances "$junos-routing-instance" interface "$junos-interface-name"**

3. Configure the access route for the routing options.

   [edit dynamic-profiles ml-lns-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access route $junos-framed-route-ip-address-prefix**

4. Configure the next-hop, metric, and preference for the router.

   [edit dynamic-profiles ml-lns-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access route $junos-framed-route-ip-address-prefix]
   user@host# **set next-hop $junos-framed-route-nexthop**
   user@host# **set metric $junos-framed-route-cost**
   user@host# **set preference $junos-framed-route-distance**

5. Configure the internal access route for the routing options.

   [edit dynamic-profiles ml-lns-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]

user@host# **set routing-options access-internal route $junos-subscriber-ip-address**

6. Configure the qualified next-hop for the internal route..

   [edit dynamic-profiles ml-lns-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access-internal route $junos-subscriber-ip-address]
   user@host# **set qualified-next-hop $junos-interface-name**

7. Follow the procedure described in "Configuring a Dynamic Profile for Dynamic LNS Member Link IFL Without Mixed Mode Support" on page 279 to configure the basic settings for the dynamic profile.

   NOTE: To enable mixed mode support, when the CPE is a PPP subscriber, you must also add an unnumbered address, and input and output filters to the **family inet** statement.

   [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set family inet unnumbered-address $junos-loopback-interface**
   user@host# **set family inet filter input "$junos-input-filter" output "$junos-output-filter"**

8. When the CPE is a PPP subscriber, you must also configure class of service and define the traffic control profile.

   [edit dynamic-profiles ml-lns-member-prof class-of-service]
   user@host# **set traffic-control-profiles tc-profile**

9. For the traffic-control profile, define the following settings: scheduler map, shaping rate, overhead accounting, guaranteed rate, and delay buffer rate.

   [edit dynamic-profiles ml-lns-member-prof class-of-service traffic-control-profiles tc-profile]
   user@host# **set scheduler-map "$junos-cos-scheduler-map"**
   user@host# **set shaping-rate "$junos-cos-shaping-rate"**
   user@host# **set overhead-accounting "$junos-cos-shaping-mode" bytes "$junos-cos-byte-adjust"**
   user@host# **set guaranteed-rate "$junos-cos-guaranteed-rate"**
   user@host# **set delay-buffer-rate "$junos-cos-delay-buffer-rate"**

10. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*.

    [edit dynamic-profiles ml-lns-member-prof class-of-service]
    user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

11. For the dynamic profile interface, define the following settings: output traffic control profile, classifiers, and rewrite rules.

[edit dynamic-profiles ml-lns-member-prof class-of-service interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
user@host# **set output-traffic-control-profile tc-profile**
user@host# **set classifiers dscp GEN-CLASSIFIER-IN**
user@host# **set rewrite-rules dscp GEN-RW-OUT-DSCP**

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

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

Configuring a Dynamic Profile for the Dynamic Bundle IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the dynamic profile for the dynamic bundle IFL, you specify the **encapsulation multilink-ppp** statement within the dynamic profile. The **dynamic profile** for the dynamic bundle IFL is referenced from the **dynamic profile** for dynamic PPPoE and LNS member link IFLs.

You must configure the **fragmentation-maps** statement statically using class-of-service and assign them in the bundle dynamic profile. You can also set these optional MLPPP parameters: MRRU, short sequence, and fragment-threshold. The following example shows how to configure the dynamic profile for the dynamic bundle IFL.

1. Specify the dynamic profile name for the bundle.

   [edit dynamic-profiles}
   user@host# **set ml-bundle-prof**

2. Although MLPPP member links process authentication and routing-instance assignments, if a non-default routing-instance is assigned, you must configure the bundle IFL under the assigned routing-instance. As a result, you must also configure routing-instances in the bundle dynamic-profile.

   [edit dynamic-profiles ml-bundle-prof]
   user@host# **set routing-instances "$junos-routing-instance" interface "$junos-interface-name"**

3. Configure the access route for the routing options.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access route $junos-framed-route-ip-address-prefix**

4. Configure the next-hop, metric, and preference for the router.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access route $junos-framed-route-ip-address-prefix]
   user@host# **set next-hop $junos-framed-route-nexthop**
   user@host# **set metric $junos-framed-route-cost**
   user@host# **set preference $junos-framed-route-distance**

5. Configure the internal access route for the routing options.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access-internal route $junos-subscriber-ip-address**

6. Configure the qualified next-hop for the internal route.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access-internal route $junos-subscriber-ip-address]
   user@host# **set qualified-next-hop $junos-interface-name**

7. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

   [edit dynamic-profiles ml-bundle-prof]
   user@host# **set interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”**

8. Configure the **encapsulation multilink-ppp** statement to enable MLPPP bundling for the dynamic profile.

   [edit dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”]
   user@host# **set encapsulation multilink-ppp**

9. Configure the following MLPPP options for this example:

   - **mrru**—Specifies the maximum received reconstructed unit value ranging from 1500 through 4500 bytes.
   - **fragment-threshold**—Applies to all packets and forwarding classes, ranging from 128 through 16,320 bytes.
   - **short-sequence**—Determines the header format for the MLPPP. Default is **long-sequence**.

   [edit dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”]
   user@host# **set mrru 1500**
   user@host# **set fragment-threshold 320**
   user@host# **set short-sequence**

10. Enable support for MLPP subscribers.

    [edit dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”]
    user@host# **set family inet**

11. To enable **fragmentation-maps** support, you must configure class-of-service and define the traffic control profile.

    [edit dynamic-profiles ml-bundle-prof class-of-service]
    user@host# **set traffic-control-profiles tcp2**

12. For the traffic-control profile, define the following settings: scheduler map, shaping rate, guaranteed rate, and delay buffer rate.

    [edit dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2]
    user@host# **set scheduler-map "$junos-cos-scheduler-map"**
    user@host# **set shaping-rate "$junos-cos-shaping-rate"**
    user@host# **set guaranteed-rate "$junos-cos-guaranteed-rate"**
    user@host# **set delay-buffer-rate "$junos-cos-delay-buffer-rate"**

13. Configure the underlying interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

    [edit dynamic-profiles ml-bundle-prof class-of-service]
    user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

14. For the dynamic profile interface, define the output traffic control profile.

    [edit dynamic-profiles ml-bundle-prof class-of-service interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set output-traffic-control-profile tcp2**

15. Define the fragmentation-map required for dynamic profile bundles and used to enable link fragmentation and interleaving (LFI).

    [edit dynamic-profiles ml-bundle-prof class-of-service interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set fragmentation-map fragmap-2**

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

    [edit]
    user@host# commit

Results

From configuration mode, confirm your configuration by entering the **show access**, **show services**, and **show dynamic-profiles** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

user@host# **show access profile ce-l2tp-profile2**

```
access profile {
     ce-l2tp-profile2 {
        client ce-lac-3 {
            user-group-profile ce-lac-1-gp;
            l2tp {
                multilink;
                interface-id not-used;
                maximum-sessions-per-tunnel 2000;
                shared-secret "$9$2wgUHQF/9pB";
                dynamic-profile ml-lns-member-prof;

            }
        }
```

```
        }
    }
```

user@host# **show services l2tp tunnel-group dyn-l2tp-tunnel-group**

```
services {
    l2tp {
        tunnel-group dyn-l2tp-tunnel-group {
            l2tp-access-profile ce-l2tp-profile2;
            aaa-access-profile ce-authenticator;
            local-gateway {
                address 10.1.1.1;
            }
            service-device-pool pool1;
            dynamic-profile ml-lns-member-prof;
        }
    }
}
```

Dynamic profile for dynamic LNS member link IFL without mixed mode:

user@host# **show dynamic-profiles mlp-lns-member-profile**

```
dynamic-profile mlp-lns-member-profile {
    interface $junos-interface-ifd-name {
        unit $junos-interface-unit" {
            dial-options {
                l2tp-interface-id dont-care;
                dedicated;
            }
            family mlppp {
                bundle $junos-bundle-interface-name ;
                service-device-pool pool1;
                dynamic-profile mlp-bundle-profile;
            }
            family inet {
            }
        }
    }
}
```

Dynamic profile for dynamic LNS member link IFL with mixed mode:

user@host# **show dynamic-profiles mlp-lns-member-profile**

```
dynamic-profile ml-lns-member-prof {
 routing-instances {
        "$junos-routing-instance" {
            interface "$junos-interface-name";
                routing-options {
                    access {
                        route $junos-framed-route-ip-address-prefix {
                            next-hop $junos-framed-route-nexthop;
                            metric $junos-framed-route-cost;
                            preference $junos-framed-route-distance;
                        }
                    }
                    access-internal {
                        route $junos-subscriber-ip-address {
                            qualified-next-hop $junos-interface-name;
                        }
                    }
                }
            }
        }
```



```
    }
  interfaces "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
            dial-options {
                l2tp-interface-id l2tp-encapsulation;
                dedicated;
            }
            family mlppp {
                bundle $junos-bundle-interface-name;
                service-device-pool pool2;
                dynamic-profile ml-bundle-prof;
            }
            family inet {
                unnumbered-address $junos-loopback-interface;
                filter {
                    input "$junos-input-filter";
                    output "$junos-output-filter";
                }
            }
        }
   class-of-service {
        traffic-control-profiles {
            tc-profile {
                scheduler-map "$junos-cos-scheduler-map";
                shaping-rate "$junos-cos-shaping-rate";
                overhead-accounting "$junos-cos-shaping-mode" bytes
  "$junos-cos-byte-adjust";
                guaranteed-rate "$junos-cos-guaranteed-rate";
                delay-buffer-rate "$junos-cos-delay-buffer-rate";
            }
        }
        interfaces {
            "$junos-interface-ifd-name" {
                unit "$junos-interface-unit" {
                    output-traffic-control-profile tc-profile;
                    classifiers {
                        dscp GEN-CLASSIFIER-IN;
                    }
                    rewrite-rules {
                        dscp GEN-RW-OUT-DSCP;
                    }
                }
            }
        }
    }
  }
```

user@host# **show dynamic-profiles ml-bundle-prof**

```
  dynamic-profile ml-bundle-prof {
        routing-instances {
        "$junos-routing-instance" {
            interface "$junos-interface-name";
                routing-options {
                    access {
                        route $junos-framed-route-ip-address-prefix {
                            next-hop $junos-framed-route-nexthop;
                            metric $junos-framed-route-cost;
                            preference $junos-framed-route-distance;
                        }
                    }
                    access-internal {
                        route $junos-subscriber-ip-address {
```

```
                                qualified-next-hop $junos-interface-name;
                            }
                        }
                    }
                }
            }
        }
        interfaces "$junos-interface-ifd-name" {
            unit "$junos-interface-unit" {
                encapsulation multilink_ppp;
                mrru 1500;
                short-sequence;
                fragment-threshold 320;
                family inet
                }
           }
       }
    class-of-service {
            traffic-control-profiles {
                tcp2 {
                    scheduler-map "$junos-cos-scheduler-map";
                    shaping-rate "$junos-cos-shaping-rate";
                    guaranteed-rate "$junos-cos-guaranteed-rate";
                    delay-buffer-rate "$junos-cos-delay-buffer-rate";
                }
            }
            interfaces {
                "$junos-interface-ifd-name" {
                    unit "$junos-interface-unit" {
                        output-traffic-control-profile tcp2;
                        fragmentation-map fragmap-2
                        }
                      }
            }
        }
```

Verification

Confirm that the configuration is working properly.

- Verifying the Subscriber Information on page 288
- Verifying Mixed Mode Support with a Dynamic MLPPP-Capable Subscriber on page 289
- Verifying Tunneled MLPPP Over LAC Interfaces on page 290

Verifying the Subscriber Information

Purpose Verify that the subscriber information for dynamic MLPPP over LNS is correct.

Action

```
root@haverhill> show subscribers extensive
Type: L2TP
User Name: lns-client
IP Address: 198.51.100.20
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: si-1/0/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: ml-lns-member-prof
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 20
Session ID: 20
Bundle Session ID: 21
Login Time: 2011-04-11 10:55:13 PDT

Type: MLPPP
User Name: lns-client
IP Address: 198.51.100.20
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: si-3/0/0.1073741825
Interface type: Dynamic
Dynamic Profile Name: ml-bundle-prof
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 21
Session ID: 21
Underlying Session ID: 20
Login Time: 2011-04-11 07:55:59 PDT
```

Meaning Subscriber information for interface **si-1/0/0.1073741824** has been configured for MLPPP with interface type of dynamic.

Verifying Mixed Mode Support with a Dynamic MLPPP-Capable Subscriber

Purpose Verify that mixed mode interfaces negotiated correctly for the single link PPP using a dynamic MLPPP-capable subscriber.

Action

```
root@haverhill> show interfaces extensive pp0.1073741832
Logical interface pp0.1073741832 (Index 489) (SNMP ifIndex 712)
   (Generation 299)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 40,
      Session AC name: haverhill1, Remote MAC address: 00:00:5e:00:53:72,
      Underlying interface: ge-1/0/0.44 (Index 376)
    Traffic statistics:
     Input  bytes  :              1213
     Output bytes  :              1672
     Input  packets:                41
     Output packets:                49
     IPv6 transit statistics:
      Input  bytes  :                0
      Output bytes  :                0
      Input  packets:                0
      Output packets:                0
    Local statistics:
     Input  bytes  :               159
     Output bytes  :              1424
     Input  packets:                10
     Output packets:                18
    Transit statistics:
     Input  bytes  :              1054                    0 bps
     Output bytes  :               248                    0 bps
     Input  packets:                31                    0 pps
     Output packets:                31                    0 pps
     IPv6 transit statistics:
      Input  bytes  :                0
      Output bytes  :                0
      Input  packets:                0
      Output packets:                0
  Keepalive settings: Interval 45 seconds, Up-count 1, Down-count 3
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Success
    Protocol inet, MTU: 65531, Generation: 384, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Is-Primary
        Destination: Unspecified, Local: 10.0.0.1, Broadcast: Unspecified,
        Generation: 297
    Protocol inet6, MTU: 65531, Generation: 385, Route table: 0
      Addresses, Flags: Is-Primary
        Destination: Unspecified, Local: 2030::1
    Generation: 298
        Destination: Unspecified, Local: fe80::2a0:a50f:fc64:6ef2
    Generation: 299
```

Meaning When a dynamic MLPPP-capable subscriber negotiates a single link PPP, the results are the same as a non-MLPPP subscriber; no bundle IFL or SDB session is created.

Verifying Tunneled MLPPP Over LAC Interfaces

Purpose Verify that the MLPPP over LAC member link IFL is correct.

Action

```
root@haverhill> show interfaces extensive pp0.1073756921
Logical interface pp0.1073756921 (Index 482) (SNMP ifIndex 706)
   (Generation 15542)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 37,
      Session AC name: haverhill, Remote MAC address: 00:00:5e:00:53:82,
      Underlying interface: ge-1/0/0.2040 (Index 457)
    Traffic statistics:
     Input  bytes  :                273
     Output bytes  :                270
     Input  packets:                 13
     Output packets:                 10
    Local statistics:
     Input  bytes  :                138
     Output bytes  :                155
     Input  packets:                  6
     Output packets:                  3
    Transit statistics:
     Input  bytes  :                135                    0 bps
     Output bytes  :                115                    0 bps
     Input  packets:                  7                    0 pps
     Output packets:                  7                    0 pps
  Keepalive settings: Interval 45 seconds, Up-count 1, Down-count 3
  LCP state: Opened
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 1492, Generation: 15534, Route table: 0
      Flags: Sendbcast-pkt-to-re
    Protocol mlppp, Multilink bundle: si-1/0/0.1073756922
    Service device pool: sipool-1, Dynamic profile: ml-bundle-prof
    MTU: 1526, Generation: 15533, Route table: 0
```

Meaning

When a PPPoE MLPPP session is tunneled, the bundle and member link binding remains. Although the bundle IFL does not participate in the control and forwarding path, it remains in the user-interface.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Mixed Mode Support for MLPPP and PPP Subscribers Overview on page 227
- Configuring L2TP Client Access to Support MLPPP for Dynamic Subscribers on page 247

Example: Configuring Dynamic PPPoE MLPPP Subscribers

This example shows how to configure dynamic Point-to-Point Protocol over Ethernet (PPPoE) multilink (MLPPP) subscribers.

- Requirements on page 292
- Overview on page 292

Requirements

This example uses the following hardware and software components:

- MX Series with MPC2s installed
- Junos OS Release 13.3 or later

Before you configure dynamic PPPoE MLPPP subscribers, be sure you have:

- If configuring a tunnel group using an inline service (**si**) interface, enabled the inline service (**si**) interface for PPPoE subscribers. See "Enabling Inline Service Interfaces for PPPoE and LNS Subscribers" on page 241.
- Configured the inline service (**si**) interface for PPPoE subscribers. See "Configuring Inline Service Interface for PPPoE and LNS Subscribers" on page 242.
- If configuring a tunnel group using a pool of service interfaces, configured service device pools for PPPoE subscribers. See "Configuring Service Device Pools for Load Balancing PPPoE and LNS Subscribers" on page 243.

Overview

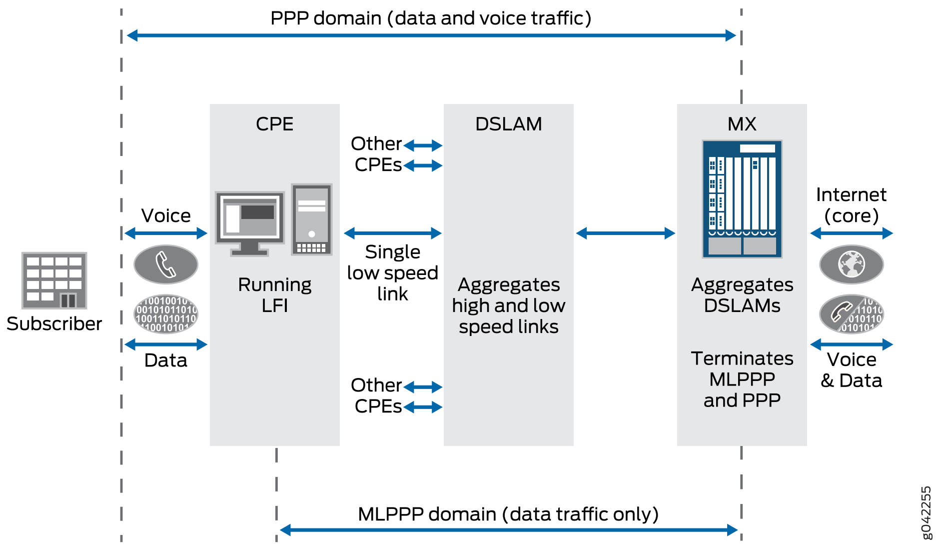
An MLPPP subscriber consists of two IFLs (logical interfaces), a member link, and a bundle. For dynamic PPPoE MLPPP subscribers, you configure the dynamic **pp0** member link IFLs using dynamic profiles. The **pp0** member link dynamic profile includes the **family mlppp** statement containing the dynamic profile name and the service interface (**si**), or a pool of service interfaces. This information is then used to create the dynamic bundle IFL.

Each dynamic bundle accepts only one dynamic member link. If more than one dynamic member link attempts to join the same dynamic bundle, the system fails the new member session.

Figure 20 on page 293 shows how the different types of traffic traverse through a network where the MX Series terminates PPPoE sessions.

Topology

Figure 20: PPP and MLPPP Traffic Terminated at MX Series



The following two domains are shown terminating traffic at the MX Series:

- PPP domain—Contains data and voice traffic
- MLPPP domain—Contains data traffic only

Configuration

To configure dynamic PPPoE MLPPP subscribers, perform these tasks:

- Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL Without Mixed Mode Support on page 295
- Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL With Mixed Mode Support on page 297
- Configuring a Dynamic Profile for the Dynamic Bundle IFL on page 300
- Results on page 302

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.

```
[edit]
set interfaces ge-1/0/0 flexible-vlan-tagging
set interfaces ge-1/0/0 unit 600 encapsulation ppp-over-ether vlan-id 600
set interfaces ge-1/0/0 unit 600 pppoe-underlying-options dynamic-profile
  ml-pp0-member-prof
set dynamic-profiles ml-pp0-member-prof
```

```
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit”
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” pppoe-options underlying-interface
  "$junos-underlying-interface" server
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” ppp-options pap chap lcp-restart-timer 5000
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family mlppp bundle “$junos-bundle-interface-name”
set dynamic-profiles ml-pp0-member-profinterfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family mlppp service-interface si-5/1/0
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family mlppp dynamic-profile ml-bundle-prof
set dynamic-profiles ml-pp0-member-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family inet

[edit]
set dynamic-profiles ml-bundle-prof
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name"
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix next-hop $junos-framed-route-nexthop
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix metric $junos-framed-route-cost
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" routing-options access route
  $junos-framed-route-ip-address-prefix preference $junos-framed-route-distance
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" access-internal route $junos-subscriber-ip-address
set dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface
  "$junos-interface-name" access-internal route $junos-subscriber-ip-address
  qualified-next-hop $junos-interface-name
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit”
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” encapsulation multilink-ppp
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” mrru 1500
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” short-sequence
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” fragment-threshold 320
set dynamic-profiles ml-bundle-prof interfaces “$junos-interface-ifd-name” unit
  “$junos-interface-unit” family inet
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  scheduler-map "$junos-cos-scheduler-map”
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  shaping-rate "$junos-cos-shaping-rate"
```



```
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  guaranteed-rate "$junos-cos-guaranteed-rate"
set dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2
  delay-buffer-rate "$junos-cos-delay-buffer-rate"
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  "$junos-interface-ifd-name" unit "$junos-interface-unit"
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  "$junos-interface-ifd-name" unit "$junos-interface-unit" output-traffic-control-profile
  tcp2
set dynamic-profiles ml-bundle-prof class-of-service interfaces
  "$junos-interface-ifd-name" unit "$junos-interface-unit" fragmentation-map fragmap-2
```

Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL Without Mixed Mode Support

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

You configure the dynamic **pp0** member link IFLs by using dynamic profiles and including the **family mlppp** statement. The **family mlppp** statement contains the **dynamic-profile** ***name***, and either the **service-interface** or the **service-device-pool** used to create the dynamic bundle IFL. If you configure a **service-device-pool**, an inline services (**si**) interface is selected from the pool to create the dynamic bundle IFL using a round-robin method.

You must also configure the **family inet** statement in the tunneled **pp0** member link dynamic profile. The **family inet** statement enables the L2TP long route to be installed and supported for the lookup engine to steer control packets to the Routing Engine.

NOTE: Optionally, you can configure the dynamic profile to support mixed mode to enable PPP subscribers to successfully log in using the dynamic profile. See "Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL With Mixed Mode Support" on page 297 for the additional configuration commands required.

The following example shows how to configure dynamic **pp0** member link IFLs over flexible VLAN to support PPPoE MLPPP subscribers.

1. Create the Gigabit Ethernet underlying interface for the dynamic profile, **ge-1/0/0** and enable flexible VLAN tagging.

   ```
   [edit interfaces]
   user@host# set ge-1/0/0 flexible vlan-tagging
   ```

2. For the **ge-1/0/0** interface, configure PPP over Ethernet encapsulation for VLAN 600.

   ```
   [edit interfaces ge-1/0/0]
   user@host# set unit 600 encapsulation ppp-over-ether vlan-id 600
   ```

3. Configure the PPPoE underlying interface and set its dynamic profile.

   ```
   [edit interfaces ge-1/0/0 unit 600]
   ```


user@host# **set pppoe-underlying-options dynamic-profile ml-pp0-member-prof**

4. Specify the dynamic profile that you previously set as the PPPoE underlying interface dynamic profile.

   [edit dynamic-profiles]
   user@host# **set ml-pp0-member-prof**

5. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

   NOTE: The interface setting for a dynamic profile for PPPoE sessions can use either of the following code formats:

   - **set interfaces pp0**

     or

   - **set interfaces "$junos-interface-ifd-name"**

   This example uses **set interfaces "$junos-interface-ifd-name"**.

   [edit dynamic-profiles ml-pp0-member-prof]
   user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

6. For the *$junos-interface-ifd-name* interface, configure the underlying interface for the PPPoE options and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

   [edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set pppoe-options underlying-interface "$junos-underlying-interface" server**

7. Configure PPP-specific interface properties in a dynamic profile: **pap**, **chap**, and set the **lcp-restart-timer** to 5000.

   [edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set ppp-options pap chap lcp-restart-timer 5000**

8. Enable MLPPP support for dynamic PPPoE MLPPP subscribers and configure the dynamic bundle interface (IFL) by setting the predefined dynamic bundle interface variable *$junos-bundle-interface-name*.

   NOTE: The **family mlppp** statement determines whether MLPPP is supported for subscribers coming in from the subscriber interface.

[edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
user@host# **set family mlppp bundle "$junos-bundle-interface-name"**

9. Specify the service interface for the dynamic PPPoE MLPPP subscribers.

   [edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family mlppp]
   user@host# **set service-interface si-5/1/0**

10. Specify the dynamic profile name for the bundle.

    [edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" family mlppp]
    user@host# **set dynamic-profile ml-bundle-prof**

11. Enable support for PPPoE tunneled subscribers and the LAC long route.

    [edit dynamic-profiles ml-lns-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set family inet**

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

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

Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL With Mixed Mode Support

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

Optionally, you can configure the dynamic profile to support mixed mode to enable PPP subscribers to successfully log in using the dynamic profile.

The following example shows the additional configurations required to support mixed mode for dynamic profiles.

NOTE: **The following configuration commands are not included in the** "CLI Quick Configuration" on page 293 **section.**

1. Configure dynamic **pp0** member link IFLs over flexible VLAN to support PPPoE MLPPP subscribers. See "Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL Without Mixed Mode Support" on page 295, steps 1 through 4.

2. Specify the dynamic profile that you used to create the dynamic PPPoE MLPPP member link.

   [edit dynamic-profiles]
   user@host# **set ml-pp0-member-prof**

3. When the customer premises equipment (CPE) is for a dynamic virtual routing and forwarding (VRF) PPP subscriber, you must configure the routing instance and its interface.

   [edit dynamic-profiles ml-pp0-member-prof]
   user@host# **set routing-instances "$junos-routing-instance" interface "$junos-interface-name"**

4. Configure the access route for the routing options.

   [edit dynamic-profiles ml-pp0-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access route $junos-framed-route-ip-address-prefix**

5. Configure the next-hop, metric, and preference for the router.

   [edit dynamic-profiles ml-pp0-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access route $junos-framed-route-ip-address-prefix]
   user@host# **set next-hop $junos-framed-route-nexthop**
   user@host# **set metric $junos-framed-route-cost**
   user@host# **set preference $junos-framed-route-distance**

6. Configure the internal access route for the routing options.

   [edit dynamic-profiles ml-pp0-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access-internal route $junos-subscriber-ip-address**

7. Configure the qualified next-hop for the internal route.

   [edit dynamic-profiles ml-pp0-member-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access-internal route $junos-subscriber-ip-address]
   user@host# **set qualified-next-hop $junos-interface-name**

8. Configure the basic settings for the dynamic profile. See "Configuring a Dynamic Profile for Dynamic pp0 Member Link IFL Without Mixed Mode Support" on page 295, steps 5 through 11.

   NOTE: To enable mixed mode support, when the CPE is a PPP subscriber, you must also add an unnumbered address, and input and output filters to the **family inet** statement.

   [edit dynamic-profiles ml-pp0-member-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set family inet unnumbered-address $junos-loopback-interface**
   user@host# **set family inet filter input "$junos-input-filter" output "$junos-output-filter"**

9. When the CPE is a PPP subscriber, you must also configure class of service and define the traffic control profile.

[edit dynamic-profiles ml-pp0-member-prof class-of-service
user@host# **set traffic-control-profiles tc-profile**

10. For the traffic-control profile, define the following settings: scheduler map, shaping rate, overhead accounting, guaranteed rate, and delay buffer rate.

    [edit dynamic-profiles ml-pp0-member-prof class-of-service traffic-control-profiles tc-profile
    user@host# **set scheduler-map "$junos-cos-scheduler-map"**
    user@host# **set shaping-rate "$junos-cos-shaping-rate"**
    user@host# **set overhead-accounting "$junos-cos-shaping-mode" bytes "$junos-cos-byte-adjust"**
    user@host# **set guaranteed-rate "$junos-cos-guaranteed-rate"**
    user@host# **set delay-buffer-rate "$junos-cos-delay-buffer-rate"**

11. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*.

    [edit dynamic-profiles ml-pp0-member-prof class-of-service]
    user@host# **set interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”**

12. For the dynamic profile interface, define the following settings: output traffic control profile, classifiers, and rewrite rules.

    [edit dynamic-profiles ml-pp0-member-prof class-of-service interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit”]
    user@host# **set output-traffic-control-profile tc-profile**
    user@host# **set classifiers dscp GEN-CLASSIFIER-IN**
    user@host# **set rewrite-rules dscp GEN-RW-OUT-DSCP**

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

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

Configuring a Dynamic Profile for the Dynamic Bundle IFL

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy.

To configure the dynamic profile for the dynamic bundle IFL, you specify the **encapsulation multilink-ppp** statement within the dynamic profile. The **dynamic profile** for the dynamic bundle IFL is referenced from the **dynamic profile** for dynamic PPPoE and LNS member link IFLs.

You must configure the **fragmentation-maps** statement statically using **class-of-service** and assign them in the bundle dynamic profile. You can also set these optional MLPPP parameters: MRRU, short sequence, and fragment-threshold. The following example shows how to configure the dynamic profile for the dynamic bundle IFL:

1. Specify the dynamic profile name for the bundle.

   [edit dynamic-profiles}
   user@host# **set ml-bundle-prof**

2. Although MLPPP member links process authentication and routing-instance assignments, if a non-default routing-instance is assigned, you must configure the bundle IFL under the assigned routing-instance. As a result, you must also configure routing-instances in the bundle dynamic-profile.

   [edit dynamic-profiles ml-bundle-prof]
   user@host# **set routing-instances "$junos-routing-instance" interface "$junos-interface-name"**

3. Configure the access route for the routing options.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access route $junos-framed-route-ip-address-prefix**

4. Configure the next-hop, metric, and preference for the router.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access route $junos-framed-route-ip-address-prefix]
   user@host# **set next-hop $junos-framed-route-nexthop**
   user@host# **set metric $junos-framed-route-cost**
   user@host# **set preference $junos-framed-route-distance**

5. Configure the internal access route for the routing options.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name"]
   user@host# **set routing-options access-internal route $junos-subscriber-ip-address**

6. Configure the qualified next-hop for the internal route.

   [edit dynamic-profiles ml-bundle-prof routing-instances "$junos-routing-instance" interface "$junos-interface-name" routing-options access-internal route $junos-subscriber-ip-address]

user@host# **set qualified-next-hop $junos-interface-name**

7. Configure the interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

   [edit dynamic-profiles ml-bundle-prof]
   user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

8. Configure the **encapsulation multilink-ppp** statement to enable MLPPP bundling for the dynamic profile.

   [edit dynamic-profiles ml-bundle-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set encapsulation multilink-ppp**

9. Configure the following MLPPP options for this example:

   - **mrru**—Specifies the maximum received reconstructed unit value ranging from 1500 through 4500 bytes.
   - **fragment-threshold**—Applies to all packets and forwarding classes, ranging from 128 through 16,320 bytes.
   - **short-sequence**—Determines the header format for the MLPPP. Default is **long-sequence**.

   [edit dynamic-profiles ml-bundle-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
   user@host# **set mrru 1500**
   user@host# **set fragment-threshold 320**
   user@host# **set short-sequence**

10. Enable support for MLPP subscribers.

    [edit dynamic-profiles ml-bundle-prof interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set family inet**

11. To enable **fragmentation-maps** support, you must configure class of service and define the traffic control profile.

    [edit dynamic-profiles ml-bundle-prof class-of-service]
    user@host# **set traffic-control-profiles tcp2**

12. For the traffic-control profile, define the following settings: scheduler map, shaping rate, guaranteed rate, and delay buffer rate.

    [edit dynamic-profiles ml-bundle-prof class-of-service traffic-control-profiles tcp2]
    user@host# **set scheduler-map "$junos-cos-scheduler-map"**
    user@host# **set shaping-rate "$junos-cos-shaping-rate"**
    user@host# **set guaranteed-rate "$junos-cos-guaranteed-rate"**
    user@host# **set delay-buffer-rate "$junos-cos-delay-buffer-rate"**

13. Configure the underlying interface for the dynamic profile by setting the predefined dynamic interface variable *$junos-interface-ifd-name*, and the underlying logical interface unit by setting the predefined unit number variable *$junos-interface-unit*. The interface and unit number variables are dynamically replaced with the interface and unit number that the subscriber accesses when connecting to the MX Series.

    [edit dynamic-profiles ml-bundle-prof class-of-service]
    user@host# **set interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"**

14. For the dynamic profile interface, define the output traffic control profile.

    [edit dynamic-profiles ml-bundle-prof class-of-service interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set output-traffic-control-profile tcp2**

15. Define the fragmentation-map required for dynamic profile bundles and used to enable link fragmentation and interleaving (LFI).

    [edit dynamic-profiles ml-bundle-prof class-of-service interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"]
    user@host# **set fragmentation-map fragmap-2**

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

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

Results

From configuration mode, confirm your configuration by entering the **show dynamic-profiles** command with the sub-hierarchy levels **interfaces**. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

user@host# **show interfaces ge-1/0/0**

```
interfaces {
    ge-1/0/0 {
        flexible- vlan-tagging;
        unit 600 {
            encapsulation ppp-over-ether;
            vlan-id 600;
            pppoe-underlying-options {
                dynamic-profile ml-pp0-member-prot;
            }
        }
    }
}
```

Dynamic profile for dynamic PPPoE member link IFL without mixed mode:

user@host# **show dynamic-profiles mlp-pp0-member-profile**

```
dynamic-profile mlp-pp0-member-profile {
     interface $"$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
            pppoe-options {
                underlying-interface "$junos-underlying-interface";
                server;
            }
```



```
                ppp-options {
                    pap;
                    chap;
                    lcp-restart-timer 5000;
                }
                family mlppp {
                    bundle $junos-bundle-interface-name;
                    service-interface si-5/1/0;
                    dynamic-profile ml-bundle-prof;
                }
                family inet
            }
        }
    }
```

Dynamic profile for dynamic PPPoE member link IFL with mixed mode:

```
user@host# show dynamic-profiles mlp-pp0-member-profile
dynamic-profile ml-pp0-member-prof {
    routing-instances {
        "$junos-routing-instance" {
            interface "$junos-interface-name";
                routing-options {
                    access {
                        route $junos-framed-route-ip-address-prefix {
                            next-hop $junos-framed-route-nexthop;
                            metric $junos-framed-route-cost;
                            preference $junos-framed-route-distance;
                        }
                    }
                    access-internal {
                        route $junos-subscriber-ip-address {
                            qualified-next-hop $junos-interface-name;
                        }
                    }
                }
            }
        }
    }
    interfaces $"$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
            pppoe-options {
                underlying-interface "$junos-underlying-interface";
                server;
            }
            ppp-options {
                pap;
                chap;
                lcp-restart-timer 5000;
            }
            family mlppp {
                bundle $junos-bundle-interface-name;
                service-interface si-5/1/0;
                dynamic-profile ml-bundle-prof;
            }
            family inet {
                unnumbered-address $junos-loopback-interface;
                filter {
                    input "$junos-input-filter";
                    output "$junos-output-filter";
                }
```

```
                }
            }
    class-of-service {
        traffic-control-profiles {
                tc-profile {
                    scheduler-map "$junos-cos-scheduler-map";
                    shaping-rate "$junos-cos-shaping-rate";
                    overhead-accounting "$junos-cos-shaping-mode" bytes
    "$junos-cos-byte-adjust";
                    guaranteed-rate "$junos-cos-guaranteed-rate";
                    delay-buffer-rate "$junos-cos-delay-buffer-rate";
                }
            }
            interfaces {
                "$junos-interface-ifd-name" {
                    unit "$junos-interface-unit" {
                        output-traffic-control-profile tc-profile;
                        classifiers {
                            dscp GEN-CLASSIFIER-IN;
                        }
                        rewrite-rules {
                            dscp GEN-RW-OUT-DSCP;
                        }
                    }
                }
            }
        }
    }
```

Verification

Confirm that the configuration is working properly.

- Verifying the Subscriber Information on page 304
- Verifying Mixed Mode Support with a Dynamic MLPPP-Capable Subscriber on page 305
- Verifying Tunneled PPPoE MLPPP Interfaces on page 306

Verifying the Subscriber Information

Purpose Verify that the subscriber information for dynamic MLPPP over PPPoE is correct.

Action

```
root@haverhill> show subscribers extensive
Type: PPPoE
User Name: dual-stack-v4v6-user@example.com
Logical System: default
Routing Instance: default
Interface: pp0.1073741824
Interface type: Dynamic
Underlying Interface: ge-1/1/0.3000
Dynamic Profile Name: DS-lac-mlppp-link-ipv6
MAC Address: 00:00:5E:00:53:02
State: Active
PPP State: Tunneled
Local IP Address: 198.51.100.21
Remote IP Address: 198.51.100.22
Radius Accounting ID: 5
Session ID: 5
Bundle Session ID: 6
VLAN Id: 3000
Login Time: 2013-03-28 15:42:30 PDT

Type: MLPPP
Logical System: default
Routing Instance: default
Interface: si-1/1/0.1073741825
Interface type: Dynamic
Underlying Interface: si-1/1/0.1073741825
Dynamic Profile Name: DS-mlppp-bundle-ipv6
State: Active
PPP State: Tunneled
Local IP Address: N/A
Remote IP Address: N/A
Radius Accounting ID: 6
Session ID: 6
Underlying Session ID: 5
Login Time: 2013-03-28 15:42:30 PDT
```

Meaning When a PPPoE MLPPP session is tunneled, the bundle and member link binding is maintained. The **PPP State** setting for both bundle and member link is set to **Tunneled**. Although there is no NCP negotiation over the bundle, the bundle session remains active.

Verifying Mixed Mode Support with a Dynamic MLPPP-Capable Subscriber

Purpose Verify that mixed-mode interfaces negotiated correctly for the single link PPP using a dynamic MLPPP-capable subscriber.

Action

```
root@haverhill> show interfaces extensive pp0.1073741832
Logical interface pp0.1073741832 (Index 489) (SNMP ifIndex 712)
   (Generation 299)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 40,
      Session AC name: haverhill1, Remote MAC address: 00:00:5e:00:53:72,
      Underlying interface: ge-1/0/0.44 (Index 376)
    Traffic statistics:
     Input  bytes  :                1213
     Output bytes  :                1672
     Input  packets:                  41
     Output packets:                  49
     IPv6 transit statistics:
      Input  bytes  :                  0
      Output bytes  :                  0
      Input  packets:                  0
      Output packets:                  0
    Local statistics:
     Input  bytes  :                 159
     Output bytes  :                1424
     Input  packets:                  10
     Output packets:                  18
    Transit statistics:
     Input  bytes  :                1054                    0 bps
     Output bytes  :                 248                    0 bps
     Input  packets:                  31                    0 pps
     Output packets:                  31                    0 pps
     IPv6 transit statistics:
      Input  bytes  :                  0
      Output bytes  :                  0
      Input  packets:                  0
      Output packets:                  0
  Keepalive settings: Interval 45 seconds, Up-count 1, Down-count 3
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Success
    Protocol inet, MTU: 65531, Generation: 384, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Is-Primary
        Destination: Unspecified, Local: 198.51.100.11, Broadcast: Unspecified,
        Generation: 297
    Protocol inet6, MTU: 65531, Generation: 385, Route table: 0
      Addresses, Flags: Is-Primary
        Destination: Unspecified, Local: 2030::1
    Generation: 298
        Destination: Unspecified, Local: fe80::2a0:a50f:fc64:6ef2
    Generation: 299
```

Meaning When a dynamic MLPPP-capable subscriber negotiates a single link PPP, the results are the same as a non-MLPPP subscriber; no bundle IFL or SDB session is created.

Verifying Tunneled PPPoE MLPPP Interfaces

Purpose Verify that the PPPoE MLPPP member link IFL is correct.

Action

```
root@haverhill> show interfaces extensive pp0.1073756921
Logical interface pp0.1073756921 (Index 482) (SNMP ifIndex 706)
   (Generation 15542)
    Flags: Up Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 37,
      Session AC name: haverhill, Remote MAC address: 00:00:5e:00:53:82,
      Underlying interface: ge-1/0/0.2040 (Index 457)
    Traffic statistics:
     Input  bytes  :                  273
     Output bytes  :                  270
     Input  packets:                   13
     Output packets:                   10
    Local statistics:
     Input  bytes  :                  138
     Output bytes  :                  155
     Input  packets:                    6
     Output packets:                    3
    Transit statistics:
     Input  bytes  :                  135                     0 bps
     Output bytes  :                  115                     0 bps
     Input  packets:                    7                     0 pps
     Output packets:                    7                     0 pps
  Keepalive settings: Interval 45 seconds, Up-count 1, Down-count 3
  LCP state: Opened
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 1492, Generation: 15534, Route table: 0
      Flags: Sendbcast-pkt-to-re
    Protocol mlppp, Multilink bundle: si-1/0/0.1073756922
    Service device pool: sipool-1, Dynamic profile: ml-bundle-prof
    MTU: 1526, Generation: 15533, Route table: 0
```

Meaning

When a PPPoE MLPPP session is tunneled, the bundle and member link binding remains. Although the bundle IFL does not participate in the control and forwarding path, it remains in the user interface.

Related Documentation

- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Mixed Mode Support for MLPPP and PPP Subscribers Overview on page 227
- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239

CHAPTER 28

Configuring Dynamic PPP Subscriber Services

Dynamic PPP Subscriber Services for Static MLPPP Interfaces Overview

Dynamic subscriber services are supported for MLPPP bundle interfaces, with certain interface and hardware restrictions. See "Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces" on page 310. Multiclass MLPPP enables the relative prioritization of up to eight classes of traffic over an MLPPP bundle, but only on link services intelligent queuing (IQ) (LSQ) interfaces.

RADIUS previously supported only authentication for MLPPP. Address management, service deactivation, and dynamic selection of subscriber properties based on RADIUS user ID are now also supported.

RADIUS can dynamically allocate IPv4 addresses for MLPPP connections. When the first subscriber logs in, an address is allocated. The same address is allocated to all links in a bundle. Any other address provided for any of the links is ignored. The IP address is released for re-allocation when the last member link in a bundle logs out. Similar to the address allocation, the services configured for the first subscriber to log in are configured for all subsequent subscribers in the bundle.

The Acct-Multi-Session-Id [50] attribute enables RADIUS to link multiple related sessions into a single log file. RADIUS uses the session database (SDB) bundle session ID for the value of Acct-Multi-Session-Id. This bundle ID enables RADIUS to initiate a disconnect for an entire bundle. By tracking the member link sessions, RADIUS is also able to disconnect the individual member links in a bundle.

The Acct-Link-Count [51] attribute records the number of links present in a multilink session at the time the accounting record is generated.

Related Documentation

- Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310
- Configuring PPP Subscriber Services for MLPPP Bundles on page 310

Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces

PPP subscriber services are supported for MLPPP bundle interfaces. These services require the following hardware:

- MX Series router
- Channelized DS3/E3 Enhanced IP PIC (PB-4CHDS3-E3-IQE-BNC) to support MLPPP subscriber access
- An Adaptive Services PIC or Multiservices PIC to support subscriber services on LSQ MLPPP bundle interfaces

Subscriber services are not supported for single-link PPP interfaces with this hardware.

Related Documentation

- Dynamic PPP Subscriber Services for Static MLPPP Interfaces Overview on page 309

Configuring PPP Subscriber Services for MLPPP Bundles

You can configure PPP subscriber services for static LSQ MLPPP bundle interfaces.

To configure PPP subscriber services for static LSQ MLPPP bundle interfaces:

1. Enable PPP subscriber services for the interfaces.

   See “Enabling PPP Subscriber Services for Static Non-Ethernet Interfaces” on page 311.
2. Attach a dynamic profile to the MLPPP bundle interface.

   See “Attaching Dynamic Profiles to MLPPP Bundles” on page 311.

Related Documentation

- Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310
- Example: Minimum MLPPP Dynamic Profile on page 312
- Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces on page 312

Enabling PPP Subscriber Services for Static Non-Ethernet Interfaces

You can enable PPP subscriber services for certain non-Ethernet interface types on particular associated PICs. Supported interfaces are listed in "Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces" on page 310.

To enable PPP subscriber services on supported non-Ethernet interfaces:

- Configure PPP subscriber services.

```
[edit chassis]
user@host# set ppp-subscriber-services enable
```

To disable PPP subscriber services on supported non-Ethernet interfaces:

- Disable PPP subscriber services.

```
[edit chassis]
user@host# set ppp-subscriber-services disable
```

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310
- Configuring PPP Subscriber Services for MLPPP Bundles on page 310

Attaching Dynamic Profiles to MLPPP Bundles

You can attach a dynamic profile to a static MLPPP bundle interface. When a PPP subscriber logs in on a member link, the specified dynamic profile is instantiated and the services defined in the profile are applied to the LSQ bundle interface.

To attach a dynamic profile to a static LSQ MLPPP bundle interface:

1. Specify that you want to configure PPP options.

```
[edit interfaces lsq-3/3/0 unit 0]
user@host# edit ppp-options
```

2. Specify the dynamic profile you want to associate with the interface.

```
[edit interfaces lsq-3/3/0 unit 0 ppp-options]
user@host# set dynamic-profile vod-profile-50
```

Related Documentation

- Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310
- Configuring PPP Subscriber Services for MLPPP Bundles on page 310
- *Dynamic Profiles Overview*
- Configuring PPP Subscriber Services for MLPPP Bundles on page 310
- Example: Minimum MLPPP Dynamic Profile on page 312
- Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces on page 312

Example: Minimum MLPPP Dynamic Profile

This example shows the minimum configuration for a dynamic profile that is used for static LSQ MLPPP bundle interfaces.

```
dynamic-profiles {
  mlppp-profile-1 {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit";
      }
    }
  }
}
```

Related Documentation

- Attaching Dynamic Profiles to MLPPP Bundles on page 311

Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces

This example shows how to configure dynamic subscriber services on MLPPP bundle interfaces. The MLPPP bundles must be configured on link services intelligent queuing (IQ) (LSQ) interfaces. The MLPPP interfaces must be statically configured.

To configure dynamic subscriber services on static LSQ MLPPP bundle interfaces:

1. Configure class of service features for the LSQ interfaces.

```
[edit]
class-of-service
  classifiers {
    inet-precedence inet_classifier {
      forwarding-class best-effort {
        loss-priority low code-points 000;
      }
      forwarding-class expedited-forwarding {
        loss-priority low code-points 011;
      }
      forwarding-class assured-forwarding {
        loss-priority low code-points 100;
      }
    }
  }
  fragmentation-maps {
    sample-fragmap {
      forwarding-class {
        best-effort {
          fragment-threshold 1000;
          multilink-class 1:
        }
        assured-forwarding {
          fragment-threshold 1000;
          multilink-class 2:
        }
```



```
            expedited-forwarding {
              multilink-class 3:
            }
          }
        }
      }
      forwarding-classes {
        queue 0 best-effort;
        queue 1 expedited-forwarding;
        queue 2 assured-forwarding;
      }
      # traffic classifiers are statically defined
        network traffic interface{
          classifiers {
            inet-precedence inet_classifier;
          }
        }
      scheduler-maps {
        allthree {
          forwarding-class best-effort scheduler be-scheduler;
          forwarding-class expedited-forwarding scheduler hiprior-sched;
          forwarding-class assured-forwarding scheduler vpn-sched;
        }
      }
      schedulers {
        be-scheduler {
          transmit-rate percent 30;
          priority low;
        }
        hiprior-scheduler {
          transmit-rate percent 40;
          priority strict-high;
        }
        vpn-sched {
          transmit-rate percent 30;
          medium-high;
        }
      }
    }
```

2. Configure the MLPPP bundle interfaces and the LSQ interfaces.

```
    [edit interfaces]
    t1-3/1/0:1:1 {
      keepalives interval 600;
      encapsulation ppp;
      unit 0 {
        ppp-options {
          lcp-restart-timer 5000;
        }
        family mlppp {
          bundle lsq-3/3/0.0;
        }
      }
    }
    t1-3/1/0:1:2 {
```

```
        keepalives interval 600;
        encapsulation ppp;
        unit 0 {
            ppp-options {
                lcp-restart-timer 5000;
            }
            family mlppp {
                bundle lsq-3/3/0.0;
            }
        }
    }
    lsq-3/3/0 {
        unit 0 {
            encapsulation multilink-ppp;
            multilink-max-classes 4;
            ppp-options {
                ncp-restart-timer 10000;
                dynamic-profile mlppp-profile;
            }
            family inet {
                address 192.168.1.1/32 {
                    destination 192.168.25.45;
                }
            }
        }
    }
```

3. Configure the dynamic profile that is applied to the MLPPP bundle interfaces.

```
[edit]
dynamic-profiles {
    mlppp-profile {
        interfaces {
            "$junos-interface-ifd-name" {
                unit junos-underlying-interface-unit" {
                    family inet {
                        filter {
                            input "$junos-input-filter";
                            output "$junos-output-filter";
                        }
                    }
                }
            }
        }
        class-of-service {
            interfaces {
                "$junos-interface-ifd-name" {
                    unit junos-underlying-interface-unit" {
                        output-traffic-control-profile tcp1;
                        fragmentation-map sample-fragmap;
                    }
                }
            }
            traffic-control-profiles {
                tcp1 {
                    scheduler-map "junos-cos-scheduler-map";
```



```
          shaping-rate "$junos-cos-shaping-rate";
          guaranteed-rate "$junos-cos-guaranteed-rate";
          delay-buffer-rate "$junos-cos-delay-buffer-rate";
        }
      }
      scheduler-maps {
        data_smap {
          forwarding-class be scheduler data_sch;
        }
      }
      schedulers {
        be_sch {
          ...
        }
      }
    }
  }
}
```

Related Documentation

- Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310
- *Layer 2 Service Package Capabilities and Interfaces*

CHAPTER 29

Monitoring and Managing MLPPP for Subscriber Access

MLPPP Subscriber Accounting Statistics Overview

For broadband subscriber management edge router Point-to-Point Protocol (PPP) subscribers, the accounting statistics contain two groups:

- The aggregate (IPv4 and IPv6) statistics group consists of statistics reported through these RADIUS attributes: **Acct-Input-Octets**, **Acct-Output-Octets**, **Acct-Input-Packets**, and **Acct-Output-Packets**.
- The IPv6 portion of the aggregate statistics group reported through the Juniper Networks **ERX-VSA**s **151** through **156**.

Broadband subscriber management edge router PPP logical interfaces (IFLs) support accurate accounting statistics by excluding PPP control traffic, and incrementing packet and octets at the point where the packet is about to leave the router. The packet is not dropped by CoS, filters, or policers.

For MLPPP subscribers, accounting is performed for each member link (currently limited to one) and not the bundle. The bundle IFL supports accurate accounting statistics only, and the member link supports transit statistics only. As a result, the following restrictions apply for member link final aggregate statistics:

- Only aggregate statistics are available with no IPv6 specific statistics; for example, **ERX-VSA 151** to **156** are all zeros.
- Packets sent and received over the member link include fragments and non-fragmented packets.
- Octets sent and received are bytes in the fragments and non-fragmented packets.
- Aggregate statistics include packets that can be dropped in the router, such as CoS, filters, and policers.
- Aggregate statistics include PPP control packets (LCP, PAP, CHAP, and NCP) and keepalive packets.

The following topics describe the statistics collection process in the lookup engine for member links and its bundle.

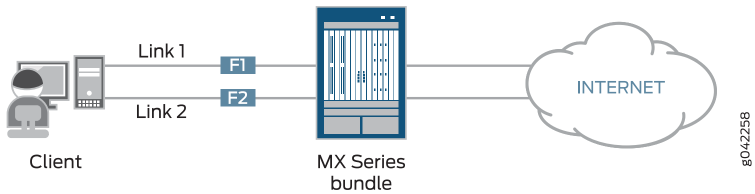
- Member Link and Bundle Statistics Collection on page 318
- RADIUS Final Statistics Output Example on page 320

Member Link and Bundle Statistics Collection

MLPPP with MPC2 currently supports only one member link per bundle. However, support for accounting statistics must consider a true multilink scenario where multiple member links exist per bundle. From the lookup engine, only the bundle has the ability to maintain Layer 3 statistics. For an individual member link, only protocol-agnostic fragments (plus non-fragmented packets) are counted.

Figure 21 on page 319 shows an MLPPP client with two active member links and the statistics maintained by the lookup engine. For MLPPP with MPC2, each member link and bundle can reside on different lookup engines from where the accounting statistics are maintained.

Figure 21: MLPPP Client with Two Active Member Links



Client-to-Internet Traffic Statistics

When the client sends IP packets towards the Internet, they may be fragmented. For example, packet P1 is fragmented into F1 and F2, and the fragments belonging to a single packet can be sent on different links (Figure 21 on page 319).

- F1 is sent on Link 1
- F2 is sent on Link 2

When Link 1 on the MX Series receives fragment F1, it is identified as an MLPPP encapsulated fragment. Because IPv4 or IPv6 families are indicated on the first fragment, all of the incoming fragments are counted using a protocol-agnostic method before the fragment is forwarded to the bundle for reassembly.

- The protocol-agnostic incoming packet count is incremented by 1.
- The protocol-agnostic incoming byte count is incremented by the size of the fragment.

Similarly on Link 2, fragment F2 is also counted using a protocol-agnostic method, and then forwarded to the bundle for reassembly.

Fragment F1 arrives at the bundle and is stored along with its MLPPP header containing the sequence number with the **begin flag** set to 0, and the **end flag** set to 1.

Fragment F2 arrives at the bundle and is stored along with its MLPPP header containing the sequence number with the **begin flag** set to 1, and the **end flag set** to 0.

The pattern of monotonically increasing sequence numbers, **begin flag** set to 1 and **end flag** set to 1, causes fragments F1 and F2 to be reassembled into a single packet.

After the packet has been reassembled, the packet's Layer 3 type (either IPv4 or IPv6) is determined at the bundle. Then, the packets and bytes are counted according to its Layer 3 type at the bundle based on accurate accounting statistics:

- *bundleA_ipv4_packets_from_client* += 1
- *bundleA_ipv4_bytes_from_client* += *packet_size*

Or

- *bundleA_ipv6_packets_from_client* += 1

- *bundleA_ipv6_bytes_from_client* += *packet_size*

Internet-to-Client Traffic Statistics

In the reverse direction, Layer 3 packets come from the Internet to the bundle.

The packets and bytes are counted according to its Layer 3 type at the bundle:

- *bundleA_ipv4_packets_to_client* += 1
- *bundleA_ipv4_bytes_to_client* += *packet_size*

Or

- *bundleA_ipv6_packets_to_client* += 1
- *bundleA_ipv6_bytes_to_client* += *packet_size*

If the packets are fragmented, the fragments belonging to the same packet can be sent out different links. Because no IPv4 or IPv6 families are indicated on the links, all of the outgoing fragments are counted using a protocol-agnostic method.

- The protocol-agnostic outgoing packet count is incremented by 1.
- The protocol-agnostic outgoing byte count is incremented by the size of the fragment.

RADIUS Final Statistics Output Example

The following output example shows RADIUS final statistics:

```
User-Name = "user@example.com"
        Acct-Status-Type = Stop
        Acct-Session-Id = "786"
        Acct-Multi-Session-Id = "787"
        Acct-Input-Octets = 1068151928
        Acct-Output-Octets = 4268692096
        Acct-Session-Time = 61965
        Acct-Input-Packets = 406636696
        Acct-Output-Packets = 357477811
        Acct-Terminate-Cause = Lost-Carrier
        Service-Type = Framed-User
        Framed-Protocol = PPP
        Framed-IPv6-Pool = "v6-pool-21"
        Acct-Authentic = RADIUS
        Acct-Delay-Time = 0
        ERX-Dhcp-Mac-Addr = "0090.1a41.ec2d"
        Event-Timestamp = "Oct 19 2012 10:31:03 IST"
        Framed-IP-Address = 10.0.0.3
        Framed-IP-Netmask = 255.0.0.0
        ERX-Input-Gigapkts = 0
        Acct-Input-Gigawords = 6
        NAS-Identifier = "kalka"
        NAS-Port = 306184213
        NAS-Port-Id = "ge-1/1/9.21:21"
        NAS-Port-Type = Ethernet
        ERX-Output-Gigapkts = 0
        Acct-Output-Gigawords = 4
        ERX-Attr-151 = 0x00000000
```



```
ERX-Attr-152 = 0x00000000
ERX-Attr-153 = 0x00000000
ERX-Attr-154 = 0x00000000
ERX-Attr-155 = 0x00000000
ERX-Attr-156 = 0x00000000
NAS-IP-Address = 10.1.1.2
Acct-Unique-Session-Id = "03eeef735aef3520"
Timestamp = 1350604541
Request-Authenticator = Verified
```

Related Documentation

- MLPPP Bundles and Inline Service Logical Interfaces Overview on page 239
- MLPPP Support for LNS and PPPoE Subscribers Overview on page 223
- Supported Features for MLPPP LNS and PPPoE Subscribers on the MX Series on page 226

PART 5

Configuring ATM for Subscriber Access

CHAPTER 30

Configuring ATM to Deliver Subscriber-Based Services

ATM for Subscriber Access Overview

By using the ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) and a supported Modular Port Concentrator (MPC), you can configure the MX Series router to support configurations that enable subscribers to access the router over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs). Using these configurations enables the delivery of subscriber-based services, such as class of service (CoS) and firewall filters, for subscribers accessing the router over an ATM network.

Supported Configurations for ATM Subscriber Access

On MX Series routers with MPC/MIC interfaces that use the ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM), you can create the following configurations to enable subscribers to access the router over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs):

- PPP-over-Ethernet-over-ATM
- Routed IP-over-ATM
- Bridged IP-over-Ethernet-over-ATM
- PPP-over-ATM
- Concurrent PPP-over-Ethernet-over-ATM interfaces and IP-over-Ethernet-over-ATM interfaces on a single ATM PVC

PPP-over-Ethernet-over-ATM Configurations

PPP-over-Ethernet-over-ATM (PPPoE-over-ATM) configurations support both statically created and dynamically created PPPoE (**pp0**) logical subscriber interfaces over static ATM underlying interfaces. Most PPPoE and subscriber services features supported on terminated connections and tunneled (L2TP access concentrator, or LAC) connections are also supported for access to an MX Series router over an ATM network.

PPPoE-over-ATM configurations require static configuration of the underlying ATM physical interface and ATM logical interface. You can configure the PPPoE (**pp0**) subscriber interface either dynamically, by means of a dynamic profile, or statically. You must also configure the ATM underlying interface with PPPoE-over-ATM logical link control (LLC) encapsulation (**encapsulation ppp-over-ether-over-atm-llc**).

Using dynamic PPPoE-over-ATM configurations for ATM subscriber access enables you to configure an MX Series router to dynamically create PPPoE logical subscriber interfaces over static ATM underlying interfaces only when needed; that is, when a subscriber logs in on the associated underlying interface. Dynamic PPPoE over static ATM configurations are *not* supported on M Series routers and T Series routers.

Optionally, you can dynamically or statically apply subscriber services such as class of service (CoS) and firewall filters to the PPPoE (**pp0**) subscriber interface. For PPPoE-over-ATM configurations that create a dynamic PPPoE subscriber interface, you can configure CoS attributes and firewall filters in the dynamic profile that defines the **pp0** subscriber interface. For PPPoE-over-ATM configurations that create a static PPPoE subscriber interface, you can statically configure CoS attributes and firewall filters as you would for any static interface configured on an MX Series router.

Routed IP-over-ATM Configurations

Routed IP-over-ATM (IPoA) configurations support statically created IPv4 and IPv6 logical subscriber interfaces over static ATM underlying interfaces. IPoA configurations are typically used to implement business digital subscriber line (DSL) connections that do not require connection negotiation for address assignment.

IPoA configurations require static configuration of the ATM underlying interface, IPv4 interface, IPv6 interface, CoS attributes, and firewall fiters. Dynamic configuration of these components is not supported.

To configure IPoA subscriber access, specify either of the following encapsulation types on the ATM underlying interface:

- For IPoA encapsulation with logical link control (LLC), configure ATM subnetwork attachment point (SNAP) encapsulation (**encapsulation atm-snap**).
- For IPoA encapsulation with virtual circuit (VC) multiplexing, configure ATM VC multiplex encapsulation (**encapsulation atm-vc-mux**).

Optionally, you can statically configure subscriber services such as CoS and firewall filters and apply them to the IPv4 or IPv6 interface; you *cannot* use a dynamic profile for this purpose.

Bridged IP-over-Ethernet-over-ATM Configurations

Bridged IP-over-Ethernet-over-ATM (IPoE-over-ATM) configurations support statically created IPv4 and IPv6 logical subscriber interfaces over static ATM underlying interfaces. Like IPoA configurations, IPoE-over-ATM configurations are typically used in topologies that do not require connection negotiation for address assignment.

For bridged IP-over-Ethernet-over-ATM configurations on an MX Series router, you must configure the ATM underlying interface with Ethernet-over-ATM LLC encapsulation (**encapsulation ether-over-atm-llc**).

IPoE-over-ATM configurations require static configuration of the ATM underlying interface, IP interface, CoS attributes, and firewall fiters. Dynamic configuration of these components is not supported. Optionally, you can statically configure subscriber services such as class of service (CoS) and firewall filters and apply them to the IPv4 or IPv6 interface; you *cannot* use a dynamic profile for this purpose.

PPP-over-ATM Configurations

PPP-over-ATM (PPPoA) configurations support statically created PPP logical subscriber interfaces over static ATM underlying interfaces. Most features supported for PPPoE configurations are also supported for PPP access to an MX Series router over an ATM network.

PPPoA configurations require static configuration of the ATM underlying interface and PPP subscriber interface.

To configure PPPoA subscriber access, you must configure either of the following encapsulation types on each PPP logical subscriber interface:

- For PPPoA encapsulation with logical link control (LLC), configure PPP-over-AAL5 LLC encapsulation (**encapsulation atm-ppp-llc**).
- For PPPoA encapsulation with virtual circuit (VC) multiplexing, configure PPP-over-AAL5 multiplex encapsulation (**encapsulation atm-ppp-vc-mux**).

Optionally, you can use dynamic profiles to dynamically or statically apply subscriber services, such as CoS attributes and firewall filters, to the static PPP subscriber interface. Configuring CoS and firewall filters in this manner enables you to efficiently and economically provide these services to PPP subscribers accessing the router over an ATM network.

Concurrent PPP-over-Ethernet-over-ATM and IP-over-Ethernet-over-ATM Configurations

You can configure subscriber interfaces for both PPPoE-over-ATM and IPoE-over-ATM concurrently on a single ATM PVC. IPoE-over-ATM includes support for both IPv4-over-Ethernet-over-ATM interfaces and IPv6-over-Ethernet-over-ATM interfaces.

In concurrent PPPoE-over-ATM and IPoE-over-ATM configurations, you define the ATM logical interface with IPoE-over-ATM encapsulation and specify PPPoE-over-ATM as a supported family. The PPPoE-over-ATM underlying interface with IPoE-over-ATM encapsulation processes PPPoE Discovery packets to establish the PPPoE session. When the PPPoE-over-ATM session is established, the router processes PPPoE-over-ATM session packets and applies PPPoE-over-ATM–specific features on the PPPoE-over-ATM session interface.

To configure concurrent PPPoE-over-ATM and IPoE-over-ATM subscriber interfaces on a single ATM PVC, you configure the ATM logical interface with Ethernet-over-ATM LLC encapsulation (**encapsulation ether-over-atm-llc**). You then configure PPPoE-over-ATM as a supported family. When the router detects the IPoE-over-ATM encapsulation and PPPoE-over-ATM as a supported family, it identifies the configuration as concurrently supporting both PPPoE-over-ATM and IPoE-over-ATM on the same ATM PVC.

The concurrent PPPoE-over-ATM and IPoE-over-ATM configuration supports all features specific to PPPoE-over-ATM interfaces and IPoE-over ATM interfaces, with no changes. These features include the following:

- Class of service (CoS)
- Traffic control profiles with ATM virtual path (VP) shaping and ATM virtual circuit (VC) shaping
- Firewall filters
- PPPoE-over ATM L2TP access concentrator (LAC) support
- Interface statistics
- PPPoE-over-ATM statistics
- Graceful Routing Engine switchover (GRES)
- Unified in-service software upgrade (unified ISSU)
- Dynamic Address Resolution Protocol (ARP)
- Framed IP addresses and address-assignment pools

Configuration and Encapsulation Types for ATM Subscriber Access

You use the same basic statements, commands, and procedures to create, verify, and manage PPPoE-over-ATM, IPoA, IPoE-over-ATM, and PPPoA configurations as the statements, commands, and procedures you use for static configurations on M Series routers and T Series routers, and for dynamic PPPoE configurations on MX Series routers.

A critical element of configuring ATM subscriber access is ensuring that you specify the correct encapsulation type for the ATM logical interface. The encapsulation type you use depends on the supported configuration and, for IPoA and PPPoA configurations, whether you want to configure an encapsulation type that uses logical link control (LLC) or virtual circuit (VC) multiplexing.

ATM Virtual Path Shaping on ATM MICs with SFP

On MX Series routers with Modular Port Concentrator (MPC) interfaces and an ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) installed, you can configure class of service (CoS) hierarchical shaping for the traffic carried on an ATM virtual path (VP). Traffic shaping helps you manage and regulate the traffic flow in your network by shaping the traffic on the VP to a specified rate. With traffic shaping, you can better control the traffic flow to avoid network congestion, and ensure that the traffic adheres to the class-of-service policies you set for it.

To configure hierarchical VP shaping on an ATM MIC with SFP (Model number MIC-3D-8OC3-2OC12-ATM), you must configure an interface set that consists of the ATM logical interface units on the ATM physical interface. The members of the interface set must all share the same virtual path identifier (VPI) and have different virtual circuit identifiers (VCIs). You then define one or more CoS traffic control profiles that include the ATM service category (**atm-service**) and the peak cell rate (**peak-rate**), sustained cell rate (**sustained-rate**), and maximum burst size (**max-burst-size**) parameters.

The ATM service category works in conjunction with the peak cell rate, sustained cell rate, and maximum burst size ATM cell parameters to shape the traffic leaving the interface. Finally, you apply a specified traffic control profile to the output traffic at the interface set and at each of its member ATM logical interfaces.

In the queueing model used for ATM VP hierarchical shaping on ATM MICs with SFP, the ATM physical interface functions as a level 1 scheduler node, the interface set containing the ATM logical interfaces functions as a level 2 scheduler node, and the ATM logical interfaces function as level 3 scheduler nodes.

The following configuration requirements apply to ATM VP shaping on ATM MICs with SFP:

- All ATM interfaces that belong to the same interface set must share the same virtual path identifier (VPI) and have a unique virtual circuit identifier (VCI).
- The ATM interface set can include only ATM interfaces. It cannot include Ethernet interfaces.
- The ATM interface set cannot include PPPoE over ATM interfaces, but it can include the underlying ATM interface over which PPPoE over ATM is carried.

Related Documentation

- ATM for Subscriber Access Encapsulation Types Overview on page 330
- *Understanding Hierarchical Scheduling for MIC and MPC Interfaces*
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383
- Configuring Concurrent PPPoE-over-ATM and IPoE-over-ATM Subscriber Interfaces on an ATM PVC on page 347
- Configuring ATM Virtual Path Shaping on ATM MICs with SFP on page 335

ATM for Subscriber Access Encapsulation Types Overview

To enable subscriber access to an MX Series router over an ATM network, you can create any of the following configurations on Modular Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use the ATM MIC with SFP:

- PPP-over-Ethernet-over-ATM (PPPoE-over ATM) with a dynamic or static PPPoE (**pp0**) subscriber interface over a static ATM underlying interface
- Routed IP-over-ATM (IPoA) with a static IPv4 or IPv6 subscriber interface over a static ATM underlying interface
- Bridged IP-over-Ethernet-over-ATM (IPoE-over-ATM) with a static IPv4 or IPv6 subscriber interface over a static ATM underlying interface
- PPP-over-ATM (PPPoA) with a static PPP subscriber interface over a static ATM underlying interface
- Concurrent PPP-over-Ethernet-over-ATM interfaces and IP-over-Ethernet-over-ATM interfaces on a single ATM PVC

As part of the configuration procedure, you must specify the appropriate encapsulation type for your configuration on the ATM logical interface.

Table 11 on page 331 lists and describes the encapsulation type you must specify as part of the **encapsulation** statement when you configure the ATM logical interface for each supported configuration.

Table 11: Encapsulation Types for Supported ATM Subscriber Access Configurations

ATM Subscriber Access Configuration	Encapsulation Type	Description
PPPoE-over-ATM with dynamic **pp0** subscriber interface	**ppp-over-ether-over-atm-llc**	PPPoE-over-ATM encapsulation with logical link control (LLC)
PPPoE-over-ATM with static **pp0** subscriber interface	**ppp-over-ether-over-atm-llc**	PPPoE-over-ATM encapsulation with LLC
IP-over-ATM (IPoA)	**atm-snap**	ATM subnetwork attachment point (SNAP) encapsulation for IPoA with LLC
	atm-vc-mux	ATM VC multiplex encapsulation for IPoA with virtual circuit (VC) multiplexing
IP-over-Ethernet-over-ATM (IPoE-over-ATM) *and* Concurrent IPoE-over-ATM and PPPoE-over-ATM subscriber interfaces on a single ATM VC	**ether-over-atm-llc**	Ethernet-over-ATM encapsulation with LLC
PPP-over-ATM (PPPoA)	**atm-ppp-llc** (for PPPoA with logical link control)	PPP-over-AAL5 encapsulation with LLC
	atm-ppp-vc-mux (for PPPoA with virtual circuit multiplexing)	PPP-over-AAL5 encapsulation with VC multiplexing

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383
- Configuring Concurrent PPPoE-over-ATM and IPoE-over-ATM Subscriber Interfaces on an ATM PVC on page 347

Guidelines for Configuring ATM for Subscriber Access

The following guidelines apply when you configure PPP-over-Ethernet-over-ATM (PPPoE-over-ATM), IP-over-ATM (IPoA), IP-over-Ethernet-over-ATM (IPoE-over-ATM), PPP-over-ATM (PPPoA), and concurrent PPPoE-over-ATM and IPoE-over-ATM configurations for ATM subscriber access. You can create these configurations on MX Series routers with Modular Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use the ATM MIC with SFP.

For all supported ATM subscriber access configurations:

- Make sure you specify the correct encapsulation type on the ATM logical interface for your configuration, as described in "ATM for Subscriber Access Encapsulation Types Overview" on page 330.

For PPPoE-over-ATM configurations:

- For dynamic or static PPPoE-over-ATM configurations, including concurrent PPPoE-over-ATM and IPoE-over-ATM subscriber interfaces on a single ATM PVC, specify PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level. Specifying PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy level is not supported for these configurations.
- For dynamic or static PPPoE-over-ATM configurations, you must configure the router to act as a PPPoE server (also known as a *remote access concentrator*). Configuring the router to act as a PPPoE client is not supported in these configurations.
- For dynamic PPPoE-over-ATM configurations, issue the **dynamic-profile *profile-name*** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level to associate the ATM logical interface with the dynamic profile that defines the PPPoE subscriber interface.

For static IPoA and IPoE-over-ATM configurations:

- Specify interface-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet]** hierarchy level (for IPv4) or at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet6]** hierarchy level (for IPv6).

For static PPPoA configurations:

- Specify PPP-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* ppp-options]** hierarchy level.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- ATM for Subscriber Access Encapsulation Types Overview on page 330
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358

- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383
- Configuring Concurrent PPPoE-over-ATM and IPoE-over-ATM Subscriber Interfaces on an ATM PVC on page 347

Configuring ATM for Subscriber Access

On MX Series routers with MPC/MIC interfaces that use the ATM MIC with SFP, you can create the following configurations to enable subscribers to access the router over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs):

- PPP-over-Ethernet-over-ATM (PPPoE-over ATM) with a dynamic PPPoE (**pp0**) subscriber interface over a static ATM underlying interface
- PPP-over-Ethernet-over-ATM (PPPoE-over ATM) with a static PPPoE (**pp0**) subscriber interface over a static ATM underlying interface
- Routed IP-over-ATM (IPoA) with a static IPv4 or IPv6 subscriber interface over a static ATM underlying interface
- Bridged IP-over-Ethernet-over-ATM with a static IPv4 or IPv6 subscriber interface over a static ATM underlying interface
- PPP-over-ATM (PPPoA) with a static PPP subscriber interface over a static ATM underlying interface
- Concurrent PPP-over-Ethernet-over-ATM interfaces and IP-over-Ethernet-over-ATM interfaces on a single ATM PVC

Before you begin:

1. Make sure the MX Series router you are using has Modular Port Concentrator/Modular Interface Card (MPC/MIC) interfaces and an ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) installed and operational.
   - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.
   - For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.
2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.
3. If your configuration includes dynamic profiles for PPPoE, class of service (CoS) attributes, or standard firewall filters, make sure you understand how to configure these attributes and apply them to the subscriber interface.

- For PPPoE dynamic profiles, see "Configuring Dynamic PPPoE Subscriber Interfaces" on page 136
- For CoS configuration, see *Configuring Traffic Scheduling and Shaping for Subscriber Access*
- For standard firewall filter configuration, see *Guidelines for Configuring Firewall Filters* and *Guidelines for Applying Standard Firewall Filters*

To configure ATM for subscriber access on an MX Series router:

1. For a PPPoE-over-ATM configuration with a dynamic PPPoE (**pp0**) subscriber interface, create a dynamic profile that defines the **pp0** subscriber interface.

   See "Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM" on page 349.
2. Configure one or more virtual path identifiers (VPIs) on the ATM physical interface.
3. Configure the ATM logical subscriber interface.
   a. Configure the appropriate encapsulation type for your configuration.

      See "ATM for Subscriber Access Encapsulation Types Overview" on page 330.
   b. Configure a virtual circuit identifier (VCI) for each VPI configured on the ATM logical interface.
   c. Configure other interface-specific properties as needed for your configuration.

      See "Guidelines for Configuring ATM for Subscriber Access" on page 332.
4. For static PPPoE-over-ATM configurations, define the static PPPoE (**pp0**) subscriber interface at the **[edit interfaces pp0 unit *logical-unit-number*]** hierarchy level.

   See "Example: Configuring a Static PPPoE Subscriber Interface over ATM" on page 358.
5. (Optional) Verify the configuration for ATM subscriber access.

   See "Verifying and Managing ATM Configurations for Subscriber Access" on page 395.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- ATM for Subscriber Access Encapsulation Types Overview on page 330
- Guidelines for Configuring ATM for Subscriber Access on page 332
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383
- Configuring Concurrent PPPoE-over-ATM and IPoE-over-ATM Subscriber Interfaces on an ATM PVC on page 347

- *ATM Interfaces Overview*

Configuring ATM Virtual Path Shaping on ATM MICs with SFP

Starting in Junos OS Release 14.2, on MX Series routers with Modular Port Concentrator (MPC) interfaces and an ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) installed, you can configure class-of-service (CoS) hierarchical shaping and schedule for the traffic carried on an ATM virtual path (VP).

After you configure the ATM physical interface and logical interface units, you must configure an interface set that consists of the ATM logical interface units. You then define one or more CoS traffic control profiles that includes the ATM service category (**atm-service**) and the peak cell rate (**peak-rate**), sustained cell rate (**sustained-rate**), and maximum burst size (**max-burst-size**) parameters. Finally, you apply the specified traffic control profile to the output traffic at the interface set and at its member ATM logical interface units.

To configure ATM VP shaping for traffic on an ATM MIC with SFP:

1. Enable CoS hierarchical shaping and scheduling on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port*]
   user@host# **hierarchical-scheduler**

2. Specify that you want to configure ATM-specific options on the physical interface.

   [edit interfaces at-*fpc/pic/port*]
   user@host# **edit** atm-options

3. Configure one or more virtual path identifiers (VPIs) on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port* atm-options]
   user@host# **set** vpi ***vpi-identifier***

4. Configure the appropriate encapsulation type for the ATM logical interface.

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
   user@host# **set** encapsulation ***encapsulation-type***

5. Configure one or more virtual circuit identifiers (VCI) for each VPI defined on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
   user@host# **set** vci ***vpi-identifier.vci-identifier***

6. (Optional) Configure PPPoE-specific options as needed for your configuration.

   For example, for PPPoE-over-ATM configurations:

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number* family pppoe]
   user@host# **set** duplicate-protection

NOTE: For dynamic or static PPPoE-over-ATM configurations on MX Series routers, you must specify PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level. Specifying PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy level is not supported for these configurations.

7. Define the set of ATM logical interfaces for which you want to configure hierarchical schedulers.

   a. Specify the name of the ATM interface set.

      [edit interfaces}
      user@host# **edit interface-set *interface-set-name***

   b. Configure each member of the ATM interface set.

      [edit interfaces interface-set *interface-set-name*]
      user@host# **set interface at-*fpc/pic/port* unit *logical-unit-number***

      NOTE: All ATM logical interfaces that belong to the same interface set must share the same VPI and have a unique VCI.

8. Configure one or more traffic shaping and scheduling profiles. For each traffic control profile:

   a. Specify the service category that determines the traffic shaping parameter for the ATM queue at the ATM MIC with SFP.

      [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]
      user@host# **set atm-service (cbr | nrtvbr | rtvbr)**

   b. Configure the transmit rate, shaping rate, and default excess rate for the ATM queue.

      [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]
      user@host# **set peak-rate *rate***
      user@host# **set sustained-rate *rate***
      user@host# **set max-burst-size *cells***

   The ATM service category works in conjunction with the **peak-rate**, **sustained-rate**, and **max-burst-size** ATM cell parameters to configure traffic shaping, transmit rate, shaping rate, and default excess rate for an ATM queue.

9. Apply the traffic control profile to the output traffic at the interface set.

   [edit class-of-service interfaces interface-set *interface-set-name*]
   user@host# **set output-traffic-control-profile *profile-name***

10. Apply the traffic control profile to the output traffic at each member interface of the ATM interface set.

    [edit class-of-service interfaces at-*fpc/pic/port* unit *logical-unit-number*]
    user@host# **set output-traffic-control-profile *profile-name***

The following example configures ATM VP shaping on interface at-1/0/4 with VPI 40. The example defines an ATM interface set named atm-vp-ifset with two member ATM logical interfaces, at-1/0/4.50 and at-1/0/4.51, both of which use VPI 40. Traffic control profiles atm-vp-tcp1, atm-vp-tcp2, and atm-vp-tcp3 are each defined with the **atm-service**, **peak-rate**, **sustained-rate**, and **max-burst size** cell parameters. Finally, the **output-traffic-control-profile** statement applies traffic control profile atm-vp-tcp1 to the output traffic at interface at-1/0/4.50, atm-vp-tcp2 to the output traffic at interface at-1/0/4.51, and atm-vp-tcp3 to the output traffic at the atm-vp-ifset interface set.

```
[edit]
# Configure ATM Physical Interface
user@host# set interfaces at-1/0/4 hierarchical-scheduler
user@host# set interfaces at-1/0/4 atm-options vpi 40
#
# Configure ATM Logical Units
user@host# set interfaces at-1/0/4 unit 50 encapsulation pppoe-over-ether-over-atm-llc
user@host# set interfaces at-1/0/4 unit 50 vci 40.50
user@host# set interfaces at-1/0/4 unit 50 family pppoe duplicate-protection
user@host# set interfaces at-1/0/4 unit 51 encapsulation pppoe-over-ether-over-atm-llc
user@host# set interfaces at-1/0/4 unit 51 vci 40.51
user@host# set interfaces at-1/0/4 unit 51 family pppoe duplicate-protection
#
# Configure ATM Interface Set
user@host# set interfaces interface-set atm-vp-ifset interface at-1/0/4 unit 50
user@host# set interfaces interface-set atm-vp-ifset interface at-1/0/4 unit 51
#
# Configure Traffic Shaping and Scheduling Profiles
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set peak-rate 3k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set sustained-rate
  200
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set max-burst-size
  1000
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set peak-rate 200
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set sustained-rate
  100
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set max-burst-size
  150
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set peak-rate 5k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set sustained-rate
  1k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set max-burst-size
  2000
#
# Apply Traffic Shaping and Scheduling Profiles
user@host# set class-of-service interfaces interface-set atm-vp-ifset
  output-traffic-control-profile atm-vp-tcp3
user@host# set class-of-service interfaces at-1/0/4 unit 50 output-traffic-control-profile
  atm-vp-tcp1
user@host# set class-of-service interfaces at-1/0/4 unit 51 output-traffic-control-profile
  atm-vp-tcp2
```

Release History Table

Release	Description
14.2	Starting in Junos OS Release 14.2, on MX Series routers with Modular Port Concentrator (MPC) interfaces and an ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) installed, you can configure class-of-service (CoS) hierarchical shaping and schedule for the traffic carried on an ATM virtual path (VP).

Related Documentation

- ATM for Subscriber Access Overview on page 325
- *Configuring CoS on Circuit Emulation ATM MICs*
- *CoS on Circuit Emulation ATM MICs Overview*

CHAPTER 31

Configuring RADIUS Server Options for Subscriber Access

RADIUS Server Options for Subscriber Access

You can specify options that the router uses when communicating with RADIUS authentication and accounting servers for subscriber access.

The following list describes the RADIUS options you can configure:

- **access-loop-id-local**—The Agent-Remote-Id and Agent-Circuit-Id generated locally when these values are not present in the client database. The interface description of the logical interface is used as the Agent-Remote-Id and the interface description portion of the NAS-Port-Id using the format **<underlying-interface-name>:<outer-tag>-<inner-tag>** is used as the Agent-Circuit-Id.

  NOTE: The NAS-Port-Id format changes (established by **[set access profile** ***profile-name*** **radius options interface-description-format]**) are applied before generating the Agent-Circuit-Id.

  The NAS-Port-Id format (established by **[set access profile** ***profile-name*** **radius options interface-description-format]**) leverages the locally generated Agent-Remote-Id and Agent-Circuit-Id.

- **accounting-session-id-format**—The format the router uses to identify the accounting session. The identifier can be in one of the following formats:
  - **decimal**—The default format. For example, **435264**
  - **description**—In the format, **jnpr** ***interface-specifier:subscriber-session-id***. For example, **jnpr fastEthernet 3/2.6:1010101010101**

- **calling-station-id-delimiter**—The character that the router uses as the separator between concatenated values in the Calling-Station-Id string (RADIUS attribute 31).

- **calling-station-id-format**—Optional information that the router includes in the Calling-Station-Id (RADIUS attribute 31).
- **client-accounting-algorithm** and **client-authentication-algorithm**—The method the router uses to access RADIUS accounting and RADIUS authentication servers. You can specify the following methods:
  - **direct**—The default method, in which there is no load balancing. For example, in the direct method, the router always accesses **server1** (the primary server) first, and uses **server2** and **server3** as backup servers.
  - **round-robin**—The method that provides load balancing by rotating router requests among the list of configured RADIUS servers. For example, if three RADIUS servers are configured to support the router, the router sends the first request to **server1**, and uses **server2** and **server3** as backup servers. The router then sends the second request to **server2**, and uses **server3** and **server1** as backups.

NOTE: When a RADIUS server in the round-robin list becomes unreachable, the next reachable server in the round-robin list is used for the current request. That same server is also used for the next request because it is at the top of the list of available servers. As a result, after a server failure, the server that is used takes up the load of two servers.

- **coa-dynamic-variable-validation**—The optional method that the router uses when processing CoA requests that include changes to a client profile dynamic variable that cannot be applied. The optional configuration specifies that when a CoA operation is unable to apply a requested change to a client profile dynamic variable, subscriber management does not apply any changes to client profile dynamic variables in the CoA request and then responds with a NACK. In the default method, subscriber management does not apply the incorrect update but does apply the other changes to the client profile dynamic variables, and then responds with an ACK message.
- **ethernet-port-type-virtual**—The physical port type of **virtual** that the router uses to authenticate clients. The port type is passed in RADIUS attribute 61 (NAS-Port-Type). By default the router passes a port type of **ethernet** in RADIUS attribute 61.
- **interface-description-format**—The information that is excluded from the interface description that the router passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the router includes both the **subinterface** and the **adapter** in the interface description. You can specify:
  - **exclude-adapter**—Exclude the adapter.
  - **exclude-subinterface**—Exclude the subinterface.
- **nas-identifier**—The value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests. You can specify a string in the range 1 through 64 characters.
- **nas-port-extended-format**—The extended format for RADIUS attribute 5 (NAS-Port) and for the width of the fields in the NAS-Port attribute that the RADIUS client uses. You can specify:

- **adapter-width** ***width***—Number of bits in the adapter field.
- **port-width** ***width***—Number of bits in the port field.
- **pw-width**—Number of bits in the pseudowire field.
- **slot-width** ***width***—Number of bits in the slot field.
- **stacked-vlan-width** ***width***—Number of bits in the SVLAN ID field.
- **vlan-width** ***width***—Number of bits in the VLAN ID field.

NOTE: The total of the widths must not exceed 32 bits, or the configuration fails.

You can configure an extended format for the NAS-Port attribute for both Ethernet subscribers and ATM subscribers. For ATM subscribers, you can specify:

- **adapter-width**—Number of bits in the ATM adapter field, in the range 0 through 32
- **port-width**—Number of bits in the ATM port field, in the range 0 through 32
- **slot-width**—Number of bits in the ATM slot field, in the range 0 through 32
- **vci-width**—Number of bits in the ATM virtual circuit identifier (VCI) field, in the range 0 through 32
- **vpi-width**—Number of bits in the ATM virtual path identifier (VPI) field, in the range 0 through 32

NOTE: For ATM subscribers, the combined total of the widths of all fields must not exceed 32 bits, or the configuration fails. The router may truncate the values of individual fields depending on the bit width you specify.

- **nas-port-id-delimiter**—The character used as the separator between values in the NAS-Port-Id string.
- **nas-port-id-format**—Optional information included in RADIUS attribute 87 (NAS-Port-Id).
- **nas-port-type**—The port type used to authenticate subscribers.
- **revert-interval**—The number of seconds that the router waits after a server has become unreachable. The router rechecks the connection to the server when the **revert-interval** expires. If the server is then reachable, it is used in accordance with the order of the server list. You can configure from 0 (off) through 604800 seconds. The default is 60 seconds.
- **service-activation**—Setting that determines whether newly authenticated subscriber can successfully log in when service activation failures related to configuration errors occur during authd processing of the activation request for the subscriber's address family. You can specify this behavior for services configured in dynamic profiles

(**dynamic-profile**) or in Extensible Subscriber Services Manager (ESSM) operation scripts (**extensible-service**):

- **optional-at-login**—Service activation is optional. Activation failure due to configuration errors does not prevent activation of the address family; it allows subscriber access. Service activation failures due to causes other than configuration errors cause network family activation to fail. The login attempt is terminated unless another address family is already active for the subscriber. This is the default behavior for the **extensible-service** service type.
- **required-at-login**—Service activation is required. Activation failure for any reason causes network family activation to fail. The login attempt is terminated unless another address family is already active for the subscriber. This is the default value for the **dynamic-profile** service type.

- **vlan-nas-port-stacked-format**—The format that turns off RADIUS attribute 5 (NAS-Port) to include the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 342

Configuring RADIUS Server Options for Subscriber Access

You can specify options that the router or switch uses when communicating with RADIUS authentication and accounting servers for subscriber access.

To configure RADIUS authentication and accounting server options:

1. Specify that you want to configure RADIUS.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# edit radius
   ```

2. Specify that you want to configure RADIUS options.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius]
   user@host# edit options
   ```

3. (Optional) Configure the method the router or switch uses to access RADIUS accounting servers.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set client-accounting-algorithm round-robin
   ```

4. (Optional) Configure the method the router or switch uses to access RADIUS authentication servers.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set client-authentication-algorithm round-robin
   ```

5. (Optional) Configure the format the router or switch uses to identify the accounting session.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set accounting-session-id-format decimal
   ```


6. (Optional) Specify that the Agent-Remote-Id and Agent-Circuit-Id are generated locally when these values are not present in the client database.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set access-loop-id-local
   ```

7. (Optional) Specify the information that is excluded from the interface description that the router or switch passes to RADIUS for inclusion in RADIUS attribute 87 (NAS-Port-Id).

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set interface-description-format exclude-adapter
   ```

8. (Optional) Configure the value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set nas-identifier 56
   ```

9. (Optional) Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute. The total of the widths must not exceed 32 bits, or the configuration fails.

   - For Ethernet subscribers:

     ```
     [edit access profile isp-bos-metro-fiber-basic radius options]
     user@host# set nas-port-extended-format ae-width 10 slot-width 4 adapter-width
       2 port-width 4 pw-width 12 stacked-vlan-width 10 vlan-width 2
     ```

     The width value appears in the Cisco NAS-Port-Info AVP (100).

   - For ATM subscribers:

     ```
     [edit access profile retailer01 radius options]
     user@host# set nas-port-extended-format atm slot-width 3 adapter-width 2
       port-width 3 vpi-width 8 vci-width 16
     ```

10. (Optional) Configure the delimiter character that the router inserts between values in RADIUS attribute 87 (NAS-Port-Id).

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set nas-port-id-delimiter %
    ```

11. (Optional) Configure the information that the router includes in RADIUS attribute 87 (NAS-Port-Id).

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set nas-port-id-format agent-circuit-id agent-remote-id
    ```

12. (Optional) Configure the delimiter character that the router inserts between values in RADIUS attribute 31 (Calling-Station-Id).

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set calling-station-id-delimiter “%”
    ```

13. (Optional) Configure the information that the router includes in RADIUS attribute 31 (Calling-Station-Id).

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set calling-station-id-format agent-circuit-id agent-remote-id
    ```


14. (Optional) Configure the port type that is included in RADIUS attribute 61 (NAS-Port-Type). This specifies the port type the router uses to authenticate subscribers.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set nas-port-type ethernet wireless-ieee80211**

    NOTE: This statement is ignored if you configure the **ethernet-port-type-virtual** in the same access profile.

15. (Optional) Configure the router or switch to use a port type of **virtual** to authenticate clients.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set ethernet-port-type-virtual**

    NOTE: This statement takes precedence over the **nas-port-type** statement if you include both in the same access profile.

16. (Optional) Configure the number of seconds that the router or switch waits after a server has become unreachable.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set revert-interval 259200**

17. (Optional) Specify that RADIUS attribute 5 (NAS-Port) includes the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set vlan-nas-port-stacked-format**

18. (Optional) Configure the router to use the optional behavior when processing CoA requests that include changes to client profile dynamic variables.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set coa-dynamic-variable-validation**

19. (Optional) Configure the router to use the optional behavior that inserts the random challenge generated by the NAS into the Request Authenticator field of Access-Request packets, rather than sending the random challenge as the CHAP-Challenge attribute (RADIUS attribute 60) in Access-Request packets. This optional behavior requires that the value of the challenge must be 16 bytes; otherwise the statement is ignored and the challenge is sent as the CHAP-Challenge attribute.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set chap-challenge-in-request-authenticator**

20. (Optional) Configure whether subscribers can successfully log in even when service activation failures related to configuration errors occur during family activation request processing by authd for a newly authenticated subscriber.

    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# **set service-activation dynamic-profile optional-at-login**

Related Documentation

- *Attaching Access Profiles*
- RADIUS Server Options for Subscriber Access on page 339
- *Configuring Router or Switch Interaction with RADIUS Servers*
- *Manual Configuration of the NAS-Port-Type RADIUS Attribute*
- *Configuring a NAS-Port-ID with Additional Options*
- *Configuring a Calling-Station-ID with Additional Attributes*
- *Subscriber Session Logins and Service Activation Failures Overview*
- *Example: Configuring RADIUS-Based Subscriber Authentication and Accounting*

Configuring the RADIUS NAS-Port Extended Format for ATM Interfaces

As an alternative to globally configuring an extended format for the NAS-Port (5) RADIUS attribute in an access profile, you can configure the NAS-Port extended format on a per-physical interface basis for both Ethernet subscribers and ATM subscribers as part of a NAS-Port options definition. The NAS-Port extended format configures the number of bits (bit width) in each field of the NAS-Port attribute, including: slot, adapter, port, ATM virtual path identifier (VPI), and ATM virtual circuit identifier (VCI).

To configure the NAS-Port extended format for an ATM interface, include one or both of the following options in the **nas-port-extended-format** statement along with the other options as appropriate for your needs:

- **vpi-width**—Number of bits in the ATM VPI field, in the range 1 through 32
- **vci-width**—Number of bits in the ATM VCI field, in the range 1 through 32

NOTE: **For ATM subscribers, the combined total of the widths of all fields must not exceed 32 bits, or the configuration fails. The router may truncate the values of individual fields depending on the bit width you specify.**

To configure an extended format for the NAS-Port RADIUS attribute for an ATM interface:

1. Specify the ATM interface you want to configure.

   [edit]
   user@host# **edit interfaces** ***interface-name***

2. Specify that you want to configure RADIUS options for a physical interface.

   [edit interfaces *interface-name*]
   user@host# **edit radius-options**

3. Create a named NAS-Port options definition.

   [edit interfaces *interface-name* radius-options]
   user@host# **edit nas-port-options** ***nas-port-options-name***

4. Configure the NAS-Port extended format.

```
[edit interfaces interface-name radius-options nas-port-options nas-port-options-name]
user@host# set nas-port-extended-format slot-width width adapter-width width
  port-width width vpi-width width vci-width width
```

The following example shows a NAS-Port options definition named boston-subscribers for ATM interface at-1/0/4 that configures a NAS-Port extended format with an ATM slot width of 6 bits, ATM adapter width of 3 bits, ATM port width of 4 bits, ATM VPI width of 12 bits, and ATM VCI width of 24 bits.

```
[edit interfaces at-1/0/4 radius-options]
nas-port-options boston-subscribers {
  nas-port-extended-format {
    slot-width 6;
    adapter-width 3;
    port-width 4;
    vpi-width 12;
    vci-width 24;
  }
}
```

Related Documentation

- *Configuring RADIUS NAS-Port Options for Subscriber Access per Physical Interface, VLAN, or Stacked VLAN*
- RADIUS Server Options for Subscriber Access on page 339
- Configuring RADIUS Server Options for Subscriber Access on page 342

CHAPTER 32

Configuring PPPoE Subscriber Interfaces Over ATM

Configuring Concurrent PPPoE-over-ATM and IPoE-over-ATM Subscriber Interfaces on an ATM PVC

To configure concurrent PPPoE-over-ATM and IPoE-over-ATM subscriber interfaces on a single ATM PVC, you configure the ATM logical interface as an IPoE-over-ATM interface by specifying the **ether-over-atm-llc** encapsulation type. You then use the **family pppoe** stanza at the **[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]** hierarchy level to configure PPPoE-over-ATM as a supported family.

When the router detects the **family pppoe** stanza and the IPoE-over-ATM encapsulation, it identifies the configuration as concurrently supporting both PPPoE-over-ATM and IPoE-over-ATM on the same ATM PVC.

Before you begin:

Configure a PPPoE dynamic profile.

See "Configuring a PPPoE Dynamic Profile" on page 136.

To configure concurrent PPPoE-over-ATM and IPoE-over-ATM subscriber interfaces on an ATM PVC:

1. Specify that you want to configure ATM-specific options on the physical interface.

   [edit interfaces at-*fpc/pic/port*]
   user@host# **edit atm-options**

2. Configure one or more VPIs on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port* atm-options]
   user@host# **set vpi *vpi-identifier***

3. Configure IPoE-over-ATM encapsulation on the ATM logical interface.

[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
user@host# **set encapsulation ether-over-atm-llc**

4. Configure the VCI for the ATM logical interface.

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
   user@host# **set vci** ***vpi-identifier.vci-identifier***

5. Configure one or both of the following IP protocol families and addresses as appropriate for your network configuration.

   - For IPv4 (**inet**):

     [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
     user@host# **set family inet address** ***address***

   - For IPv6 (**inet6**):

     [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
     user@host# **set family inet6 address** ***address***

6. Configure PPPoE-over-ATM as a supported family by associating a PPPoE dynamic profile with the ATM logical interface.

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
   user@host# **set family pppoe dynamic-profile** ***profile-name***

   The dynamic profile defines PPPoE-specific options for the **pp0** logical interface, and establishes the PPPoE session. When the PPPoE-over-ATM session is established, PPPoE-over-ATM features operate on the PPPoE-over-ATM session interface.

7. Enable the IPv6 neighbor discovery protocol for the ATM logical interface.

   [edit protocols router-advertisement interface at-*fpc/pic/port.logical-unit-number*]
   user@host# **set prefix** ***prefix***

The following example configures concurrent support for IPv4-over-Ethernet-over-ATM, IPv6-over-Ethernet-over-ATM, and PPPoE-over-ATM subscriber interfaces on an ATM PVC with VPI 10 and VCI 200. ATM logical interface at-1/2/0.200 is configured with IPoE-over-ATM encapsulation (**ether-over-atm-llc**). The **family pppoe** statement configures PPPoE-over-ATM as a supported family by associating a PPPoE dynamic profile named pppoeoa-profile with interface at-1/2/0.200.

```
[edit]
user@host# set interfaces at-1/2/0 atm-options vpi 10
user@host# set interfaces at-1/2/0 unit 200 encapsulation ether-over-atm-llc
user@host# set interfaces at-1/2/0 unit 200 vci 10.200
user@host# set interfaces at-1/2/0 unit 200 family inet address 10.101.103.1/24
user@host# set interfaces at-1/2/0 unit 200 family inet6 address 201.db8:13:13::1/64
user@host# set interfaces at-1/2/0 unit 200 family pppoe dynamic-profile pppoeoa-profile
user@host# set protocols router-advertisement interface at-1/2/0.200 prefix
  201.db8:13:13::/64
```

Related Documentation

- Guidelines for Configuring ATM for Subscriber Access on page 332
- Verifying and Managing ATM Configurations for Subscriber Access on page 395
- ATM for Subscriber Access Overview on page 325

Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM

This example illustrates a Point-to-Point Protocol over Ethernet (PPPoE) over ATM configuration that creates a dynamic PPPoE (**pp0**) subscriber interface over a static ATM underlying interface on an MX Series router. The router must have Module Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use an ATM MIC with small form-factor pluggable transceiver (SFP).

NOTE: You can also configure a *static* PPPoE interface over a static ATM underlying interface on an MX Series router with an ATM MIC with SFP installed. For information, see "Example: Configuring a Static PPPoE Subscriber Interface over ATM" on page 358.

Requirements

This example uses the following software and hardware components:

- MX Series 3D Universal Edge Router
- ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) and compatible MPC1 or MPC2

Before you begin:

1. Make sure the MX Series router you are using has an ATM MIC with SFP installed and operational.
   - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.
   - For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.
2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.
3. Make sure you understand how to configure and use dynamic PPPoE subscriber interfaces.
   - For overview information, see "Subscriber Interfaces and PPPoE Overview" on page 129
   - For configuration instructions, see "Configuring Dynamic PPPoE Subscriber Interfaces" on page 136

Overview

By using the ATM MIC with SFP and a supported MPC, you can configure an MX Series router to support dynamic PPPoE subscriber access over an ATM network. PPPoE-over-ATM configurations on MX Series routers consist of one or more dynamically created PPPoE (**pp0**) subscriber interfaces over a static ATM underlying interface. Most PPPoE and subscriber services features supported on terminated connections and tunneled (L2TP access concentrator, or LAC) connections are also supported for PPPoE-over-ATM connections on an MX Series router.

Optionally, you can dynamically apply subscriber services such as class of service (CoS) and firewall filters to the PPPoE subscriber interface by configuring these services in the dynamic profile that creates the **pp0** subscriber interface. In this example, the PPPoE dynamic profile (pppoe-profile) applies CoS traffic shaping parameters to the dynamic **pp0** subscriber interface. Configuring CoS and firewall filters in this manner enables you to efficiently and economically provide these services to PPPoE subscribers accessing the router over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs).

This example includes the following basic steps to configure dynamic PPPoE-over-ATM subscriber access on an MX Series router:

1. Create a PPPoE dynamic profile named pppoe-profile for the **pp0** subscriber interface that includes all of the following:
   - The logical unit number, represented by the **$junos-interface-unit** predefined dynamic variable
   - The name of the underlying ATM interface, represented by the **$junos-underlying-interface** predefined dynamic variable
   - The **server** statement, which configures the router to act as a PPPoE server

     NOTE: Configuring the router to act as a PPPoE client is not supported.
   - The unnumbered address (lo0.0) for the IPv4 (**inet**) protocol family
   - CoS traffic shaping parameters
2. Statically configure the ATM physical interface at-1/0/0 with virtual path identifier (VPI) 3.
3. Statically configure logical unit 2 on the ATM physical interface (at-1/0/0.2) with at least the following properties:
   - PPPoE-over-ATM logical link control (LLC) encapsulation (**ppp-over-ether-over-atm-llc**)
   - Virtual circuit identifier (VCI) 2 on VPI 3. The combination of VPIs and VCIs provisions the ATM AAL5 PVC for access over the ATM network.

- PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level, including at least the name of the associated PPPoE dynamic profile (pppoe-profile) that creates the pp0 dynamic subscriber interface

  In dynamic PPPoE-over-ATM configurations, each **pp0** interface defined in the dynamic profile corresponds to a dynamic PPPoE subscriber interface.

NOTE: For dynamic or static PPPoE-over-ATM configurations on MX Series routers, You must specify PPPoE-specific options in the **family pppoe** stanza at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. Specifying PPPoE-specific options in the **pppoe-underlying-options** stanza at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level is not supported for these configurations.

Configuration

To configure a dynamic PPPoE subscriber interface over an underlying ATM interface, perform these tasks:

- Configuring the PPPoE Dynamic Profile on page 352
- Configuring the ATM Physical Interface on page 354
- Configuring the Dynamic PPPoE Subscriber Interface on Logical Unit 2 on page 355

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in 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.

```
# PPPoE Dynamic Profile
set dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit" ppp-options
  chap
set dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"
  pppoe-options underlying-interface "$junos-underlying-interface"
set dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"
  pppoe-options server
set dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"
  no-keepalives
set dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit" family
  inet unnumbered-address lo0.0
set dynamic-profiles pppoe-profile class-of-service traffic-control-profiles tcp-test
  shaping-rate 10m
set dynamic-profiles pppoe-profile class-of-service interfaces pp0 unit
  "$junos-interface-unit" output-traffic-control-profile tcp-test
#
# ATM Physical Interface
set interfaces at-1/0/0 atm-options vpi 3
#
# Logical Unit 2
set interfaces at-1/0/0 atm-options vpi 3
set interfaces at-1/0/0 unit 2 encapsulation ppp-over-ether-over-atm-llc
```

set interfaces at-1/0/0 unit 2 vci 3.2
set interfaces at-1/0/0 unit 2 family pppoe access-concentrator ac-pppoeoa
set interfaces at-1/0/0 unit 2 family pppoe duplicate-protection
set interfaces at-1/0/0 unit 2 family pppoe dynamic-profile pppoe-profile
set interfaces at-1/0/0 unit 2 family pppoe max-sessions 3
set interfaces at-1/0/0 unit 2 family pppoe short-cycle-protection

Configuring the PPPoE Dynamic Profile

Step-by-Step Procedure

To configure the PPPoE dynamic profile for the **pp0** subscriber interface:

1. Name the dynamic profile.

   [edit]
   user@host# **edit** dynamic-profiles **pppoe-profile**

2. Specify that you want to configure the **pp0** (PPPoE) interface.

   [edit dynamic-profiles pppoe-profile]
   user@host# **edit** interfaces pp0

3. Specify that you want to configure the logical unit represented by the **$junos-interface-unit** predefined variable.

   [edit dynamic-profiles pppoe-profile interfaces pp0]
   user@host# **edit** unit **$junos-interface-unit**

   The **$junos-interface-unit** variable is dynamically replaced with the actual unit number supplied by the network when the subscriber logs in.

4. Configure PPPoE-specific options for the **pp0** interface.

   a. Configure the ATM underlying interface represented by the **$junos-underlying-interface** predefined variable.

      [edit dynamic-profiles pppoe-profile interfaces pp0 unit “$junos-interface-unit”]
      user@host# **set** pppoe-options underlying-interface **$junos-underlying-interface**

      The **$junos-underlying-interface** variable is dynamically replaced with the actual name of the underlying interface supplied by the network when the subscriber logs in.

   b. Configure the router to act as a PPPoE server, also known as a remote access concentrator.

      [edit dynamic-profiles pppoe-profile interfaces pp0 unit “$junos-interface-unit”]
      user@host# **set** pppoe-options server

5. Configure Challenge Handshake Authentication Protocol (CHAP) authentication for the **pp0** interface.

   [edit dynamic-profiles pppoe-profile interfaces pp0 unit “$junos-interface-unit”]
   user@host# **set** ppp-options chap

6. Disable sending keepalive messages on the interface.

   [edit dynamic-profiles pppoe-profile interfaces pp0 unit “$junos-interface-unit”]
   user@host# **set** no-keepalives

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

a. Specify that you want to configure the IPv4 (**inet**) protocol family.

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

b. Configure the unnumbered address for the protocol family.

```
[edit dynamic-profiles pppoe-profile interfaces pp0 unit "$junos-interface-unit"
  family inet]
user@host# set unnumbered-address lo0.0
user@host# up 4
```

8. Configure CoS traffic shaping parameters in the dynamic profile for the pp0 subscriber interface.

a. Specify that you want to configure CoS traffic shaping parameters.

```
[edit dynamic-profiles pppoe-profile]
user@host# edit class-of-service
```

b. Create a traffic-control profile.

```
[edit dynamic-profiles pppoe-profile class-of-service]
user@host# edit traffic-control-profiles tcp-test
```

c. Configure the traffic shaping rate.

```
[edit dynamic-profiles pppoe-profile class-of-service traffic-control-profiles
  tcp-test]
user@host# set shaping-rate 10m
user@host# up 2
```

d. Apply the traffic shaping parameters to the pp0 dynamic subscriber interface.

```
[edit dynamic-profiles pppoe-profile class-of-service]
user@host# edit interfaces pp0 unit $junos-interface-unit
```

e. Apply the output traffic scheduling and shaping profile to the interface.

```
[edit dynamic-profiles pppoe-profile class-of-service interfaces pp0 unit
  "$junos-interface-unit]
user@host# set output-traffic-control-profile tcp-test
```

Results From the **[edit]** hierarchy level in configuration mode, confirm the results of the PPPoE dynamic profile configuration by issuing the **show dynamic-profiles pppoe-profile** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show dynamic-profiles pppoe-profile
interfaces {
  pp0 {
    unit "$junos-interface-unit" {
      ppp-options {
        chap;
      }
      pppoe-options {
        underlying-interface "$junos-underlying-interface";
        server;
      }
```

```
            no-keepalives;
            family inet {
               unnumbered-address lo0.0;
            }
         }
      }
   }
   class-of-service {
      traffic-control-profiles {
         tcp-test {
            shaping-rate 10m;
         }
      }
      interfaces {
         pp0 {
            unit "$junos-interface-unit" {
               output-traffic-control-profile tcp-test;
            }
         }
      }
   }
```

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

Configuring the ATM Physical Interface

Step-by-Step Procedure

To configure the ATM physical interface:

1. Specify that you want to configure ATM-specific options on the physical interface.

   ```
   [edit interfaces at-1/0/0]
   user@host# edit atm-options
   ```

2. Configure one or more VPIs on the physical interface.

   ```
   [edit interfaces at-1/0/0 atm-options]
   user@host# set vpi 3
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the ATM physical interface configuration by issuing the **show interfaces at-1/0/0** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/0
atm-options {
   vpi 3;
}
```

If you are done configuring the ATM physical interface, enter **commit** from configuration mode.

Configuring the Dynamic PPPoE Subscriber Interface on Logical Unit 2

Step-by-Step Procedure

To configure the dynamic PPPoE subscriber interface on logical unit 2:

1. Configure PPPoE-over-ATM LLC encapsulation on the interface.

   ```
   [edit interfaces at-1/0/0 unit 2]
   user@host# set encapsulation ppp-over-ether-over-atm-llc
   ```

2. Configure the VCI for the logical interface.

   ```
   [edit interfaces at-1/0/0 unit 2]
   user@host# set vci 3.2
   ```

   This statement configures VCI 2 on VPI 3.

3. Specify that you want to configure the PPPoE protocol family.

   ```
   [edit interfaces at-1/0/0 unit 2]
   user@host# edit family pppoe
   ```

4. Associate the interface with the dynamic profile that creates the dynamic PPPoE subscriber interface.

   ```
   [edit interfaces at-1/0/0 unit 2 family pppoe]
   user@host# set dynamic-profile pppoe-profile
   ```

5. Configure additional PPPoE-specific options for the dynamic subscriber interface.

   ```
   [edit interfaces at-1/0/0 unit 2 family pppoe]
   user@host# set max-sessions 3
   user@host# set duplicate-protection
   user@host# set short-cycle-protection
   user@host# set access-concentrator ac-pppoeoa
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the dynamic PPPoE subscriber interface configuration on logical unit 2 by issuing the **show interfaces at-1/0/0.2** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/0.2
encapsulation ppp-over-ether-over-atm-llc;
vci 3.2;
family pppoe {
   access-concentrator ac-pppoeoa;
   duplicate-protection;
   dynamic-profile pppoe-profile;
   max-sessions 3;
   short-cycle-protection;
}
```

If you are done configuring the dynamic PPPoE subscriber interface on logical unit 2, enter **commit** from configuration mode.

Verification

To confirm that the dynamic PPPoE subscriber interface is properly configured on ATM interface at-1/0/0.2, perform the following tasks:

- Verifying the ATM Physical Interface Configuration on page 356
- Verifying the Dynamic PPPoE Subscriber Interface Configuration on Logical Unit 2 on page 356
- Verifying the PPPoE Underlying Interface Configuration on page 357

Verifying the ATM Physical Interface Configuration

Purpose Verify that ATM physical interface at-1/0/0 is properly configured for use with ATM PVCs.

Action From operational mode, issue the **show interfaces at-1/0/0** command.

For brevity, this **show** command output includes only the configuration that is relevant to the at-1/0/0 physical interface. Any other configuration on the system has been replaced with ellipses (...).

```
user@host> show interfaces at-1/0/0
Physical interface: at-1/0/0, Enabled, Physical link is Up
  Interface index: 173, SNMP ifIndex: 592
  Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SDH mode, Speed: OC3,
 Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:00:5e:00:53:95
  Last flapped   : 2012-09-17 07:21:19 PDT (08:26:16 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SDH   alarms   : None
  SDH   defects  : None
    VPI 3
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                    0
         Output packets:                    0
...
```

Meaning **ATM-PVC** in the Link-level Type field indicates that encapsulation for ATM permanent virtual circuits is being used on ATM physical interface at-1/0/0. The **Active** flag for VPI 3 indicates that the virtual path is up and operational.

Verifying the Dynamic PPPoE Subscriber Interface Configuration on Logical Unit 2

Purpose Verify that the dynamic PPPoE subscriber interface is properly configured on logical unit 2 (at-1/0/0.2).

Action From operational mode, issue the **show interfaces at-1/0/0.2** command.

```
user@host> show interfaces at-1/0/0.2
  Logical interface at-1/0/0.2 (Index 350) (SNMP ifIndex 1701)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE-over-ATM-LLC
    Input packets : 0
    Output packets: 0
    Protocol pppoe
      Dynamic Profile: pppoe-profile,
      Service Name Table: None,
      Max Sessions: 3, Max Sessions VSA Ignore: Off,
      Duplicate Protection: On, Short Cycle Protection: mac-address,
      AC Name: ac-pppoeoa
    VCI 3.2
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

Meaning **PPPoE-over-ATM-LLC** in the Encapsulation field indicates that logical interface at-1/0/0.2 is properly configured for PPPoE-over-ATM LLC encapsulation. **Protocol pppoe** indicates that the PPPoE protocol family has been properly configured on the logical interface. The Dynamic Profile field indicates that dynamic profile **pppoe-profile** creates the dynamic PPPoE subscriber interface. The **Active** flag for VCI 3.2 indicates that VCI 2 on VPI 3 is up and operational.

Verifying the PPPoE Underlying Interface Configuration

Purpose Verify that the underlying interface is properly configured for dynamic PPPoE-over-ATM subscriber access.

Action From operational mode, issue the **show pppoe underlying-interfaces at-1/0/0.2** command.

```
user@host> show pppoe underlying-interfaces at-1/0/0.2 detail
at-1/0/0.2 Index 350
  State: Static, Dynamic Profile: pppoe-profile,
  Max Sessions: 3, Max Sessions VSA Ignore: Off,
  Active Sessions: 0,
  Service Name Table: None,
  Duplicate Protection: On, Short Cycle Protection: mac-address,
  AC Name: ac-pppoeoa,
```

Meaning This command indicates that ATM logical interface at-1/0/0.2 is properly configured as the PPPoE underlying interface. **Static** in the State field indicates that at-1/0/0/.2 is statically configured. The Dynamic Profile field indicates that **pppoe-profile** is the name of the dynamic profile used to create this interface. The remaining fields display information about the PPPoE-specific interface options configured for the PPPoE underlying interface at the **[edit interfaces at-1/0/0 unit 2 family pppoe]** hierarchy level.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358

- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383

Example: Configuring a Static PPPoE Subscriber Interface over ATM

This example illustrates a Point-to-Point Protocol over Ethernet (PPPoE) over ATM configuration that creates a static PPPoE (**pp0**) subscriber interface over a static ATM underlying interface on an MX Series router. The router must have Module Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use an ATM MIC with small form-factor pluggable transceiver (SFP).

NOTE: You can also configure a *dynamic* PPPoE interface over a static ATM underlying interface on an MX Series router with an ATM MIC with SFP installed. For information, see "Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM" on page 349.

- Requirements on page 358
- Overview on page 359
- Configuration on page 360
- Verification on page 363

Requirements

This example uses the following software and hardware components:

- MX Series 3D Universal Edge Router
- ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) and compatible MPC1 or MPC2

Before you begin:

1. Make sure the MX Series router you are using has an ATM MIC with SFP installed and operational.
   - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.
   - For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.
2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.

Overview

By using the ATM MIC with SFP and a supported MPC, you can configure an MX Series router to support static PPPoE subscriber access over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs). PPPoE-over-ATM configurations on MX Series routers consist of one or more statically created PPPoE (**pp0**) logical subscriber interfaces over a static ATM underlying interface. Most PPPoE and subscriber services features supported on terminated connections and tunneled (L2TP access concentrator, or LAC) connections are also supported for PPPoE-over-ATM connections on an MX Series router.

This example include the following basic steps to configure static PPPoE-over-ATM subscriber access on an MX Series router:

1. Statically configure ATM physical interface at-1/0/6 with virtual path identifier (VPI) 6.
2. Statically configure logical unit 2 on the ATM physical interface (at-1/0/6.2) with the following properties:
   - PPPoE-over-ATM logical link control (LLC) encapsulation (**ppp-over-ether-over-atm-llc**)
   - Virtual circuit identifier (VCI) 2 on VPI 6. The combination of VPIs and VCIs provisions the ATM AAL5 PVC for access over the ATM network.
   - (Optional) PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level

   NOTE: For dynamic or static PPPoE-over-ATM configurations on MX Series routers, You must specify PPPoE-specific options in the **family pppoe** stanza at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. Specifying PPPoE-specific options in the **pppoe-underlying-options** stanza at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level is not supported for these configurations.

3. Statically configure the **pp0** logical subscriber interface (pp0.2) with at least the following properties:
   - The name of the underlying ATM interface (at-1/0/6.2)
   - The **server** statement, which configures the router to act as a PPPoE server
   - The unnumbered address (lo0.0) for the **inet** (IPv4) or **inet6** (IPv6) protocol family

   In static PPPoE-over-ATM configurations, each **pp0** logical interface configured at the **[edit interfaces pp0 unit *logical-unit-number*]** hierarchy level corresponds to a static PPPoE subscriber interface.

Configuration

To configure a static PPPoE subscriber interface over an underlying ATM interface, perform these tasks:

- Configuring the ATM Physical Interface on page 360
- Configuring Encapsulation, VCI, and PPPoE Options on Logical Unit 2 on page 361
- Configuring the Static PPPoE Subscriber Interface on page 362

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in 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.

```
# ATM Physical Interface
set interfaces at-1/0/6 atm-options vpi 6
#
# Logical Unit 2
set interfaces at-1/0/6 unit 2 encapsulation ppp-over-ether-over-atm-llc
set interfaces at-1/0/6 unit 2 vci 6.2
set interfaces at-1/0/6 unit 2 family pppoe access-concentrator ac-pppoeoa
set interfaces at-1/0/6 unit 2 family pppoe duplicate-protection
set interfaces at-1/0/6 unit 2 family pppoe max-sessions 3
set interfaces at-1/0/6 unit 2 family pppoe max-sessions-vsa-ignore
set interfaces at-1/0/6 unit 2 family pppoe short-cycle-protection lockout-time-min 120
set interfaces at-1/0/6 unit 2 family pppoe short-cycle-protection lockout-time-max 240
#
# Static PPPoE Subscriber Interface
set interfaces pp0 unit 2 ppp-options chap
set interfaces pp0 unit 2 pppoe-options underlying-interface at-1/0/6.2
set interfaces pp0 unit 2 pppoe-options server
set interfaces pp0 unit 2 keepalives interval 10
set interfaces pp0 unit 2 family inet unnumbered-address lo0.0
```

Configuring the ATM Physical Interface

Step-by-Step Procedure

To configure the ATM physical interface:

1. Specify that you want to configure ATM-specific options on the physical interface.

   ```
   [edit interfaces at-1/0/6]
   user@host# edit atm-options
   ```

2. Configure one or more VPIs on the physical interface.

   ```
   [edit interfaces at-1/0/6 atm-options]
   user@host# set vpi 6
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the ATM physical interface configuration by issuing the **show interfaces at-1/0/6** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
```



```
user@host# show interfaces at-1/0/6
atm-options {
  vpi 6;
}
```

If you are done configuring the ATM physical interface, enter **commit** from configuration mode.

Configuring Encapsulation, VCI, and PPPoE Options on Logical Unit 2

Step-by-Step Procedure

To configure encapsulation, VCI, and PPPoE options on logical unit 2:

1. Configure PPPoE-over-ATM LLC encapsulation on the interface.

   ```
   [edit interfaces at-1/0/6 unit 2]
   user@host# set encapsulation ppp-over-ether-over-atm-llc
   ```

2. Configure the VCI for the logical interface.

   ```
   [edit interfaces at-1/0/6 unit 2]
   user@host# set vci 6.2
   ```

   This statement configures VCI 2 on VPI 6.

3. Specify that you want to configure the PPPoE protocol family.

   ```
   [edit interfaces at-1/0/6 unit 2]
   user@host# edit family pppoe
   ```

4. Configure additional PPPoE-specific options for the dynamic subscriber interface.

   ```
   [edit interfaces at-1/0/6 unit 2 family pppoe]
   user@host# set duplicate-protection
   user@host# set short-cycle-protection lockout-time-min 120 lockout-time-max
     240
   user@host# set max-sessions 3
   user@host# set max-sessions-vsa-ignore
   user@host# set access-concentrator ac-pppoeoa
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the configuration on logical unit 2 by issuing the **show interfaces at-1/0/6.2** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/6.2
encapsulation ppp-over-ether-over-atm-llc;
vci 6.2;
family pppoe {
  access-concentrator ac-pppoeoa;
  duplicate-protection;
  max-sessions 3;
  max-sessions-vsa-ignore;
  short-cycle-protection {
    lockout-time-min 120;
    lockout-time-max 240;
  }
}
```


If you are done configuring logical unit 2, enter **commit** from configuration mode.

Configuring the Static PPPoE Subscriber Interface

Step-by-Step Procedure

To configure the static PPPoE subscriber interface:

1. Specify that you want to configure the **pp0** subscriber interface on logical unit 2.

   ```
   [edit]
   user@host# edit interfaces pp0 unit 2
   ```

2. Specify that you want to configure PPP options for the subscriber interface.

   ```
   [edit interfaces pp0 unit 2]
   user@host# edit ppp-options
   ```

3. Configure Challenge Handshake Authentication Protocol (CHAP) authentication for the subscriber interface.

   ```
   [edit interfaces pp0 unit 2 ppp-options]
   user@host# set chap
   user@host# up
   ```

4. Specify that you want to configure PPPoE-specific options.

   ```
   [edit interfaces pp0 unit 2]
   user@host# edit pppoe-options
   ```

5. Associate the PPPoE subscriber interface with the underlying ATM interface.

   ```
   [edit interfaces pp0 unit 2 pppoe-options]
   user@host# set underlying-interface at-1/0/6.2
   ```

6. Configure the router to act as a PPPoE server, also known as a remote access concentrator.

   ```
   [edit interfaces pp0 unit 2 pppoe-options]
   user@host# set server
   user@host# up
   ```

7. Configure the interval for sending keepalive requests.

   ```
   [edit interfaces pp0 unit 2]
   user@host# set keepalives interval 10
   ```

8. Specify that you want to configure the IPv4 (**inet**) protocol family.

   ```
   [edit interfaces pp0 unit 2]
   user@host# edit family inet
   ```

9. Configure the unnumbered address for the protocol family.

   ```
   [edit interfaces pp0 unit 2 family inet]
   user@host# set unnumbered-address lo0.0
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static PPPoE subscriber interface configuration by issuing the **show interfaces pp0** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces pp0
unit 2 {
  ppp-options {
    chap;
  }
  pppoe-options {
    underlying-interface at-1/0/6.2;
    server;
  }
  keepalives interval 10;
  family inet {
    unnumbered-address lo0.0;
  }
}
```

If you are done configuring the static PPPoE subscriber interface, enter **commit** from configuration mode.

Verification

To confirm that the static PPPoE subscriber interface pp0.2 is properly configured on ATM underlying interface at-1/0/6.2, perform the following tasks:

Verifying the ATM Physical Interface Configuration

Purpose Verify that ATM physical interface at-1/0/6 is properly configured for use with ATM PVCs.

Action From operational mode, issue the **show interfaces at-1/0/6** command.

For brevity, this **show** command output includes only the configuration that is relevant to the at-1/0/6 physical interface. Any other configuration on the system has been replaced with ellipses (...).

```
user@host> show interfaces at-1/0/6
Physical interface: at-1/0/6, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 598
  Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SDH mode, Speed: OC3,
 Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:00:5e:00:53:9b
  Last flapped   : 2012-09-19 07:57:59 PDT (07:46:56 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SDH   alarms   : LOL, LOS
  SDH   defects  : LOL, LOS, LOP, BERR-SF, HP-FERF
```

```
    VPI 6
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                    0
         Output packets:                    0
...
```

Meaning **ATM-PVC** in the Link-level Type field indicates that encapsulation for ATM permanent virtual circuits is being used on ATM physical interface at-1/0/6. The **Active** flag for VPI 6 indicates that the virtual path is up and operational.

Verifying the Encapsulation, VCI, and PPPoE Options Configuration on Logical Unit 2

Purpose Verify that the encapsulation, VCI, and PPPoE settings have been properly configured on logical unit 2 (at-1/0/6.2).

Action From operational mode, issue the **show interfaces at-1/0/6.2** command.

```
user@host> show interfaces at-1/0/6.2
  Logical interface at-1/0/6.2 (Index 345) (SNMP ifIndex 1990)
    Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation:
PPPoE-over-ATM-LLC
    Input packets : 0
    Output packets: 0
    Protocol pppoe
      Dynamic Profile: None,
      Service Name Table: None,
      Max Sessions: 3, Max Sessions VSA Ignore: On,
      Duplicate Protection: On, Short Cycle Protection: mac-address,
      AC Name: ac-pppoeoa
    VCI 6.2
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

Meaning **PPPoE-over-ATM-LLC** in the Encapsulation field indicates that logical interface at-1/0/6.2 is properly configured for PPPoE-over-ATM LLC encapsulation. **Protocol pppoe** indicates that the PPPoE protocol family has been properly configured on the logical interface. The **Active** flag for VCI 6.2 indicates that VCI 2 on VPI 6 is up and operational.

Verifying the Static PPPoE Subscriber Interface Configuration

Purpose Verify that the static PPPoE subscriber interface (pp0.2) is properly configured.

Action From operational mode, issue the **show interfaces pp0** command.

```
user@host> show interfaces pp0
Physical interface: pp0, Enabled, Physical link is Up
  Interface index: 131, SNMP ifIndex: 505
  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

  Logical interface pp0.2 (Index 360) (SNMP ifIndex 1991)
    Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPPoE
    PPPoE:
      State: SessionDown, Session ID: None,
      Underlying interface: at-1/0/6.2 (Index 345)
    Input packets : 0
    Output packets: 0
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  LCP state: Not-configured
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 1492
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 198.51.100/24, Local: 198.51.100.11
```

Meaning **PPPoE** in the Link-level type field indicates that PPPoE encapsulation is in use on the **pp0** physical interface. **PPPoE** in the Encapsulation field indicates that PPPoE encapsulation is also in use on the pp0.2 logical subscriber interface. The Underlying interface field indicates that **at-1/0/6.2** is properly configured as the underlying interface for the static PPPoE subscriber interface. **Protocol inet** indicates that the IPv4 protocol family is properly configured on the pp0.2 logical subscriber interface.

Verifying the PPPoE Underlying Interface Configuration

Purpose Verify that the underlying interface is properly configured for static PPPoE-over-ATM subscriber access.

Action From operational mode, issue the **show pppoe underlying-interfaces at-1/0/6.2 extensive** command.

```
user@host> show pppoe underlying-interfaces at-1/0/6.2 extensive
at-1/0/6.2 Index 345
  State: Static, Dynamic Profile: None,
  Max Sessions: 3, Max Sessions VSA Ignore: On,
  Active Sessions: 0,
  Service Name Table: None,
  Duplicate Protection: On, Short Cycle Protection: mac-address,
  AC Name: ac-pppoeoa,
  PacketType                        Sent          Received
    PADI                               0                 0
    PADO                               0                 0
    PADR                               0                 0
    PADS                               0                 0
    PADT                               0                 0
    Service name error                 0                 0
    AC system error                    0                 0
    Generic error                      0                 0
    Malformed packets                  0                 0
    Unknown packets                    0                 0
  Lockout Time (sec):  Min: 120, Max: 240
    Total clients in lockout: 0
    Total clients in lockout grace period: 0
```


Meaning This command indicates that ATM logical interface at-1/0/6.2 is properly configured as the PPPoE underlying interface. **Static** in the State field indicates that at-1/0/0/.2 is statically configured. The remaining fields display information about the PPPoE-specific interface options configured for the PPPoE underlying interface at the **[edit interfaces at-1/0/6 unit 2 family pppoe]** hierarchy level. The Lockout Time fields, which appear in this command only when you display the **extensive** level of output, show the minimum lockout time (120 seconds) and maximum lockout time (240 seconds) configured for the PPPoE underlying interface.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383

CHAPTER 33

Configuring ATM Virtual Path Shaping on ATM MICs with SFP

Configuring ATM Virtual Path Shaping on ATM MICs with SFP

Starting in Junos OS Release 14.2, on MX Series routers with Modular Port Concentrator (MPC) interfaces and an ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) installed, you can configure class-of-service (CoS) hierarchical shaping and schedule for the traffic carried on an ATM virtual path (VP).

After you configure the ATM physical interface and logical interface units, you must configure an interface set that consists of the ATM logical interface units. You then define one or more CoS traffic control profiles that includes the ATM service category (**atm-service**) and the peak cell rate (**peak-rate**), sustained cell rate (**sustained-rate**), and maximum burst size (**max-burst-size**) parameters. Finally, you apply the specified traffic control profile to the output traffic at the interface set and at its member ATM logical interface units.

To configure ATM VP shaping for traffic on an ATM MIC with SFP:

1. Enable CoS hierarchical shaping and scheduling on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port*]
   user@host# **hierarchical-scheduler**

2. Specify that you want to configure ATM-specific options on the physical interface.

   [edit interfaces at-*fpc/pic/port*]
   user@host# **edit atm-options**

3. Configure one or more virtual path identifiers (VPIs) on the ATM physical interface.

   [edit interfaces at-*fpc/pic/port* atm-options]
   user@host# **set vpi *vpi-identifier***

4. Configure the appropriate encapsulation type for the ATM logical interface.

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
   user@host# **set encapsulation *encapsulation-type***

5. Configure one or more virtual circuit identifiers (VCI) for each VPI defined on the ATM physical interface.

[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
user@host# **set vci** ***vpi-identifier.vci-identifier***

6. (Optional) Configure PPPoE-specific options as needed for your configuration.

   For example, for PPPoE-over-ATM configurations:

   [edit interfaces at-*fpc/pic/port* unit *logical-unit-number* family pppoe]
   user@host# **set duplicate-protection**

   NOTE: For dynamic or static PPPoE-over-ATM configurations on MX Series routers, you must specify PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* family pppoe]** hierarchy level. Specifying PPPoE-specific options at the **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy level is not supported for these configurations.

7. Define the set of ATM logical interfaces for which you want to configure hierarchical schedulers.

   a. Specify the name of the ATM interface set.

      [edit interfaces}
      user@host# **edit interface-set** ***interface-set-name***

   b. Configure each member of the ATM interface set.

      [edit interfaces interface-set *interface-set-name*]
      user@host# **set interface at-*fpc/pic/port* unit *logical-unit-number***

      NOTE: All ATM logical interfaces that belong to the same interface set must share the same VPI and have a unique VCI.

8. Configure one or more traffic shaping and scheduling profiles. For each traffic control profile:

   a. Specify the service category that determines the traffic shaping parameter for the ATM queue at the ATM MIC with SFP.

      [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]
      user@host# **set atm-service (cbr | nrtvbr | rtvbr)**

   b. Configure the transmit rate, shaping rate, and default excess rate for the ATM queue.

      [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]
      user@host# **set peak-rate** ***rate***
      user@host# **set sustained-rate** ***rate***
      user@host# **set max-burst-size** ***cells***

   The ATM service category works in conjunction with the **peak-rate**, **sustained-rate**, and **max-burst-size** ATM cell parameters to configure traffic shaping, transmit rate, shaping rate, and default excess rate for an ATM queue.

9. Apply the traffic control profile to the output traffic at the interface set.

   [edit class-of-service interfaces interface-set *interface-set-name*]
   user@host# **set output-traffic-control-profile *profile-name***

10. Apply the traffic control profile to the output traffic at each member interface of the ATM interface set.

    [edit class-of-service interfaces at-*fpc/pic/port* unit *logical-unit-number*]
    user@host# **set output-traffic-control-profile *profile-name***

The following example configures ATM VP shaping on interface at-1/0/4 with VPI 40. The example defines an ATM interface set named atm-vp-ifset with two member ATM logical interfaces, at-1/0/4.50 and at-1/0/4.51, both of which use VPI 40. Traffic control profiles atm-vp-tcp1, atm-vp-tcp2, and atm-vp-tcp3 are each defined with the **atm-service**, **peak-rate**, **sustained-rate**, and **max-burst size** cell parameters. Finally, the **output-traffic-control-profile** statement applies traffic control profile atm-vp-tcp1 to the output traffic at interface at-1/0/4.50, atm-vp-tcp2 to the output traffic at interface at-1/0/4.51, and atm-vp-tcp3 to the output traffic at the atm-vp-ifset interface set.

```
[edit]
# Configure ATM Physical Interface
user@host# set interfaces at-1/0/4 hierarchical-scheduler
user@host# set interfaces at-1/0/4 atm-options vpi 40
#
# Configure ATM Logical Units
user@host# set interfaces at-1/0/4 unit 50 encapsulation pppoe-over-ether-over-atm-llc
user@host# set interfaces at-1/0/4 unit 50 vci 40.50
user@host# set interfaces at-1/0/4 unit 50 family pppoe duplicate-protection
user@host# set interfaces at-1/0/4 unit 51 encapsulation pppoe-over-ether-over-atm-llc
user@host# set interfaces at-1/0/4 unit 51 vci 40.51
user@host# set interfaces at-1/0/4 unit 51 family pppoe duplicate-protection
#
# Configure ATM Interface Set
user@host# set interfaces interface-set atm-vp-ifset interface at-1/0/4 unit 50
user@host# set interfaces interface-set atm-vp-ifset interface at-1/0/4 unit 51
#
# Configure Traffic Shaping and Scheduling Profiles
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set peak-rate 3k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set sustained-rate
  200
user@host# set class-of-service traffic-control-profiles atm-vp-tcp1 set max-burst-size
  1000
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set peak-rate 200
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set sustained-rate
  100
user@host# set class-of-service traffic-control-profiles atm-vp-tcp2 set max-burst-size
  150
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 atm-service nrtvbr
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set peak-rate 5k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set sustained-rate
  1k
user@host# set class-of-service traffic-control-profiles atm-vp-tcp3 set max-burst-size
  2000
```

```
#
# Apply Traffic Shaping and Scheduling Profiles
user@host# set class-of-service interfaces interface-set atm-vp-ifset
  output-traffic-control-profile atm-vp-tcp3
user@host# set class-of-service interfaces at-1/0/4 unit 50 output-traffic-control-profile
  atm-vp-tcp1
user@host# set class-of-service interfaces at-1/0/4 unit 51 output-traffic-control-profile
  atm-vp-tcp2
```

Release History Table

Release	Description
14.2	Starting in Junos OS Release 14.2, on MX Series routers with Modular Port Concentrator (MPC) interfaces and an ATM Modular Interface Card (MIC) with small form-factor pluggable transceiver (SFP) installed, you can configure class-of-service (CoS) hierarchical shaping and schedule for the traffic carried on an ATM virtual path (VP).

Related Documentation

- ATM for Subscriber Access Overview on page 325
- *Configuring CoS on Circuit Emulation ATM MICs*
- *CoS on Circuit Emulation ATM MICs Overview*

CHAPTER 34

Configuring Static Subscriber Interfaces over ATM

Example: Configuring a Static Subscriber Interface for IP Access over ATM

This example illustrates a routed IP-over-ATM (IPoA) configuration that creates a subscriber interface for a static IPv4 interface over a static ATM interface on an MX Series router. The router must have Module Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use an ATM MIC with small form-factor pluggable transceiver (SFP).

Requirements

This example uses the following software and hardware components:

- MX Series 3D Universal Edge Router
- ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) and compatible MPC1 or MPC2

Before you begin:

1. Make sure the MX Series router you are using has an ATM MIC with SFP installed and operational.
    - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.

- For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.

2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.

3. Define the static standard firewall filters (biz-customer-in-filter and biz-customer-out-filter) referenced in the configuration.

   - For information about creating standard firewall filters, see *Guidelines for Configuring Firewall Filters*.
   - For information about applying a firewall filter to an interface, see *Guidelines for Applying Standard Firewall Filters*.

Overview

By using the ATM MIC with SFP and a supported MPC, you can configure the MX Series router to support subscriber access for a statically created IPv4 or IPv6 interface over a static ATM underlying interface. An IPoA configuration enables you to provide access to subscribers on static IPv4 or IPv6 interfaces over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual circuits (PVCs).

NOTE: IPoA configurations require static configuration of the IPv4 interface, IPv6 interface, CoS attributes, and firewall fiters. Dynamic configuration is not supported.

To configure IPoA subscriber access, configure the correct encapsulation type: **atm-snap** for IPoA encapsulation with logical link control (LLC), or **atm-vc-mux** for IPoA encapsulation with virtual circuit (VC) multiplexing. This example configures **atm-vc-mux** as the encapsulation type on the ATM logical interface.

To provision the ATM AAL5 PVCs for access over the ATM network, you must also configure the virtual path identifiers (VPIs) on the ATM physical interface, and one or more virtual circuit identifiers (VCIs) for each VPI.

In IPoA configurations, the subscriber interfaces correspond to the IPv4 or IPv6 addresses that are on the same network as the statically configured ATM underlying interface. In this IPoA example, the IPv4 address 10.0.0.2 represents the subscriber interface. You can configure the destination address with the **set address 10.0.0.254/32 destination 10.0.0.2** statement at the **[edit interfaces at-1/0/3 unit 0 family inet]** hierarchy level.

This example includes the following basic steps to statically configure a single IPv4 subscriber interface over an ATM underlying interface:

1. Configure VPI 0 on ATM physical interface at-1/0/3.
2. Configure ATM VC multiplex encapsulation, VCI 0.39 (VCI 39 on VPI 0), and the following IPv4 (**inet**) protocol family characteristics on logical interface at-1/0/3.0 :

   - IP source address validation (**rpf-check**)

- Standard input (biz-customer-in-filter) and output (biz-customer-out-filter) firewall filters
- Interface address 10.0.0.254/32 with destination address 10.0.0.2

3. Configure static access route 10.200.10.0/24 with qualified-next-hop address at-1/0/0.0.

Configuration

To configure a static IPv4 subscriber interface over a static ATM underlying interface, perform these tasks:

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in 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.

```
# ATM Physical Interface
set interfaces at-1/0/3 atm-options vpi 0
#
# Logical Unit 0
set interfaces at-1/0/3 unit 0 encapsulation atm-vc-mux
set interfaces at-1/0/3 unit 0 vci 0.39
set interfaces at-1/0/3 unit 0 family inet rpf-check
set interfaces at-1/0/3 unit 0 family inet filter input biz-customer-in-filter
set interfaces at-1/0/3 unit 0 family inet filter output biz-customer-out-filter
set interfaces at-1/0/3 unit 0 family inet address 10.0.0.254/32 destination 10.0.0.2
#
# Routing Properties
set routing-options access route 200.10.10.0/24 qualified-next-hop at-1/0/0.0
```

Configuring the ATM Physical Interface

Step-by-Step Procedure

To configure the ATM physical interface:

1. Specify that you want to configure ATM-specific options on the physical interface.

   ```
   [edit interfaces at-1/0/3]
   user@host# edit atm-options
   ```

2. Configure one or more VPIs on the physical interface.

   ```
   [edit interfaces at-1/0/3 atm-options]
   user@host# set vpi 0
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the ATM physical interface configuration by issuing the **show interfaces at-1/0/3** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/3
atm-options {
  vpi 0;
}
```

If you are done configuring the ATM physical interface, enter **commit** from configuration mode.

Configuring the Static IPv4 Subscriber Interface on Logical Unit 0

Step-by-Step Procedure

To configure the static IPv4 subscriber interface on logical unit 0:

1. Configure ATM VC multiplex encapsulation on the logical interface.

   ```
   [edit interfaces at-1/0/3 unit 0]
   user@host# set encapsulation atm-vc-mux
   ```

2. Configure the VCI for the logical interface.

   ```
   [edit interfaces at-1/0/3 unit 0]
   user@host# set vci 0.39
   ```

3. Configure the IPv4 (**inet**) protocol family, IPv4 address, and remote (destination) address of the connection.

   ```
   [edit interfaces at-1/0/3 unit 0]
   user@host# set family inet address 10.0.0.254/32 destination 10.0.0.2
   ```

4. Specify that you want to configure additional attributes for the IPv4 protocol family.

   ```
   [edit interfaces at-1/0/3 unit 0]
   user@host# edit family inet
   ```

5. Enable IP source address validation, which checks whether traffic is arriving at the router on an expected path.

   ```
   [edit interfaces at-1/0/3 unit 0 family inet]
   user@host# set rpf-check
   ```

6. Apply the previously defined standard firewall filters to the logical interface.

   ```
   [edit interfaces at-1/0/3 unit 0 family inet]
   user@host# set filter input biz-customer-in-filter
   user@host# set filter output biz-customer-out-filter
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static subscriber interface configuration on logical unit 0 by issuing the **show interfaces at-1/0/3.0** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/3.0
encapsulation atm-vc-mux;
vci 0.39;
family inet {
  rpf-check;
  filter {
```

```
        input biz-customer-in-filter;
        output biz-customer-out-filter;
      }
      address 10.0.0.254/32 {
        destination 10.0.0.2;
      }
    }
```

If you are done configuring the static subscriber interface on logical unit 0, enter **commit** from configuration mode.

Configuring Routing Properties

Step-by-Step Procedure

To configure static routing properties:

1. Specify that you want to configure protocol-independent routing properties.

   ```
   [edit]
   user@host# edit routing-options
   ```

2. Configure a static access route for routing downstream traffic from the router, and a qualified-next-hop address for routing upstream traffic to the router.

   ```
   [edit routing-options]
   user@host# set access route 200.10.10.0/24 qualified-next-hop at-1/0/0.0
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static routing properties configuration by issuing the **show routing-options** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show routing-options
access {
  route 200.10.10.0/24 {
    qualified-next-hop at-1/0/0.0;
  }
}
```

If you are done configuring the static routing properties, enter **commit** from configuration mode.

Verification

To confirm that the IPoA configuration is working properly, perform the following tasks:

- Verifying the ATM Physical Interface Configuration on page 375
- Verifying the Static Subscriber Interface Configuration on Logical Unit 0 on page 376

Verifying the ATM Physical Interface Configuration

Purpose

Verify that the at-1/0/3 physical interface is properly configured for use with ATM PVCs.

Action

From operational mode, issue the **show interfaces at-1/0/3** command.

For brevity, this **show** command output includes only the configuration that is relevant to the at-1/0/3 physical interface. Any other configuration on the system has been replaced with ellipses (...).

```
user@host> show interfaces at-1/0/3
Physical interface: at-1/0/3, Enabled, Physical link is Down
  Interface index: 168, SNMP ifIndex: 595
  Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SONET mode, Speed:
OC3, Loopback: None,
  Payload scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:00:5e:00:53:18
  Last flapped   : 2012-08-28 07:14:48 PDT (08:28:47 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : LOL, LOS
  SONET defects  : LOL, LOS, LOP, BERR-SF, RDI-P
    VPI 0
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                    0
         Output packets:                    0
  ...
```

Meaning **ATM-PVC** in the Link-level Type field indicates that encapsulation for ATM permanent virtual circuits is being used on ATM physical interface at-1/0/3. The **Active** flag for VPI 0 indicates that the virtual path is up and operational.

Verifying the Static Subscriber Interface Configuration on Logical Unit 0

Purpose Verify that the static subscriber interface on logical unit 0 is properly configured for IPv4 access over ATM.

Action From operational mode, issue the **show interfaces at-1/0/3.0** command.

```
user@host> show interfaces at-1/0/3.0
  Logical interface at-1/0/3.0 (Index 341) (SNMP ifIndex 1984)
    Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-VCMUX

    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 2040
      Flags: Sendbcast-pkt-to-re, uRPF
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.0.0.2, Local: 10.0.0.254
    VCI 0.39
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

Meaning **ATM-VCMUX** in the Encapsulation field indicates that the logical interface at-1/0/3.0 is properly configured for IPoA encapsulation with VC multiplexing. **Protocol inet** indicates that the IPv4 protocol family has been properly configured on the logical interface. The local address 10.0.0.254 is the IPv4 address of the logical interface. The destination address 10.0.0.2, which is in the same network as the local address, is the IPv4 address of the remote side of the connection and represents the static subscriber interface. The **Active** flag for VCI 0.39 indicates that virtual circuit identifier (VCI) 39 on VPI 0 is up and operational.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383

Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM

This example illustrates a bridged IP-over-Ethernet-over-ATM (IPoE-over-ATM) configuration that creates a subscriber interface for IPv4 access over a static ATM interface on an MX Series router. The router must have Module Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use an ATM MIC with small form-factor pluggable transceiver (SFP).

Requirements

This example uses the following software and hardware components:

- MX Series 3D Universal Edge Router
- ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) and compatible MPC1 or MPC2

Before you begin:

1. Make sure the MX Series router you are using has an ATM MIC with SFP installed and operational.
   - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.

- For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.

2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.

3. Define the static standard firewall filters (biz-customer-in-filter and biz-customer-out-filter) referenced in the configuration.

   - For information about creating standard firewall filters, see *Guidelines for Configuring Firewall Filters*.

   - For information about applying a firewall filter to an interface, see *Guidelines for Applying Standard Firewall Filters*.

Overview

By using the ATM MIC with SFP and a supported MPC, you can configure the MX Series router to support subscriber access for a statically created IPv4 or IPv6 interface over a static ATM underlying interface. An IPoE-over-ATM configuration enables you to provide access to subscribers on static IPv4 or IPv6 interfaces over an underlying ATM interface on an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual circuits (PVCs).

NOTE: IPoE-over-ATM configurations require static configuration of the IP interface, ATM interface, CoS attributes, and firewall fiters. Dynamic configuration is not supported.

To configure bridged IPoE-over-ATM subscriber access, you must configure Ethernet-over-ATM logical link control (LLC) encapsulation on the ATM underlying interface by including the **encapsulation ether-over-atm-llc** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

To provision the ATM AAL5 PVCs for access over the ATM network, you must also configure the virtual path identifiers (VPIs) on the ATM physical interface, and one or more virtual circuit identifiers (VCIs) for each VPI.

In IPoE-over-ATM configurations, the subscriber interfaces are associated with IPv4 or IPv6 addresses that are mapped to media access control (MAC) addresses. To statically configure Address Resolution Protocol (ARP) table entries that map IP address to MAC addresses, use the **arp** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet address *address*]** hierarchy level. In this example, the IPv4 address 10.0.50.2, configured with the **set arp 10.0.50.2 mac 00:00:5e:00:53:ff publish** statement at the **[edit interfaces at-1/0/2 unit 0 family inet address 10.0.50.254/24]** hierarchy level, represents the subscriber interface.

This example includes the following basic steps to statically configure a single IPv4 subscriber interface over an ATM underlying interface:

1. Configure VPI 0 on ATM physical interface at-1/0/2.

2. Configure Ethernet-over-ATM LLC encapsulation, VCI 0.39 (VCI 39 on VPI 0), and the following IPv4 (**inet**) protocol family characteristics on logical interface at-1/0/2.0 :
   - IPv4 subscriber interface address 10.0.50.254/24
   - Static Address Resolution Protocol (ARP) table entries that provide explicit mappings between IP addresses and MAC addresses
   - IP source address validation (**rpf-check**)
   - Standard input (biz-customer-in-filter) and output (biz-customer-out-filter) firewall filters
3. Configure static access route 200.10.10.0/24 with qualified-next-hop address at-1/0/0.0.

Configuration

To configure a static IPv4 subscriber interface over a static ATM underlying interface, perform these tasks:

- Configuring the ATM Physical Interface on page 379
- Configuring the Static IPv4 Subscriber Interface on Logical Unit 0 on page 380
- Configuring Routing Properties on page 381

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in 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.

```
# ATM Physical Interface
set interfaces at-1/0/2 atm-options vpi 0
#
# Logical Unit 0
set interfaces at-1/0/2 unit 0 encapsulation ether-over-atm-llc
set interfaces at-1/0/2 unit 0 vci 0.39
set interfaces at-1/0/2 unit 0 family inet rpf-check
set interfaces at-1/0/2 unit 0 family inet filter input biz-customer-in-filter
set interfaces at-1/0/2 unit 0 family inet filter output biz-customer-out-filter
set interfaces at-1/0/2 unit 0 family inet address 10.0.50.254/24 arp 10.0.50.2 mac
  00:00:5e:00:53:ff
set interfaces at-1/0/2 unit 0 family inet address 10.0.50.254/24 arp 10.0.50.2 publish
#
# Routing Properties
set routing-options access route 10.200.10.0/24 qualified-next-hop at-1/0/0.0
```

Configuring the ATM Physical Interface

Step-by-Step Procedure

To configure the ATM physical interface:

1. Specify that you want to configure ATM-specific options on the physical interface.

```
[edit interfaces at-1/0/2]
user@host# edit atm-options
```

2. Configure one or more VPIs on the physical interface.

   [edit interfaces at-1/0/2 atm-options]
   user@host# **set** vpi **0**

Results From the **[edit]** hierarchy level in configuration mode, confirm the results of the ATM physical interface configuration by issuing the **show interfaces at-1/0/2** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/2
atm-options {
  vpi 0;
}
```

If you are done configuring the ATM physical interface, enter **commit** from configuration mode.

Configuring the Static IPv4 Subscriber Interface on Logical Unit 0

Step-by-Step Procedure

To configure the static IPv4 subscriber interface on logical unit 0:

1. Configure Ethernet-over-ATM LLC encapsulation on the logical interface.

   [edit interfaces at-1/0/2 unit 0]
   user@host# **set** encapsulation **ether-over-atm-llc**

2. Configure the VCI for the logical interface.

   [edit interfaces at-1/0/2 unit 0]
   user@host# **set** vci **0.39**

3. Configure the IPv4 (**inet**) protocol family and address.

   [edit interfaces at-1/0/2 unit 0]
   user@host# **set** family **inet address 10.0.50.254/24**

4. Specify that you want to configure static ARP table entries to map between IP addresses and MAC addresses.

   [edit interfaces at-1/0/2 unit 0 family inet]
   user@host# **edit** family **inet address 10.0.50.254/24**

5. Configure IP address 10.0.50.2, which maps to the MAC address, and MAC address 00:00:5e:00:53:ff, which maps to the IP address. Include the **publish** option to specify that the router reply to ARP requests for the specified IP address.

   [edit interfaces at-1/0/2 unit 0 family inet address 10.0.50.254/24]
   user@host# **set** arp **10.0.50.2 mac 00:00:5e:00:53:ff publish**
   user@host# **up**

6. Enable IP source address validation, which checks whether traffic is arriving at the router on an expected path.

   [edit interfaces at-1/0/2 unit 0 family inet]
   user@host# **set** rpf-check

7. Apply the previously defined standard firewall filters to the logical interface.


```
[edit interfaces at-1/0/2 unit 0 family inet]
user@host# set filter input biz-customer-in-filter
user@host# set filter output biz-customer-out-filter
```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static subscriber interface configuration on logical unit 0 by issuing the **show interfaces at-1/0/2.0** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/2.0
encapsulation ether-over-atm-llc;
vci 0.39;
family inet {
  rpf-check;
  filter {
    input biz-customer-in-filter;
    output biz-customer-out-filter;
  }
  address 10.0.50.254/24 {
    arp 10.0.50.2 mac 00:00:5e:00:53:ff publish;
  }
}
```

If you are done configuring the static subscriber interface on logical unit 0, enter **commit** from configuration mode.

Configuring Routing Properties

Step-by-Step Procedure

To configure static routing properties:

1. Specify that you want to configure protocol-independent routing properties.

   ```
   [edit]
   user@host# edit routing-options
   ```

2. Configure a static access route for routing downstream traffic from the router, and a qualified-next-hop address for routing upstream traffic to the router.

   ```
   [edit routing-options]
   user@host# set access route 10.200.10.0/24 qualified-next-hop at-1/0/0.0
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static routing properties configuration by issuing the **show routing-options** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show routing-options
access {
  route 10.200.10.0/24 {
    qualified-next-hop at-1/0/0.0;
  }
}
```

If you are done configuring the static routing properties, enter **commit** from configuration mode.

Verification

To confirm that the IPoE-over-ATM configuration is working properly, perform the following tasks:

- Verifying the ATM Physical Interface Configuration on page 382
- Verifying the Static Subscriber Interface Configuration on Logical Unit 0 on page 382

Verifying the ATM Physical Interface Configuration

Purpose Verify that the at-1/0/2 physical interface is properly configured for use with ATM PVCs.

Action From operational mode, issue the **show interfaces at-1/0/2** command.

For brevity, this **show** command output includes only the configuration that is relevant to the at-1/0/2 physical interface. Any other configuration on the system has been replaced with ellipses (...).

```
user@host> show interfaces at-1/0/2
Physical interface: at-1/0/2, Enabled, Physical link is Down
  Interface index: 175, SNMP ifIndex: 594
  Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SDH mode, Speed: OC3,
 Loopback: None,
Payload scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:00:5e:00:53:97
  Last flapped   : 2012-09-06 12:11:39 PDT (05:45:45 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SDH   alarms   : LOL, LOS
  SDH   defects  : LOL, LOS, LOP, BERR-SF, HP-FERF
    VPI 0
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                   0
         Output packets:                   0
...
```

Meaning **ATM-PVC** in the Link-level Type field indicates that encapsulation for ATM permanent virtual circuits is being used on ATM physical interface at-1/0/2. The **Active** flag for VPI 0 indicates that the virtual path is up and operational.

Verifying the Static Subscriber Interface Configuration on Logical Unit 0

Purpose Verify that the static subscriber interface on logical unit 0 is properly configured for IPoE-over-ATM access.

Action From operational mode, issue the **show interfaces at-1/0/2.0** command.

```
user@host> show interfaces at-1/0/2.0
  Logical interface at-1/0/2.0 (Index 336) (SNMP ifIndex 1983)
    Flags: Device-Down Point-To-Multipoint SNMP-Traps 0x4000 Encapsulation:
Ether-over-ATM-LLC
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 2016
      Flags: Sendbcast-pkt-to-re, uRPF
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.0.50/24, Local: 10.0.50.254, Broadcast: 10.0.50.255
    VCI 0.39
      Flags: Active, Multicast
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

Meaning **Ether-over-ATM-LLC** in the Encapsulation field indicates that logical interface at-1/0/2.0 is properly configured for Ethernet-over-ATM encapsulation with LLC. **Protocol inet** indicates that the IPv4 protocol family has been properly configured on the logical interface. The destination address 10.0.50/24 identifies the network in which the subscriber interface (10.0.50.2) resides. The **Active** flag for VCI 0.39 indicates that virtual circuit identifier (VCI) 39 on VPI 0 is up and operational.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383

Example: Configuring a Static PPP Subscriber Interface over ATM

This example illustrates a PPP-over-ATM (PPPoA) configuration that creates three static PPP logical subscriber interfaces over a static ATM underlying interface on an MX Series router. The router must have Module Port Concentrator/Modular Interface Card (MPC/MIC) interfaces that use an ATM MIC with small form-factor pluggable transceiver (SFP).

- Requirements on page 384
- Overview on page 384
- Configuration on page 385
- Verification on page 390

Requirements

This example uses the following software and hardware components:

- MX Series 3D Universal Edge Router
- ATM MIC with SFP (Model Number MIC-3D-8OC3-2OC12-ATM) and compatible MPC1 or MPC2

Before you begin:

1. Make sure the MX Series router you are using has an ATM MIC with SFP installed and operational.
   - For information about compatible MPCs for the ATM MIC with SFP, see the *MX Series Interface Module Reference*.
   - For information about installing MPCs and MICs in an MX Series router, see the *Hardware Guide* for your MX Series router model.
2. Make sure you understand how to configure and use static ATM interfaces.

   See *ATM Interfaces Overview*.
3. Create the dynamic profile (pppoa-cos-profile) and access profile (pe-B-ppp-clients) referenced in the configuration.
   - For information about creating a basic dynamic profile, see *Configuring a Basic Dynamic Profile*.
   - For information about creating a dynamic profile for class of service (CoS) attributes, see *Configuring Traffic Scheduling and Shaping for Subscriber Access*.
   - For information about creating an access profile for PPP Challenge Handshake Authentication Protocol (CHAP) authentication, see *Configuring the PPP Challenge Handshake Authentication Protocol*.

Overview

By using the ATM MIC with SFP and a supported MPC, you can configure an MX Series router to support PPP subscriber access over an ATM network. PPPoA configurations on MX Series routers consist of one or more statically created PPP logical subscriber interfaces over a static ATM underlying interface.

Optionally, you can use dynamic profiles to dynamically or statically apply subscriber services services, such as CoS and firewall filters, to the static PPP logical interface. Configuring CoS and firewall filters in this manner enables you to efficiently and economically provide these services to PPP subscribers accessing the router over an ATM network using ATM Adaptation Layer 5 (AAL5) permanent virtual connections (PVCs). This example uses a previously configured dynamic profile named pppoa-cos-profile to apply traffic scheduling and shaping parameters to logical interface at-1/0/1.2.

To configure PPPoA subscriber access, configure the correct encapsulation type: **atm-ppp-llc** for PPPoA encapsulation with logical link control (LLC), or **atm-ppp-vc-mux** for PPPoA encapsulation with virtual circuit (VC) multiplexing. This example configures **atm-ppp-llc** as the encapsulation type on logical interface at-1/0/1.0, and **atm-ppp-vc-mux** as the encapsulation type on logical interfaces at-1/0/1.1 and at-1/0/1.2.

To provision the ATM AAL5 PVCs for access over the ATM network, you must also configure the virtual path identifiers (VPIs) on the ATM physical interface, and one or more virtual circuit identifiers (VCIs) for each VPI.

In PPPoA configurations, each statically configured logical interface (for example, at-1/0/1.0) corresponds to a PPP logical subscriber interface. This example configures three PPP logical subscriber interfaces over an ATM interface, as follows:

- The ATM physical interface (at-1/0/1) is statically configured with VPI 0 and VPI 2.
- Logical interface at-1/0/1.0 (logical unit 0) is configured with PPP-over AAL5 LLC encapsulation, VCI 0.120 (VCI 120 on VPI 0), PPP-specific options, and the IPv4 protocol family and address.
- Logical interface at-1/0/1.1 (logical unit 1) is configured with PPP-over-AAL5 VC multiplexing encapsulation, VCI 2.120 (VCI 120 on VPI 2), PPP-specific options, and the IPv4 protocol family and address.
- Logical interface at-1/0/1.2 (logical unit 2) is configured with PPP-over-AAL5 VC multiplexing encapsulation, VCI 2.121 (VCI 121 on VPI 2), PPP-specific options, and the IPv4 protocol family and address. The PPP-specific options include applying a dynamic profile named pppoa-cos-profile to the static PPP interface. The pppoa-cos-profile dynamic profile applies traffic scheduling and shaping parameters to the PPP logical subscriber interface.

Configuration

To configure static PPP logical subscriber interfaces over an ATM interface, perform these tasks:

- Configuring the ATM Physical Interface on page 386
- Configuring the Static PPP Subscriber Interface on Logical Unit 0 on page 387
- Configuring the Static PPP Subscriber Interface on Logical Unit 1 on page 388
- Configuring the Static PPP Subscriber Interface on Logical Unit 2 on page 389

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in 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.

```
# ATM Physical Interface
set interfaces at-1/0/1 atm-options vpi 0
set interfaces at-1/0/1 atm-options vpi 2
#
# Logical Unit 0
set interfaces at-1/0/1 unit 0 encapsulation atm-ppp-llc
```

```
set interfaces at-1/0/1 unit 0 vci 0.120
set interfaces at-1/0/1 unit 0 ppp-options chap access-profile pe-B-ppp-clients
set interfaces at-1/0/1 unit 0 ppp-options chap local-name pe-A-at-1/0/1
set interfaces at-1/0/1 unit 0 keepalives interval 5
set interfaces at-1/0/1 unit 0 keepalives up-count 6
set interfaces at-1/0/1 unit 0 keepalives down-count 4
set interfaces at-1/0/1 unit 0 family inet address 192.0.2.133/30
#
# Logical Unit 1
set interfaces at-1/0/1 unit 1 encapsulation atm-ppp-vc-mux
set interfaces at-1/0/1 unit 1 vci 2.120
set interfaces at-1/0/1 unit 1 keepalives interval 6
set interfaces at-1/0/1 unit 1 keepalives up-count 6
set interfaces at-1/0/1 unit 1 keepalives down-count 4
set interfaces at-1/0/1 unit 1 family inet address 192.0.2.143/30
#
# Logical Unit 2
set interfaces at-1/0/1 unit 2 encapsulation atm-ppp-vc-mux
set interfaces at-1/0/1 unit 2 vci 2.121
set interfaces at-1/0/1 unit 2 ppp-options chap access-profile pe-A-ppp-clients
set interfaces at-1/0/1 unit 2 ppp-options chap local-name pe-A-at-1/0/1
set interfaces at-1/0/1 unit 2 ppp-options chap passive
set interfaces at-1/0/1 unit 2 ppp-options dynamic-profile pppoa-cos-profile
set interfaces at-1/0/1 unit 2 keepalives interval 5
set interfaces at-1/0/1 unit 2 keepalives up-count 6
set interfaces at-1/0/1 unit 2 keepalives down-count 4
set interfaces at-1/0/1 unit 2 family inet address 192.0.2.153/30
```

Configuring the ATM Physical Interface

Step-by-Step Procedure

To configure the ATM physical interface:

1. Specify that you want to configure ATM-specific options on the physical interface.

   ```
   [edit interfaces at-1/0/1]
   user@host# edit atm-options
   ```

2. Configure one or more VPIs on the physical interface.

   ```
   [edit interfaces at-1/0/1 atm-options]
   user@host# set vpi 0
   user@host# set vpi 2
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the ATM physical interface configuration by issuing the **show interfaces at-1/0/1** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/1
atm-options {
  vpi 0;
  vpi 2;
}
```


If you are done configuring the ATM physical interface, enter **commit** from configuration mode.

Configuring the Static PPP Subscriber Interface on Logical Unit 0

Step-by-Step Procedure

To configure the static PPP subscriber interface on logical unit 0:

1. Configure PPP-over AAL5 LLC encapsulation on the logical interface.

```
[edit interfaces at-1/0/1 unit 0]
user@host# set encapsulation atm-ppc-llc
```

2. Configure the VCI for the logical interface.

```
[edit interfaces at-1/0/1 unit 0]
user@host# set vci 0.120
```

3. Specify that you want to configure options for PPP CHAP on the logical interface.

```
[edit interfaces at-1/0/1 unit 0]
user@host# edit ppp-options chap
```

4. Assign the previously configured pe-B-ppp-clients access profile to the PPP logical subscriber interface.

```
[edit interfaces at-1/0/1 unit 0 ppp-options chap]
user@host# set access-profile pe-B-ppp-clients
```

5. Configure the local name used by the interface in CHAP challenge and response packets.

```
[edit interfaces at-1/0/1 unit 0 ppp-options chap]
user@host# set local-name "pe-A-at-1/0/1"
user@host# up 2
```

6. Configure the transmission of keepalive messages on the logical interface.

```
[edit interfaces at-1/0/1 unit 0]
user@host# set keepalives interval 5
user@host# set keepalives up-count 6
user@host# set keepalives down-count 4
```

7. Configure the IPv4 (**inet**) protocol family and IP address.

```
[edit interfaces at-1/0/1 unit 0]
user@host# set family inet address 192.0.2.133/30
```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static PPP subscriber interface configuration on logical unit 0 by issuing the **show interfaces at-1/0/1.0** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/1.0
encapsulation atm-ppp-llc;
vci 0.120;
ppp-options {
  chap {
    access-profile pe-B-ppp-clients;
```

```
      local-name pe-A-at-1/0/1;
    }
  }
  keepalives interval 5 up-count 6 down-count 4;
  family inet {
    address 192.0.2.133/30;
  }
```

If you are done configuring the PPP logical subscriber interface on logical unit 0, enter **commit** from configuration mode.

Configuring the Static PPP Subscriber Interface on Logical Unit 1

Step-by-Step Procedure

To configure the static PPP subscriber interface on logical unit 1:

1. Configure PPP-over-AAL5 VC multiplexing encapsulation on the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 1]
   user@host# set encapsulation atm-ppc-vc-mux
   ```

2. Configure the VCI for the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 1]
   user@host# set vci 2.120
   ```

3. Configure the transmission of keepalive messages on the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 1]
   user@host# set keepalives interval 6
   user@host# set keepalives up-count 6
   user@host# set keepalives down-count 4
   ```

4. Configure the IPv4 (**inet**) protocol family and IP address.

   ```
   [edit interfaces at-1/0/1 unit 1]
   user@host# set family inet address 192.0.2.143/30
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static PPP subscriber interface configuration on logical unit 1 by issuing the **show interfaces at-1/0/1.1** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/1.1
encapsulation atm-ppp-vc-mux;
vci 2.120;
keepalives interval 6 up-count 6 down-count 4;
family inet {
  address 192.0.2.143/30;
}
```

If you are done configuring the PPP logical subscriber interface on logical unit 1, enter **commit** from configuration mode.

Configuring the Static PPP Subscriber Interface on Logical Unit 2

Step-by-Step Procedure

To configure the static PPP subscriber interface on logical unit 2:

1. Configure PPP-over-AAL5 VC multiplex encapsulation on the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 2]
   user@host# set encapsulation atm-ppc-vc-mux
   ```

2. Configure the VCI for the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 2]
   user@host# set vci 2.121
   ```

3. Specify that you want to configure options for PPP CHAP on the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 2]
   user@host# edit ppp-options chap
   ```

4. Assign the previously configured pe-A-ppp-clients access profile to the PPP logical subscriber interface.

   ```
   [edit interfaces at-1/0/1 unit 2 ppp-options chap]
   user@host# set access-profile pe-A-ppp-clients
   ```

5. Configure the local name used by the interface in CHAP challenge and response packets.

   ```
   [edit interfaces at-1/0/1 unit 2 ppp-options chap]
   user@host# set local-name "pe-A-at-1/0/1"
   ```

6. Configure passive mode for CHAP authentication.

   ```
   [edit interfaces at-1/0/1 unit 2 ppp-options chap]
   user@host# set passive
   user@host# up
   ```

7. Apply the previously configured pppoa-cos-profile dynamic profile to the PPP logical subscriber interface.

   ```
   [edit interfaces at-1/0/1 unit 2 ppp-options]
   user@host# set dynamic-profile pppoa-cos-profile
   user@host# up
   ```

8. Configure the transmission of keepalive messages on the logical interface.

   ```
   [edit interfaces at-1/0/1 unit 2]
   user@host# set keepalives interval 5
   user@host# set keepalives up-count 6
   user@host# set keepalives down-count 4
   ```

9. Configure the IPv4 (**inet**) protocol family and IP address.

   ```
   [edit interfaces at-1/0/1 unit 2]
   user@host# set family inet address 192.0.2.153/30
   ```

Results

From the **[edit]** hierarchy level in configuration mode, confirm the results of the static PPP subscriber interface configuration on logical unit 2 by issuing the **show interfaces at-1/0/1.2** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it.

```
[edit]
user@host# show interfaces at-1/0/1.2
encapsulation atm-ppp-vc-mux;
vci 2.121;
ppp-options {
  chap {
    access-profile pe-A-ppp-clients;
    local-name pe-A-at-1/0/1;
    passive;
  }
  dynamic-profile pppoa-cos-profile;
}
keepalives interval 5 up-count 6 down-count 4;
family inet {
  address 192.0.2.153/30;
}
```

If you are done configuring the PPP logical subscriber interface on logical unit 2, enter **commit** from configuration mode.

Verification

To confirm that the PPPoA configuration is working properly, perform the following tasks:

Verifying the ATM Physical Interface Configuration

Purpose Verify that the at-1/0/1 physical interface is properly configured for use with ATM PVCs.

Action From operational mode, issue the **show interfaces at-1/0/1** command.

For brevity, this **show** command output includes only the configuration that is relevant to the at-1/0/1 physical interface. Any other configuration on the system has been replaced with ellipses (...).

```
user@host> show interfaces at-1/0/1
Physical interface: at-1/0/1, Enabled, Physical link is Down
  Interface index: 166, SNMP ifIndex: 593
  Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SONET mode, Speed:
OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:00:5e:00:53:96
  Last flapped   : 2012-06-29 15:35:29 PDT (2d 16:24 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : LOL, LOS
  SONET defects  : LOL, LOS, LOP, BERR-SF, RDI-P
    VPI 0
```

```
    Flags: Active
    Total down time: 0 sec, Last down: Never
  Traffic statistics:
       Input  packets:                    0
       Output packets:                    0
   VPI 2
    Flags: Active
    Total down time: 0 sec, Last down: Never
  Traffic statistics:
       Input  packets:                    0
       Output packets:                    0

  ...
```

Meaning **ATM-PVC** in the Link-level Type field indicates that encapsulation for ATM permanent virtual circuits is being used on ATM physical interface at-1/0/1. The **Active** flag for VPI 0 and VPI 2 indicates that these virtual paths are up and operational.

Verifying the Static PPPoA Configuration on Logical Unit 0

Purpose Verify that the static PPP subscriber interface is properly configured on logical unit 0 (at-1/0/1.0).

Action From operational mode, issue the **show interfaces at-1/0/1.0** command.

```
user@host> show interfaces at-1/0/1.0
Logical interface at-1/0/1.0 (Index 337) (SNMP ifIndex 1979)
   Flags: Device-Down Point-To-Point Inverse-ARP SNMP-Traps 0x4000 Encapsulation:
 ATM-PPP-LLC
    Input packets : 0
    Output packets: 0
  Keepalive settings: Interval 5 seconds, Up-count 6, Down-count 4
    LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 2034
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 192.0.2.132/30, Local: 192.0.2.133, Broadcast: 192.0.2.135
    VCI 0.120
      Flags: Active, Inverse-ARP
      Total down time: 0 sec, Last down: Never
      ARP statistics
       Received: 0, Sent: 0, Denied: 0, Operation not supported: 0,
       Bad packet length: 0, Bad protocol: 0, Bad protocol length: 0,
       Bad hardware length: 0, Dropped: 0
       Last received: Never, Last sent: Never
        Input packets : 0
        Output packets: 0
```

Meaning **ATM-PPP-LLC** in the Encapsulation field indicates that logical interface at-1/0/1.0 is properly configured for PPP-over-AAL5 logical link control (LLC) encapsulation. **Protocol inet** indicates that the IPv4 protocol family has been properly configured on the logical interface. The **Active** flag for VCI 0.120 indicates that virtual circuit identifier (VCI) 120 on VPI 0 is up and operational.

Verifying the Static PPPoA Configuration on Logical Unit 1

Purpose Verify that the static PPP subscriber interface is properly configured on logical unit 1 (at-1/0/1.1).

Action From operational mode, issue the **show interfaces at-1/0/1.1** command.

```
user@host> show interfaces at-1/0/1.1

  Logical interface at-1/0/1.1 (Index 338) (SNMP ifIndex 1980)
    Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation:
ATM-PPP-VCMUX
    Input packets : 0
    Output packets: 0
  Keepalive settings: Interval 6 seconds, Up-count 6, Down-count 4
   LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 2038
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 192.0.2.142/30, Local: 192.0.2.143, Broadcast: 192.0.2.145
    VCI 2.120
      Flags: Active, Inverse-ARP
      Total down time: 0 sec, Last down: Never
      ARP statistics
       Received: 0, Sent: 0, Denied: 0, Operation not supported: 0,
       Bad packet length: 0, Bad protocol: 0, Bad protocol length: 0,
       Bad hardware length: 0, Dropped: 0
       Last received: Never, Last sent: Never
        Input packets : 0
        Output packets: 0
```

Meaning **ATM-PPP-VCMUX** in the Encapsulation field indicates that the logical interface at-1/0/1.1 is properly configured for PPP-over-AAL5 VC multiplexing encapsulation. **Protocol inet** indicates that the IPv4 protocol family has been properly configured on the logical interface. The **Active** flag for VCI 2.120 indicates that virtual circuit identifier (VCI) 120 on VPI 2 is up and operational.

Verifying the Static PPPoA Configuration on Logical Unit 2

Purpose Verify that the static PPP subscriber interface is properly configured on logical unit 2 (at-1/0/1.2).

Action From operational mode, issue the **show interfaces at-1/0/1.2** command.

```
user@host> show interfaces at-1/0/1.2
Logical interface at-1/0/1.2 (Index 339) (SNMP ifIndex 1981)
    Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation:
ATM-PPP-VCMUX
    Input packets : 0
    Output packets: 0
  Keepalive settings: Interval 5 seconds, Up-count 6, Down-count 4
   LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Closed
  PAP state: Closed
    Protocol inet, MTU: 2038
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 192.0.2.152/30, Local: 192.0.2.153, Broadcast: 192.0.2.155
    VCI 2.121
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

Meaning **ATM-PPP-VCMUX** in the Encapsulation field indicates that the logical interface at-1/0/1.2 is properly configured for PPP-over-AAL5 VC multiplexing encapsulation. **Protocol inet** indicates that the IPv4 protocol family has been properly configured on the logical interface. The **Active** flag for VCI 2.121 indicates that virtual circuit identifier 121 on VPI 2 is up and operational.

Related Documentation

- ATM for Subscriber Access Overview on page 325
- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377

CHAPTER 35

Verifying and Managing ATM Configurations

Verifying and Managing ATM Configurations for Subscriber Access

Purpose View information about the static or dynamic subscriber interfaces configured over a static ATM underlying interface on an MX Series router with MPC/MIC interfaces and an ATM MIC with SFP.

Action

- To display information about the ATM physical interface to ensure that it is properly configured for use with ATM PVCs:

  `user@host>` show interfaces **at-*fpc/pic/port***

- To display information about the ATM logical interface to ensure that it is properly configured as a dynamic or static subscriber interface:

  `user@host>` show interfaces **at-*fpc/pic/port.logical-unit-number***

- To display information about all static PPPoE (**pp0**) subscriber interfaces for static PPPoE-over-ATM configurations:

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

- To display information about a specified static PPPoE (**pp0**) subscriber interface for static PPPoE-over-ATM configurations:

  `user@host>` show interfaces **pp0.*logical-unit-number***

- To display detailed information about the PPPoE underlying interface for dynamic or static PPPoE-over-ATM configurations:

  `user@host>` show pppoe underlying-interfaces **at-*fpc/pic/port.logical-unit-number* detail**

- To display extensive information, including packet statistics and lockout time settings, about the PPPoE underlying interface for dynamic or static PPPoE-over-ATM configurations:

  `user@host>` show pppoe underlying-interfaces **at-*fpc/pic/port.logical-unit-number* extensive**

- To display extensive information about the active ATM subscriber with the specified ATM virtual path identifier (VPI) and ATM virtual circuit identifier (VCI):

  `user@host>` show subscribers **vpi *vpi-identifier* vci *vci-identifier* extensive**

Related Documentation

- Configuring ATM for Subscriber Access on page 333
- Example: Configuring a Dynamic PPPoE Subscriber Interface over ATM on page 349
- Example: Configuring a Static PPPoE Subscriber Interface over ATM on page 358
- Example: Configuring a Static Subscriber Interface for IP Access over ATM on page 371
- Example: Configuring a Static Subscriber Interface for IP Access over Ethernet over ATM on page 377
- Example: Configuring a Static PPP Subscriber Interface over ATM on page 383

PART 6

Troubleshooting

CHAPTER 36

Contacting Juniper Networks Technical Support

Collecting Subscriber Access Logs Before Contacting Juniper Networks Technical Support

Problem

Description: When you experience a subscriber access problem in your network, we recommend that you collect certain logs before you contact Juniper Networks 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 Networks 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 Networks 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 Networks Technical Support*

PART 7

Configuration Statements and Operational Commands

CHAPTER 37

Configuration Statements

accept

Syntax accept (any | dhcp-v4 | dhcp-v6 | inet | inet6 | pppoe);

Hierarchy Level [edit interfaces *interface-name* auto-configure stacked-vlan-ranges dynamic-profile *profile-name*],
[edit interfaces *interface-name* auto-configure vlan-ranges dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.5.
dhcp-v4 option added in Junos OS Release 10.0.
dhcp-v6, **inet6** and **pppoe** options added in Junos OS Release 10.2.
any option added in Junos OS Release 10.4.

Description Specify the type of VLAN Ethernet packet accepted by an interface that is associated with a VLAN dynamic profile or stacked VLAN dynamic profile.

Options **any**—Any packet type. Specifies that any incoming packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes. This option is used when configuring wholesaling in a Layer 2 network.

dhcp-v4—IPv4 DHCP packet type. Specifies that incoming IPv4 DHCP discover packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes

NOTE: The DHCP-specific mac-address and option-82 options are rejected if the accept statement is not set to dhcp-v4.

dhcp-v6—IPv6 DHCP packet type. Specifies that incoming IPv6 DHCP discover packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes.

inet—IPv4 Ethernet and ARP packet type.

inet6—IPv6 Ethernet packet type.

pppoe—Point-to-Point Protocol over Ethernet packet type.

NOTE: The **pppoe** VLAN Ethernet packet type option is supported only for MPC/MIC interfaces.

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

Related Documentation

- Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
- *Configuring VLAN Interfaces for the Layer 2 Wholesale Solution*
- Configuring Subscriber Packet Types to Trigger VLAN Authentication on page 32

access (Static Access Routes)

Syntax

```
access {
  route ip-prefix</prefix-length> {
    metric route-cost;
    next-hop next-hop;
    preference route-distance;
    qualified-next-hop next-hop;
    tag tag-number
  }
```

Hierarchy Level

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

Release Information

Statement introduced in Junos OS Release 10.1.
Statement introduced in Junos OS Release 12.3 for ACX Series routers.

Description

Configure access routes.

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.

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

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 140
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- *PPPoE Overview*

access-profile

Syntax access-profile *name*;

Hierarchy Level

[edit interfaces *interface-name* ppp-options chap],
[edit interfaces *interface-name* ppp-options pap],
[edit interfaces *interface-name* unit *logical-unit-number* ppp-options chap],
[edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options chap],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]

Release Information

Statement introduced before Junos OS Release 7.4.
Support for PAP added in Junos OS Release 8.3.
Support for VLAN and stacked VLAN ranges added in Junos OS Release 10.0.

Description

For CHAP authentication, the mapping between peer names (or “clients”) and the secrets associated with their respective links. For PAP authentication, the peer's username and password.

For Asynchronous Transfer Mode 2 (ATM2) IQ interfaces only, you can configure a Challenge Handshake Authentication Protocol (CHAP) access profile on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 logical link control (LLC) encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

Options *name*—Name of the access profile.

Required Privilege Level

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

Related Documentation

- *Configuring the PPP Challenge Handshake Authentication Protocol*
- *Configuring the PPP Password Authentication Protocol On a Physical Interface*
- *default-chap-secret*
- *Junos OS System Basics Configuration Guide*

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*

agent-circuit-identifier (Dynamic VLAN Interface Sets)

Syntax

```
agent-circuit-identifier {
  dynamic-profile profile-name;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit” auto-configure],
[edit interfaces *interface-name* unit *logical-unit-number* auto-configure]

Release Information

Statement introduced in Junos OS Release 12.2.

Description

Configure a static or dynamic underlying VLAN interface to enable dynamic VLAN subscriber interface creation 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 on page 41
- Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information on page 42

agent-specifier

Syntax

```
agent-specifier {
  aci circuit-id-string ari remote-id-string {
    drop;
    delay seconds;
    terminate;
    dynamic-profile profile-name;
    routing-instance routing-instance-name;
    static-interface interface-name;
  }
}
```

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*]

Release Information Statement introduced in Junos OS Release 10.0.

drop, **delay**, **terminate**, **dynamic-profile**, **routing-instance**, and **static-interface** options introduced in Junos OS Release 10.2.

Description Specify the action taken by the interface for the specified agent circuit identifier/agent remote identifier (ACI/ARI) pair when the interface receives a PPPoE Active Discovery Initiation (PADI) control packet that includes the vendor-specific tag with ACI/ARI pair information. You can configure an ACI/ARI pair for a named service, **empty** service, or **any** service in a PPPoE service name table. A maximum of 8000 ACI/ARI pairs are supported per PPPoE service name table. You can distribute the ACI/ARI pairs in any combination among the named, **empty**, and **any** service entries in the service name table.

You can use an asterisk (*) as a wildcard character to match ACI/ARI pairs, the ACI alone, or the ARI alone. The asterisk can be placed only at the beginning, the end, or both the beginning and end of the identifier string. You can also specify an asterisk alone for either the ACI or the ARI. You cannot specify only an asterisk for both the ACI and the ARI. When you specify a single asterisk as the identifier, that identifier is ignored in the PADI packet.

For example, suppose you care about matching only the ACI and do not care what value the ARI has in the PADI packet, or even whether the packet contains an ARI value. In this case you can set the ***remote-id-string*** to a single asterisk. Then the interface ignores the ARI received in the packet and the interface takes action based only on matching the specified ACI.

Default The default action is terminate.

Options **aci *circuit-id-string***—Identifier for the agent circuit ID that corresponds to the DSLAM interface that initiated the service request. This is a string of up to 63 characters.

ari *remote-id-string*—Identifier for the subscriber associated with the DSLAM interface that initiated the service request. This is a string of up to 63 characters.

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 PPPoE Service Name Tables on page 195
- Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information on page 200

aggregate-clients (DHCP Local Server)

Syntax aggregate-clients (merge | replace);

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit system services dhcp-local-server dynamic-profile *profile-name*],
[edit system services dhcp-local-server group *group-name* dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.
Options **merge** and **replace** introduced in Junos OS Release 9.5.

Description Specify that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple client sessions exist on the same underlying VLAN.

Not supported for IP demux subscriber interfaces.

Options **merge**—Aggregate multiple clients attributes for the same subscriber (logical interface)

replace—Replace the entire logical interface whenever a new client logs in to the network using the same VLAN logical interface

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

Related Documentation

- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

arp (Interfaces)

Syntax arp *ip-address* (mac | multicast-mac) *mac-address* publish;

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

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

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description For Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces only, configure Address Resolution Protocol (ARP) table entries, mapping IP addresses to MAC addresses.

NOTE: By default, an ARP policer is installed that is shared among all the Ethernet interfaces on which you have configured the **family inet** statement. By including the **arp** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet policer]** hierarchy level, you can apply a specific ARP-packet policer to an interface. This feature is not available on EX Series switches.

When you need to conserve IP addresses, you can configure an Ethernet interface to be unnumbered by including the **unnumbered-address** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet]** hierarchy level.

Options *ip-address*—IP address to map to the MAC address. The IP address specified must be part of the subnet defined in the enclosing **address** statement.

mac *mac-address*—MAC address to map to the IP address. Specify the MAC address as six hexadecimal bytes in one of the following formats: ***nnnn.nnnn.nnnn*** or ***nn:nn:nn:nn:nn:nn***. For example, **0000.5e00.5355** or **00:00:5e:00:53:55**.

multicast-mac *mac-address*—Multicast MAC address to map to the IP address. Specify the multicast MAC address as six hexadecimal bytes in one of the following formats: ***nnnn.nnnn.nnnn*** or ***nn:nn:nn:nn:nn:nn***. For example, **0000.5e00.5355** or **00:00:5e:00:53:55**.

publish—(Optional) Have the router or switch reply to ARP requests for the specified IP address. If you omit this option, the router or switch uses the entry to reach the destination but does not reply to ARP requests.

NOTE: For unicast MAC addresses only, if you include the **publish** option, the router or switch replies to proxy ARP requests.

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

Related Documentation
- *Configuring Static ARP Table Entries For Mapping IP Addresses to MAC Addresses*

atm-options

Syntax

```
atm-options {
  cell-bundle-size cells;
  ilmi;
  linear-red-profiles profile-name {
    high-plp-max-threshold percent;
    low-plp-max-threshold percent;
    queue-depth cells high-plp-threshold percent low-plp-threshold percent;
  }
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  pic-type (atm1 | atm2);
  plp-to-clp;
  promiscuous-mode {
    vpi vpi-identifier;
  }
  scheduler-maps map-name {
    forwarding-class class-name {
      epd-threshold cells plp1 cells;
      linear-red-profile profile-name;
      priority (high | low);
      transmit-weight (cells number | percent number);
    }
    vc-cos-mode (alternate | strict);
  }
  use-null-cw;
  vpi vpi-identifier {
    maximum-vcs maximum-vcs;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
        length);
      queue-length number;
    }
  }
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure ATM-specific physical interface properties.

The statements are explained separately.

NOTE: Certain options apply only to specific platforms.

Required Privilege Level

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

Related Documentation

- *Interface Encapsulations Overview*
- *multipoint-destination*
- *shaping*
- vci on page 576

authentication

Syntax

```
authentication {
  packet-types [packet-types];
  password password-string;
  username-include {
    circuit-id;
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    interface-name;
    mac-address;
    option-18;
    option-37;
    option-82 <circuit-id> <remote-id>;
    radius-realm radius-realm-string;
    remote-id;
    user-prefix user-prefix-string;
  }
}
```

Hierarchy Level

[edit interfaces *interface-name* auto-configure vlan-ranges],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges]

Release Information

Statement introduced in Junos OS Release 10.0.

Description

Specify the authentication parameters that trigger the Access-Request message to AAA for the interface.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Configuring Subscribers over Static Interfaces*
- *Configuring the Static Subscriber Global Authentication Password*
- *Configuring a Username for Authentication of Out-of-Band Triggered Dynamic VLANs*
- *Layer 2 Wholesale with ANCP-Triggered VLANs Overview*

auto-configure

Syntax

```
auto-configure {
  vlan-ranges {
    access-profile profile-name;
    authentication {
      packet-types [packet-types];
      password password-string;
      username-include{
        circuit-id;
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        interface-name;
        mac-address;
        option-18;
        option-37;
        option-82 <circuit-id> <remote-id>;
        radius-realm radius-realm-string;
        remote-id;
        user-prefix user-prefix-string;
      }
    }
    dynamic-profile profile-name {
      accept (any | dhcp-v4 | dhcp-v6 | inet | inet6 | pppoe);
      accept-out-of-band protocol;
      ranges (any | low-tag)–(any | high-tag);
    }
    override;
  }
  stacked-vlan-ranges {
    access-profile profile-name;
    authentication {
      packet-types [packet-types];
      password password-string;
      username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        interface-name;
        mac-address;
        option-18;
        option-37;
        option-82 <circuit-id> <remote-id>;
        radius-realm radius-realm-string;
        user-prefix user-prefix-string;
      }
    }
    dynamic-profile profile-name {
      accept (any | dhcp-v4 | dhcp-v6 | inet | inet6 | pppoe);
      ranges (any | low-tag–high-tag),(any | low-tag–high-tag);
    }
    override;
  }
```



```
  remove-when-no-subscribers;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Enable the configuration of dynamic, auto-sensed VLANs.

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 an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17

auto-configure (Dynamic VLAN Interface Sets)

Syntax

```
auto-configure {
  agent-circuit-identifier {
    dynamic-profile profile-name;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit"],
[edit interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 12.2.

Description Enable the configuration of dynamic, auto-sensed VLAN subscriber interfaces on a static or dynamic underlying VLAN 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

- Configuring Dynamic Underlying VLAN Interfaces to Use Agent Circuit Identifier Information on page 41
- Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information on page 42

chap

Syntax

```
chap {
  access-profile name;
  challenge-length minimum minimum-length maximum maximum-length;
  default-chap-secret name;
  local-name name;
  passive;
}
```

Hierarchy Level

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

Release Information

Statement introduced before Junos OS Release 7.4.

Description

Allow each side of a link to challenge its peer, using a “secret” known only to the authenticator and that peer. The secret is not sent over the link.

By default, PPP CHAP is disabled. If CHAP is not explicitly enabled, the interface makes no CHAP challenges and denies all incoming CHAP challenges.

For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

BEST PRACTICE: On inline service (si) interfaces for L2TP, only the **chap** statement itself is typically used for subscriber management. We recommend that you leave the subordinate statements at their default values.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Configuring the PPP Challenge Handshake Authentication Protocol*
- *Applying PPP Attributes to L2TP LNS Subscribers with a User Group Profile*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

chap (Dynamic PPP)

Syntax

```
chap {
  challenge-length minimum minimum-length maximum maximum-length;
  local-name name;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit" ppp-options]

Release Information

Statement introduced in Junos OS Release 9.5.

Support at the **[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options]** hierarchy level introduced in Junos OS Release 12.2.

Description

Specify CHAP authentication in a PPP dynamic profile.

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

- *Dynamic Profiles Overview*
- *Configuring Dynamic Authentication for PPP Subscribers*
- *Attaching Dynamic Profiles to Static PPP Subscriber Interfaces*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

circuit-type

Syntax

```
circuit-type;
```

Hierarchy Level

[edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication
username-include],

Release Information

Statement introduced in Junos OS Release 10.0.

Description

Specify that the circuit type is concatenated with the username during the subscriber authentication process.

Required Privilege Level

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

class-of-service (Dynamic Profiles)

Syntax

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

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

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure Junos OS CoS features in a dynamic profile.

Default If you do not configure any CoS features, all packets are transmitted from output transmission queue 0.

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

Related Documentation
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *Configuring Static Hierarchical Scheduling in a Dynamic Profile*

delay (PPPoE Service Name Tables)

Syntax delay *seconds*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.0.
Support at **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level introduced in Junos OS Release 10.2.

Description Configure the PPPoE underlying interface on the router to wait a specified number of seconds after receiving a PPPoE Active Discovery Initiation (PADI) control packet from a PPPoE client before sending a PPPoE Active Discovery Offer (PADO) packet to indicate that it can service the client request

The router (PPPoE server) does not check whether another server has already sent a PADO packet during the delay period in response to the PPPoE client's PADI packet. It is up to the PPPoE client to determine whether another PPPoE server has responded to its PADI request, or if it must respond to the delayed PADO packet to establish a PPPoE session.

Options ***seconds***—Number of seconds that the PPPoE underlying interface waits after receiving a PADI packet from a PPPoE client before sending a PADO packet in response.

Range: 1 through 120 seconds

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 on page 195

delimiter

Syntax delimiter *delimiter-character*;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify the character used as the delimiter between the concatenated components of the username. You cannot use the semicolon (;) as a delimiter.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

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 67
- *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 67
- *Demultiplexing Interface Overview*

demux-source (Dynamic Underlying Interface)

Syntax demux-source *family*;

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

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the logical demultiplexing (demux) source family type on the IP demux underlying interface within a dynamic profile.

NOTE: **The IP demux interface feature currently supports only Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.**

Options ***family***—Protocol family:

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

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

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 67
- *Demultiplexing Interface Overview*

destination (Tunnels)

Syntax

destination *address*;

Hierarchy Level

[edit interfaces *interface-name* unit *logical-unit-number* family inet address *address*],
[edit interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*],
[edit interfaces *interface-name* unit *logical-unit-number* tunnel],
[edit logical-systems *logical-system-name* interfaces interface-name unit *logical-unit-number* family inet address *address*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* tunnel]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1 for EX Series switches.
Statement introduced in Junos OS Release 13.2 for the QFX Series.
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description

For encrypted, PPP-encapsulated, and tunnel interfaces, specify the remote address of the connection.

Options

address—Address of the remote side of the connection.

Required Privilege Level

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

Related Documentation

- *Configuring the Interface Address*
- *Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)*
- *Junos OS Services Interfaces Library for Routing Devices*
- *point-to-point*

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 on page 141
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

domain-name

Syntax domain-name *domain-name-string*;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify the domain name that is concatenated with the username during the subscriber authentication process.

Options ***domain-name-string***—The domain name formatted string.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

drop (PPPoE Service Name Tables)

Syntax drop;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.0.
Support at **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level introduced in Junos OS Release 10.2.

Description Direct the router to drop (ignore) a PPPoE Active Discovery Initiation (PADI) control packet received from a PPPoE client that contains the specified service name tag or agent circuit identifier/agent remote identifier (ACI/ARI) information. This action effectively denies the client's request to provide the specified service, or to accept requests from the subscriber or subscribers represented by the ACI/ARI information.

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 on page 195

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 on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

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 on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

dynamic-profile (Dynamic VLAN Interface Sets)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces “$junos-interface-ifd-name” unit “$junos-interface-unit” auto-configure agent-circuit-identifier],
[edit interfaces *interface-name* unit *logical-unit-number* auto-configure agent-circuit-identifier]

Release Information Statement introduced in Junos OS Release 12.2.

Description Attach a dynamic profile for an agent circuit identifier (ACI) interface set to a static or dynamic underlying VLAN interface.

Options

- *profile-name*—Name of the dynamic profile that defines the ACI interface set.

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 on page 41
- Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information on page 42

dynamic-profile (PPP)

Syntax dynamic-profile *profile-name*;

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

Release Information Statement introduced in Junos OS Release 9.5.
Support for MLPPP on LSQ interfaces introduced in Junos OS Release 10.2.

Description Specify the dynamic profile that is attached to the interface. On the MX Series routers, this statement is supported on PPPoE interfaces only.

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

Related Documentation

- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*
- *Attaching Dynamic Profiles to Static PPP Subscriber Interfaces*
- Attaching Dynamic Profiles to MLPPP Bundles on page 311
- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310

dynamic-profile (PPPoE Service Name Tables)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify a dynamic profile to instantiate a dynamic PPPoE interface. You can associate a dynamic profile with a named service entry, **empty** service entry, or **any** service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.

The dynamic profile associated with a service entry in a PPPoE service name table overrides the dynamic profile associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.

If you include the **dynamic-profile** statement at the **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level, you cannot also include the **static-interface** statement at this level. The **dynamic-profile** and **static-interface** statements are mutually exclusive for ACI/ARI pair configurations.

Options *profile-name*—Name of the dynamic profile that the router uses to instantiate a dynamic PPPoE interface.

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 on page 195
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201

dynamic-profile (Stacked VLAN)

Syntax

```
dynamic-profile profile-name {
  accept (any | dhcp-v4 |dhcp-v6| inet | inet6 | pppoe);
  access-profile vlan-dynamic-profile-name;
  ranges (any | low-tag–high-tag),(any | low-tag–high-tag);
}
```

Hierarchy Level [edit interfaces *interface-name* auto-configure stacked-vlan-ranges]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure a dynamic profile for use when configuring dynamic stacked VLANs.

Options ***profile-name***—Name of the dynamic profile that you want to use when configuring dynamic stacked VLANs.

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

- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*
- Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20

dynamic-profile (VLAN)

Syntax

```
dynamic-profile profile-name {
  accept (any | dhcp-v4 |dhcp-v6| inet | inet6 | pppoe);
  accept-out-of-band protocol;
  access-profilevlan-dynamic-profile-name;
  ranges (any | low-tag)–(any | high-tag);
}
```

Hierarchy Level

[edit interfaces *interface-name* auto-configure vlan-ranges]

Release Information

Statement introduced in Junos OS Release 9.5.

Description

Configure a dynamic profile for use when configuring dynamic VLANs.

Options

profile-name—Name of the dynamic profile that you want to use when configuring dynamic VLANs.

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

- *Dynamic Profiles Overview*
- *Configuring a Basic Dynamic Profile*
- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17

dynamic-profiles

Syntax

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

```
      term term-name {
        from {
          match-conditions;
        }
        then {
          action;
          action-modifiers;
        }
        only-at-create;
      }
    }
    filter filter-name {
      enhanced-mode-override;
      fast-lookup-filter;
      instance-shared;
      interface-shared;
    interface-specific;
      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 uid {
    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;
            }
        }
    }
    policer uid {
        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;
        }
    }
    three-color-policer uid {
        action {
            loss-priority high then discard;
        }
        logical-interface-policer;
        single-rate {
            (color-aware | color-blind);
            committed-burst-size bytes;
            committed-information-rate bps;
            excess-burst-size bytes;
        }
        two-rate {
            (color-aware | color-blind);
            committed-burst-size bytes;
            committed-information-rate bps;
            peak-burst-size bytes;
            peak-information-rate bps;
            }
        }
    }
}
policy-options {
    prefix-list uid {
        ip-addresses;
        dynamic-db;
    }
}
interfaces interface-name {
    interface-set interface-set-name {
```



```
    interface interface-name {
      unit logical unit number {
        advisory-options {
          downstream-rate rate;
          upstream-rate rate;
        }
      }
    }
  }
  unit logical-unit-number {
    auto-configure {
      agent-circuit-identifier {
        dynamic-profile profile-name;
      }
    }
    encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid |
      atm-tcc-vc-mux | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux |
      atm-snap | atm-tcc-snap | atm-vc-mux | ether-over-atm-llc |
      ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet |
      frame-relay-ccc | frame-relay-ppp | frame-relay-tcc | frame-relay-ether-type |
      frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end | multilink-ppp |
      ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc
      | vlan-tcc | vlan-vpls);
    family family {
      address address;
      filter {
        adf {
          counter;
          input-precedence precedence;
          not-mandatory;
          output-precedence precedence;
          rule rule-value;
        }
        input filter-name (
          precedence precedence;
          shared-name filter-shared-name;
        }
        output filter-name {
          precedence precedence;
          shared-name filter-shared-name;
        }
      }
      rpf-check {
        fail-filter filter-name;
        mode loose;
      }
      service {
        input {
          service-set service-set-name {
            service-filter filter-name;
          }
          post-service-filter filter-name;
        }
        input-vlan-map {
          inner-tag-protocol-id tpid;
          inner-vlan-id number;
```

```
                (push | swap);
                tag-protocol-id tpid;
                vlan-id number;
            }
            output {
                service-set service-set-name {
                    service-filter filter-name;
                }
            }
            output-vlan-map {
                inner-tag-protocol-id tpid;
                inner-vlan-id number;
                (pop | swap);
                tag-protocol-id tpid;
                vlan-id number;
            }
        }
        unnumbered-address interface-name <preferred-source-address address>;
    }
    filter {
        input filter-name (
            shared-name filter-shared-name;
        }
        output filter-name {
            shared-name filter-shared-name;
        }
    }
    ppp-options {
        chap;
        pap;
    }
    vlan-id number;
    vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
  }
}
interfaces {
  demux0 {...}
}
interfaces {
  pp0 {...}
}
policy-options {
  prefix-list uid {
    ip-addresses;
    dynamic-db;
  }
}
predefined-variable-defaults predefined-variable <variable-option> default-value;
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 {
            interfaceinterface-name {
                disable;
                (accounting | no-accounting);
                group-policy;
                immediate-leave;
                oif-map;
                passive;
                ssm-map ssm-map-name;
                static {
                    group multicast-group-address {
                        exclude;
                        group-count number;
                        group-increment increment;
                        source ip-address {
                            source-count number;
                            source-increment increment;
                        }
                    }
                }
                version version;
            }
        }
        router-advertisement {
            interface interface-name {
                current-hop-limit number;
                default-lifetime seconds;
                (managed-configuration | no-managed-configuration);
                max-advertisement-interval seconds;
                min-advertisement-interval seconds;
                (other-stateful-configuration | no-other-stateful-configuration);
                prefix prefix;
                reachable-time milliseconds;
                retransmit-timer milliseconds;
            }
        }
    }
}
routing-instances routing-instance-name {
    interface interface-name;
    routing-options {
        access {
            route prefix {
                next-hop next-hop;
                metric route-cost;
                preference route-distance;
                tag route-tag;
```

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



```
            variable-name {
              default-value default-value;
              equals expression;
              mandatory;
              uid;
              uid-reference;
            }
          }
        }
      }
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.2.
Support at the **filter, policer, hierarchical-policer, three-color-policer, and policy options** hierarchy levels introduced in Junos OS Release 11.4.

Description Create dynamic profiles for use with DHCP or PPP client access.

Options ***profile-name***—Name of the dynamic profile; string of up to 80 alphanumeric characters.

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 a Basic Dynamic Profile*
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- *Dynamic Profiles Overview*

encapsulation (Logical Interface)

Syntax encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap | atm-tcc-vc-mux | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet | ethernet-ccc | ethernet-vpls | ethernet-vpls-fr | frame-relay-ccc | frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-ppp | frame-relay-tcc | gre-fragmentation | multilink-frame-relay-end-to-end | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc | vlan-tcc | vlan-vpls | vxlan);

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

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers (**ethernet**,**vlan-ccc**, and **vlan-tcc** options only).
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the **atm-ccc-cell-relay** and **atm-ccc-vc-mux** options are supported on ACX Series routers.

Description Configure a logical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.

Options **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

atm-ccc-vc-mux—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

atm-cisco-nlpid—Use Cisco ATM network layer protocol identifier (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 (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—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.

atm-ppp-vc-mux—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only.

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

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

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

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

ppp-over-ether—Use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

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

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

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

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

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

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

vxlan—Use VXLAN data plane encapsulation for EVPN.

Required Privilege Level

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

Related Documentation

- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring the Encapsulation for Layer 2 Switching TCCs*
- *Configuring Interface Encapsulation on Logical Interfaces*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Circuit and Translational Cross-Connects Overview*
- *Identifying the Access Concentrator*
- *Configuring ATM Interface Encapsulation*
- *Configuring VLAN and Extended VLAN Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- Configuring ATM for Subscriber Access on page 333
- *CoS on ATM IMA Pseudowire Interfaces Overview*
- *Configuring Policing on an ATM IMA Pseudowire*

enhanced-mode

Syntax enhanced-mode;

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family-name* filter *filter-name*],
[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, the default, compiled format. Only term-based (enhanced) firewall filters will be generated, regardless of the setting of the **enhanced-mode** statement at the [**edit chassis network-services**] hierarchy level, if any of the following are true:

- Flexible filter match conditions are configured at the **[edit firewall family *family-name* filter *filter-name* term *term-name* from]** or **[edit firewall filter *filter-name* term *term-name* from]** hierarchy levels.
- A tunnel header push or pop action, such as GRE encapsulate or decapsulate is configured at the **[edit firewall family *family-name* filter *filter-name* term *term-name* then]** hierarchy level.
- Payload-protocol match conditions are configured at the **[edit firewall family *family-name* filter *filter-name* term *term-name* from]** or **[edit firewall filter *filter-name* term *term-name* from]** hierarchy levels.
- An extension-header match is configured at the **[edit firewall family *family-name* filter *filter-name* term *term-name* from]** or **[edit firewall filter *filter-name* term *term-name* from]** hierarchy levels.
- A match condition is configured that only works with MPC cards, such as firewall bridge filters for IPv6 traffic.

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

Syntax

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

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

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

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

Release Information Statement introduced before Junos OS Release 7.4.
Option **max-sessions-vsa-ignore** introduced in Junos OS Release 11.4.

Description Configure protocol family information for the logical interface.

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

Options *family*—Protocol family:

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

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

- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation. You can optionally configure this protocol family for the logical interface on which you configure VPLS.
- **ethernet-switching**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite. You can configure this protocol family for the logical interface of CCC physical interfaces. When you use this encapsulation type, you can configure the **ccc** family only.
- **inet**—Internet Protocol version 4 suite. You must configure this protocol family for the logical interface to support IP protocol traffic, including Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Internet Control Message Protocol (ICMP), and Internet Protocol Control Protocol (IPCP).
- **inet6**—Internet Protocol version 6 suite. You must configure this protocol family for the logical interface to support IPv6 protocol traffic, including Routing Information Protocol for IPv6 (RIPng), Intermediate System-to-Intermediate System (IS-IS), BGP, and Virtual Router Redundancy Protocol for IPv6 (VRRP).
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite. You must configure this protocol family for the logical interface to support IS-IS traffic.
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15. You must configure this protocol or multilink Point-to-Point Protocol (MLPPP) for the logical interface to support multilink bundling.
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16. You must configure this protocol or **mlfr-end-to-end** for the logical interface to support link services and voice services bundling.
- **multilink-ppp**—Multilink Point-to-Point Protocol. You must configure this protocol (or **mlfr-end-to-end**) for the logical interface to support multilink bundling.
- **mpls**—Multiprotocol Label Switching (MPLS). You must configure this protocol family for the logical interface to participate in an MPLS path.
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite. You can configure this protocol family for the logical interface of TCC physical interfaces.

- **tnp**—Trivial Network Protocol. This protocol is used to communicate between the Routing Engine and the router's packet forwarding components. The Junos OS automatically configures this protocol family on the router's internal interfaces only, as discussed in *Understanding Internal Ethernet Interfaces*.
- **vpls**—(M Series and T Series routers only) Virtual private LAN service. You can optionally configure this protocol family for the logical interface on which you configure VPLS. VPLS provides an Ethernet-based point-to-multipoint Layer 2 VPN to connect customer edge (CE) routers across an MPLS backbone. When you configure a VPLS encapsulation type, the **family vpls** statement is assumed by default.

  MX Series routers support dynamic profiles for VPLS pseudowires, VLAN identifier translation, and automatic bridge domain configuration.

  For more information about VPLS, see the *Junos OS VPNs Library for Routing Devices* and the *Junos OS, Release 16.1*.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Configuring the Protocol Family*

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> <filter [aci]>;
  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.
pppoe option added 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 67
- Subscriber Interfaces and Demultiplexing Overview on page 60

family (Dynamic PPPoE)

Syntax

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

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

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure protocol family information for the logical interface.

Options *family*—Protocol family:

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

The remaining statements are explained separately.

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

Related Documentation

- Configuring a PPPoE Dynamic Profile on page 136
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

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;
      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 {
    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> <filter [aci]>;
  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.

pppoe option added 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*

filter (Applying to a Logical Interface)

Syntax

```
filter {
  group filter-group-number;
  input filter-name;
  input-list [ filter-names ];
  output filter-name;
  output-list [ filter-names ];
}
```

Hierarchy Level Protocol-independent firewall filter on MX Series router logical interface:

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

All other standard firewall filters on all other devices:

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

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Apply a stateless firewall filter to a logical interface at a specific protocol level.

Options

group *filter-group-number*—Number of the group to which the interface belongs. Range: 1 through 255

input *filter-name*—Name of one filter to evaluate when packets are received on the interface.

input-list [*filter-names*]—Names of filters to evaluate when packets are received on the interface. Up to 16 filters can be included in a filter input list.

output *filter-name*—Name of one filter to evaluate when packets are transmitted on the interface.

output-list [*filter-names*]—Names of filters to evaluate when packets are transmitted on the interface. Up to 16 filters can be included in a filter output list.

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

Related Documentation

- *Guidelines for Configuring Firewall Filters*
- *Guidelines for Applying Standard Firewall Filters*

filter (Dynamic Profiles Filter Attachment)

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

- For general information about configuring firewall filters, see the Junos OS Routing Policies, Firewall Filters and Traffic Policers Feature Guide for Routing Devices.
- *Firewall Filters Overview*

- *Understanding Dynamic Firewall Filters*
- *Classic Filters Overview*
- *Basic Classic Filter Syntax*
- *Parameterized Filters Overview*

flexible-vlan-tagging

Syntax flexible-vlan-tagging;

Hierarchy Level [edit interfaces ae*x*],
[edit interfaces ge-*fpc/pic/port*],
[edit interfaces et-*fpc/pic/port*],
[edit interfaces ps0],
[edit interfaces xe-*fpc/pic/port*]

Release Information Statement introduced in Junos OS Release 8.1.
Support for aggregated Ethernet added in Junos OS Release 9.0.
Statement introduced in Junos OS Release 12.1x48 for PTX Series Packet Transport Routers.
Statement introduced in Junos OS Release 13.2X50-D15 for EX Series switches.
Statement introduced in Junos OS Release 13.2X51-D20 for the QFX Series.

Description Support simultaneous transmission of 802.1Q VLAN single-tag and dual-tag frames on logical interfaces on the same Ethernet port, and on pseudowire logical interfaces.

This statement is supported on M Series and T Series routers, for Fast Ethernet and Gigabit Ethernet interfaces only on Gigabit Ethernet IQ2 and IQ2-E, IQ, and IQE PICs, and for aggregated Ethernet interfaces with member links in IQ2, IQ2-E, and IQ PICs or in MX Series DPCs, or on Ethernet interfaces for PTX Series Packet Transport Routers or 100-Gigabit Ethernet Type 5 PIC with CFP. This statement is supported on Gigabit Ethernet, 10-Gigabit Ethernet, 40-Gigabit Ethernet, and aggregated Ethernet interfaces on EX Series switches.

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

Related Documentation

- *Configuring Mixed Tagging*
- *Configuring Flexible VLAN Tagging on PTX Series Packet Transport Routers*

forwarding-classes (Class-of-Service)

Syntax

```
forwarding-classes {
  class queue-num queue-number priority (high | low);
  queue queue-number class-name priority (high | low) [ policing-priority (premium | normal) ];
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before Junos OS Release 7.4.
policing-priority option introduced in Junos OS Release 9.5.
Statement introduced on PTX Series Packet Transport Routers in Junos OS Release 12.1.

Description Associate the forwarding class with a queue name and number. For M320, MX Series, T Series routers and EX Series switches only, you can configure fabric priority queuing by including the **priority** statement. For Enhanced IQ PICs, you can include the **policing-priority** option.

NOTE: **The priority add policing-priority options are not supported on PTX Series Packet Transport Routers.**

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

- *Configuring a Custom Forwarding Class for Each Queue*
- *Forwarding Classes and Fabric Priority Queues*
- *Configuring Layer 2 Policers on IQE PICs*
- *Classifying Packets by Egress Interface*

fragmentation-maps

Syntax

```
fragmentation-maps {
  map-name {
    forwarding-class class-name {
      drop-timeout milliseconds;
      fragment-threshold bytes;
      multilink-class number;
      no-fragmentation;
    }
  }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Multiservices and Services PIC link services IQ (**lsq**) and virtual LSQ redundancy (**rlsq**) interfaces, define fragmentation properties for individual forwarding classes.

Default If you do not include this statement, traffic in all forwarding classes is fragmented.

Options ***map-name***—Name of the fragmentation map.

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

- *Fragmentation by Forwarding Class Overview*
- *Configuring Fragmentation by Forwarding Class*
- *Example: Configuring Fragmentation by Forwarding Class*
- *Configuring Drop Timeout Interval for Fragmentation by Forwarding Class*
- *fragmentation-map*

group (DHCP Local Server)

Syntax

```
group group-name {
  access-profile profile-name;
  authentication {
    password password-string;
    username-include {
      circuit-type;
      client-id;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      relay-agent-interface-id
      relay-agent-remote-id;
      relay-agent-subscriber-id;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
  interface interface-name {
    access-profile profile-name;
    exclude;
    overrides {
      client-discover-match <option60-and-option82>;
      client-negotiation-match incoming-interface;
      interface-client-limit number;
      process-inform {
        pool pool-name;
      }
      rapid-commit;
    }
    service-profile dynamic-profile-name;
    trace;
    upto upto-interface-name;
  }
  liveness-detection {
    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
    method {
      bfd {
        version (0 | 1 | automatic);
        minimum-interval milliseconds;
        minimum-receive-interval milliseconds;
        multiplier number;
        no-adaptation;
        transmit-interval {
          minimum-interval milliseconds;
          threshold milliseconds;
        }
        detection-time {
```

```
            threshold milliseconds;
          }
          session-mode(automatic | multihop | singlehop);
          holddown-interval milliseconds;
        }
      }
    }
    overrides {
      client-discover-match <option60-and-option82>;
      client-negotiation-match incoming-interface;
      delegated-pool;
      delete-binding-on-renegotiation;
      interface-client-limit number;
      process-inform {
        pool pool-name;
      }
      rapid-commit;
    }
    reconfigure {
      attempts attempt-count;
      clear-on-abort;
      strict;
      timeout timeout-value;
      token token-value;
      trigger {
        radius-disconnect;
      }
    }
    route-suppression;
    service-profile dynamic-profile-name;
  }
```

Hierarchy Level

[edit system services dhcp-local-server],
[edit system services dhcp-local-server dhcpv6],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server ...],
[edit logical-systems *logical-system-name* system services dhcp-local-server ...],
[edit routing-instances *routing-instance-name* system services dhcp-local-server ...]

Release Information

Statement introduced in Junos OS Release 9.0.
Statement introduced in Junos OS Release 12.1 for EX Series switches.

Description

Configure a group of interfaces that have a common configuration, such as authentication parameters. A group must contain at least one interface.

Options

group-name—Name of the group.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Extended DHCP Local Server Overview*
- *Grouping Interfaces with Common DHCP Configurations*
- *Using External AAA Authentication Services with DHCP*
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

inline-services (PIC level)

Syntax

```
inline-services {
  bandwidth (1g | 10g | 20g | 30g | 40g);
}
```

Hierarchy Level [edit chassis fpc *slot-number* pic *number*]

Release Information Statement introduced in Junos OS Release 11.4.
20g, **30g**, and **40g** options added in Junos OS Release 14.1R3.

Description Enable inline services on PICs residing on MPCs. To enable inline services that are specified at the fpc level, see configuration statement *inline-services (FPC Level)*

The remaining statement is explained separately.

Options The option is described separately.

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

Related Documentation

- *Enabling Inline Service Interfaces*
- *Configuring an L2TP LNS with Inline Service Interfaces*

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. When used for input VLAN maps, you can specify the **$junos-inner-vlan-map-id** predefined variable to dynamically obtain the VLAN identifier.

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 (Dynamic Service Sets)

Syntax

```
input {
  service-set service-set-name {
    service-filter filter-name;
  }
  post-service-filter filter-name;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service],
[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos–interface–unit” family *family* service]

Release Information

Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit” family *family* service]** hierarchy level introduced in Junos OS Release 10.1.

Description

Define the input service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

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

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

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*

interface (Dynamic Interface Sets)

Syntax

```
interface interface-name {
  unit logical unit number {
    advisory-options {
      downstream-rate rate;
      upstream-rate rate;
    }
  }
}
```

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

Release Information Statement introduced in Junos OS Release 12.2.

Description Add a subscriber interface to a dynamic interface set.

In a dynamic profile that defines an agent circuit identifier (ACI) interface set, observe the following guidelines when you use the **interface** statement:

- Use the predefined dynamic interface variable **$junos-interface-ifd-name** to represent the interface name. Do not use a specific interface name, such as **demux0**, when defining an ACI interface set.
- Do not include the **unit *logical-unit-number*** statement.

Options *interface-name*—Either the specific name of the interface to include in the interface set, or the predefined dynamic interface variable **$junos-interface-ifd-name**. The interface variable is dynamically replaced with the interface that the DHCP or PPPoE subscriber accesses when connecting to the router.

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

- Defining ACI Interface Sets on page 39
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

interface-name

Syntax interface-name;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include],

Release Information Statement introduced in Junos OS Release 10.0.

Description Append the interface name and VLAN ID or stacked VLAN ID to the username string used for authentication. The appended information takes the following format:

- For single VLAN—**<interface-name>:<4-digit-vlan-id>**
- For stack VLANs—**<interface-name>:<4-digit-svlan-id>-<4-digit-vlan-id>**

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

interface-set (Dynamic VLAN Interface Sets Association)

Syntax

```
interface-set interface-set-name {
  interface interface-name {
    unit logical-unit-number {
      advisory-options {
        downstream-rate rate;
        upstream-rate rate;
      }
    }
  }
}
```

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

Release Information Statement introduced in Junos OS Release 12.2.

Description For MX Series routers with MPC/MIC modules that face the access side of the network, associate an agent circuit identifier (ACI) interface set with a dynamic VLAN subscriber interface for DHCP or PPPoE subscribers. To associate an ACI interface set with a dynamic subscriber interface, you must include the **interface-set** stanza in the dynamic profile that defines the logical subscriber interface.

An ACI interface set is a logical collection of subscriber interfaces that originate at the same household or on the same access-loop port.

Options

- *interface-set-name*—Name of the ACI interface set, which is represented in a dynamic profile for a subscriber interface by the Junos OS predefined variable **$junos-interface-set-name**.

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 VLAN Subscriber Interfaces Based on Agent Circuit Identifier Information on page 43
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

interface-set (Dynamic VLAN Interface Sets Definition)

Syntax

```
interface-set interface-set-name {
  interface interface-name;
  pppoe-underlying-options {
    max-sessions number;
  }
}
```

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

Release Information Statement introduced in Junos OS Release 12.2.

Description For MX Series routers with MPC/MIC modules that face the access side of the network, configure an agent circuit identifier (ACI) interface set for the creation of dynamic VLAN subscriber interfaces for DHCP or PPPoE subscribers based on ACI information. An ACI interface set is a logical collection of subscriber interfaces that originate at the same household or on the same access-loop port.

To configure an ACI interface set for dynamic VLAN subscriber interfaces, you must include the **interface-set** stanza in the dynamic profile that defines the ACI interface set.

Options

- *interface-set-name*—Name of the ACI interface set, which is represented in a dynamic profile by the Junos OS predefined variable **$junos-interface-set-name**.

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

- Defining ACI Interface Sets on page 39
- Clearing Agent Circuit Identifier Interface Sets on page 46
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

interfaces

Syntax interfaces { ... }

Hierarchy Level [edit]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure interfaces on the router or switch.

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

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

Related Documentation

- *Physical Interface Configuration Statements Overview*
- *Configuring Aggregated Ethernet Link Protection*

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 (
              precedence precedence;
              shared-name  filter-shared-name;
            }
            output filter-name {
              precedence precedence;
              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 {
            aaa-options aaa-options-name;
            authentication [ authentication-protocols ];
            chap {
              challenge-length minimum minimum-length maximum maximum-length;
            }
            initiate-ncp (ip | ipv6 | dual-stack-passive)
            ipcp-suggest-dns-option;
            mru size;
            mtu (size | use-lower-layer);
            on-demand-ip-address;
            pap;
            peer-ip-address-optional;
          }
          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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 67
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- DHCP Subscriber Interface Overview on page 59
- *Configuring Subscribers over Static Interfaces*
- *Demultiplexing Interface Overview*

keepalives

Syntax keepalives <interval *seconds*> <down-count *number*> <up-count *number*>;

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Enable the sending of keepalives on a physical interface configured with PPP, Frame Relay, or Cisco HDLC encapsulation.

For ATM2 IQ interfaces only, you can enable keepalives on a logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

Default Sending of keepalives is enabled by default. The default keepalive interval is 10 seconds for PPP, Frame Relay, or Cisco HDLC. The default down-count is 3 and the default up-count is 1 for PPP or Cisco HDLC.

Options **down-count *number***—The number of keepalive packets a destination must fail to receive before the network takes down a link.

Range: 1 through 255

Default: 3

interval *seconds*—The time in seconds between successive keepalive requests.

Range: 1 through 32767 seconds

Default: 10 seconds

up-count *number*—The number of keepalive packets a destination must receive to change a link's status from down to up.

Range: 1 through 255

Default: 1

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

Related Documentation

- *Configuring Keepalives*
- *Configuring Frame Relay Keepalives*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

keepalives (Dynamic Profiles)

Syntax

```
keepalives {
  interval seconds;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces pp0 unit *logical-unit-number*]
[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit”]
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit”]

Release Information

Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit”]** hierarchy level introduced in Junos OS Release 10.1.
Support at the **[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit”]** hierarchy level introduced in Junos OS Release 12.2.

Description

Specify the keepalive interval in a PPP dynamic profile.

Default

Sending of keepalives is enabled by default.

Options

interval *seconds*—The time in seconds between successive keepalive requests.

Range: 1 through 32767 seconds

Default: 30 seconds for LNS-based PPP sessions. 10 seconds for all other PPP sessions.

Required Privilege Level

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

Related Documentation

- *Dynamic Profiles Overview*
- *Configuring Dynamic Authentication for PPP Subscribers*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

local-name

Syntax local-name *name*;

Hierarchy Level [edit interfaces *interface-name* ppp-options chap],
[edit interfaces *interface-name* ppp-options pap],
[edit interfaces *interface-name* unit *logical-unit-number* ppp-options chap],
[edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options chap],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options]

Release Information Statement introduced before Junos OS Release 7.4.
Support for PAP added in Junos OS Release 8.3.
Support at the **[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options]** hierarchy level introduced in Junos OS Release 14.2.

Description Specify the name of the interface used for CHAP or PAP authentication. Dynamic interfaces are supported only for CHAP authentication.

For ATM2 IQ interfaces only, you can configure a CHAP local name on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

Options *name*—Name of the interface used as an identifier in CHAP challenge and response packets or PAP request and response packets.

Default: When you do not include the **local-name** statement in the configuration, the interface sends the router's system hostname in CHAP challenge and response packets or PAP request and response packets.

Range: For CHAP authentication, a string of 1 through 32 characters. For PAP authentication, a string of 1 through 8 characters.

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

Related Documentation

- *Configuring the PPP Challenge Handshake Authentication Protocol*
- *Configuring the PPP Password Authentication Protocol On a Physical Interface*
- *Junos OS System Basics Configuration Guide*

mac

Syntax mac *mac-address*;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Set the MAC address of the interface.

Use this statement at the **[edit interfaces ... ps0]** hierarchy level to configure the MAC address for a pseudowire logical device that is used for subscriber interfaces over point-to-point MPLS pseudowires.

Options ***mac-address***—MAC address. Specify the MAC address as six hexadecimal bytes in one of the following formats: ***nnnn.nnnn.nnnn*** or ***nn:nn:nn:nn:nn:nn***. For example, **0000.5e00.5355** or **00:00:5e:00:53:55**.

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

Related Documentation

- *Configuring the MAC Address on the Management Ethernet Interface*
- *Configuring a Pseudowire Subscriber Logical Interface Device*

mac-address (VLAN and Stacked VLAN Interfaces)

Syntax mac-address;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include],

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify that the client hardware address (chaddr) from the incoming DHCP discover packet be concatenated with the username during the subscriber authentication process.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

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.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Enable IP and MAC address validation for static Ethernet and IP demux interfaces.

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 an IP Demultiplexing Interface*
- *Configuring a VLAN Demultiplexing Interface*

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.

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 119

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 on page 168

- Defining ACI Interface Sets on page 39
- PPPoE Maximum Session Limit Overview on page 165
- Guidelines for Using PPPoE Maximum Session Limit from RADIUS on page 167
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- Subscriber Interfaces and PPPoE Overview on page 129

max-sessions (PPPoE Service Name Tables)

Syntax max-sessions *number*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the maximum number of active PPPoE sessions using either static or dynamic PPPoE interfaces that the router can establish with the specified named service, **empty** service, or **any** service entry in a PPPoE service name table. The router maintains a count of active PPPoE sessions for each service entry to determine when the maximum sessions limit has been reached.

The router uses the **max-sessions** value for a PPPoE service name table entry in conjunction with the **max-sessions** value configured for the PPPoE underlying interface, and with the maximum number of PPPoE sessions supported on your router. If your configuration exceeds any of these maximum session limits, the router is unable to establish the PPPoE session.

Options *number*—Maximum number of active PPPoE sessions that the router can establish with the specified PPPoE service name table entry, in the range 1 to the platform-specific maximum PPPoE sessions supported for your router. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform.

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 Number of Active PPPoE Sessions Established with a Specified Service Name on page 203
- Configuring PPPoE Service Name Tables on page 195
- PPPoE Maximum Session Limit Overview on page 165
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- Subscriber Interfaces and PPPoE Overview on page 129

max-sessions-vsa-ignore (Static and Dynamic Subscribers)

Syntax max-sessions-vsa-ignore;

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 Release 11.4.

Description Configure the router to ignore (clear) the value returned by RADIUS in the Max-Clients-Per-Interface Juniper Networks vendor-specific attribute (VSA) [26-143], and restore the PPPoE maximum session value on the underlying interface to the value configured in the CLI with the **max-sessions** statement. The PPPoE maximum session value specifies the maximum number of concurrent static or dynamic PPPoE logical interfaces (sessions) that the router can activate on the PPPoE underlying interface, or the maximum number of active static or dynamic PPPoE sessions that the router can establish with a particular service entry in a PPPoE service name table.

Default If you do not include the **max-sessions-vsa-ignore** statement, the 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.

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 on page 168
- PPPoE Maximum Session Limit Overview on page 165
- Guidelines for Using PPPoE Maximum Session Limit from RADIUS on page 167
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- Subscriber Interfaces and PPPoE Overview on page 129

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*

mru (Dynamic and Static PPPoE)

Syntax mru *size*;

Hierarchy Level [edit access group-profile *group-profile-name* ppp ppp-options]
[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit” ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit” ppp-options],
[edit interfaces pp0 unit *unit-number* ppp-options]
[edit interfaces si *interface-id* unit *unit-number* ppp-options]

Release Information Statement introduced in Junos OS Release 14.2.

Description Specify the size of maximum receive unit (MRU) that the router uses during link control protocol (LCP) negotiation for dynamic and static PPP subscribers and L2TP tunneled subscribers.

Options *size*—MRU size in bytes that is used during LCP negotiation.

Range: 64–65,535

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

Related Documentation

- Configuring MTU and MRU for PPP Subscribers on page 184
- Understanding MTU and MRU Configuration for PPP Subscribers on page 181

mtu

Syntax mtu *bytes*;

Hierarchy Level [edit interfaces *interface-name*],
[edit interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit interfaces interface-range *name*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit logical-systems *logical-system-name* protocols l2circuit local-switching interface *interface-name* backup-neighbor *address*],
[edit logical-systems *logical-system-name* protocols l2circuit neighbor *address* interface *interface-name*],
[edit logical-systems *logical-system-name* protocols l2circuit neighbor *address* interface *interface-name* backup-neighbor *address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols l2vpn interface *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols vpls],
[edit protocols l2circuit local-switching interface *interface-name* backup-neighbor *address*],
[edit protocols l2circuit neighbor *address* interface *interface-name*]
[edit protocols l2circuit neighbor *address* interface *interface-name* backup-neighbor *address*],
[edit routing-instances *routing-instance-name* protocols l2vpn interface *interface-name*],
[edit routing-instances *routing-instance-name* protocols vpls]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Support for Layer 2 VPNs and VPLS introduced in Junos OS Release 10.4.
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
Support at the **[set interfaces interface-name unit logical-unit-number family ccc]** hierarchy level introduced in Junos OS Release 12.3R3 for MX Series routers.

Description Specify the maximum transmission unit (MTU) size for the media or protocol. The default MTU size depends on the device type. Changing the media MTU or protocol MTU causes an interface to be deleted and added again.

To route jumbo data packets on an integrated routing and bridging (IRB) interface or routed VLAN interface (RVI) on EX Series switches, you must configure the jumbo MTU size on the member physical interfaces of the VLAN that you have associated with the IRB interface or RVI, as well as on the IRB interface or RVI itself (the interface named irb or vlan, respectively).

CAUTION: For EX Series switches, setting or deleting the jumbo MTU size on an IRB interface or RVI while the switch is transmitting packets might cause packets to be dropped.

NOTE:

The MTU for an IRB interface is calculated by removing the Ethernet header overhead [6(DMAC)+6(SMAC)+2(EtherType)]. Because, the MTU is the lower value of the MTU configured on the IRB interface and the MTU configured on the IRB's associated bridge domain IFDs or IFLs, the IRB MTU is calculated as follows:

- In case of Layer 2 IFL configured with the **flexible-vlan-tagging** statement, the IRB MTU is calculated by including 8 bytes overhead (SVLAN+CVLAN).
- In case of Layer 2 IFL configured with the **vlan-tagging** statement, the IRB MTU is calculated by including a single VLAN 4 bytes overhead.

NOTE:

- If a packet whose size is larger than the configured MTU size is received on the receiving interface, the packet is eventually dropped. The value considered for MRU (maximum receive unit) size is also the same as the MTU size configured on that interface.
- Not all devices allow you to set an MTU value, and some devices have restrictions on the range of allowable MTU values. You cannot configure an MTU for management Ethernet interfaces (fxp0, em0, or me0) or for loopback, multilink, and multicast tunnel devices.
- On ACX Series routers, you can configure the protocol MTU by including the **mtu** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet]** or **[edit interfaces *interface-name* unit *logical-unit-number* family inet6]** hierarchy level.
  - If you configure the protocol MTU at any of these hierarchy levels, the configured value is applied to all families that are configured on the logical interface.
  - If you are configuring the protocol MTU for both **inet** and **inet6** families on the same logical interface, you must configure the same value for both the families. It is not recommended to configure different MTU size values for **inet** and **inet6** families that are configured on the same logical interface.
- For IRB interfaces, MTU is calculated by removing the Ethernet header overhead **(6(DMAC)+6(SMAC)+2(EtherType))**, and the MTU is a minimum of the two values:
  - Configured MTU
  - Associated bridge domain's physical or logical interface MTU
    - For Layer 2 logical interfaces configured with **flexible-vlan-tagging**, IRB MTU is calculated by including 8 bytes overhead (**SVLAN+CVLAN**).
    - For Layer 2 logical interfaces configured with **vlan-tagging**, IRB MTU is calculated by including single VLAN 4 bytes overhead.

    NOTE: Changing the Layer 2 logical interface option from **vlan-tagging** to **flexible-vlan-tagging** or vice versa adjusts the logical interface MTU by 4 bytes with the existing MTU size. As a result, the Layer 2 logical interface is deleted and re-added, and the IRB MTU is re-computed appropriately.

For more information about configuring MTU for specific interfaces and router or switch combinations, see *Configuring the Media MTU*.

Options *bytes*—MTU size.

Range: 256 through 9192 bytes, 256 through 9216 (EX Series switch interfaces), 256 through 9500 bytes (Junos OS 12.1X48R2 for PTX Series routers)

Default: 1500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS), 1514 bytes (EX Series switch interfaces)

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

Related Documentation

- *Configuring the Media MTU*
- *Configuring the MTU for Layer 2 Interfaces*
- *Setting the Protocol MTU*

mtu (Dynamic and Static PPPoE)

Syntax mtu (*size* | use-lower-layer);

Hierarchy Level [edit access group-profile *group-profile-name* ppp ppp-options]
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options],
[edit interfaces pp0 unit *unit-number* ppp-options]
[edit interfaces si *interface-id* unit *unit-number* ppp-options]

Release Information Statement introduced in Junos OS Release 14.2.

Description Specify the size of maximum transmission unit (MTU) for the PPP connection. For a PPP connection, the MTU size defines the largest data unit that can be forwarded without fragmentation. This size does not include the overhead of the lower layers.

Options *size*—MTU size in bytes for a PPP connection.

Range: 64–65,535

use-lower-layer—Set the PPP MTU size to the interface MTU size excluding the overhead of the lower layers.

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

Related Documentation

- Configuring MTU and MRU for PPP Subscribers on page 184
- Understanding MTU and MRU Configuration for PPP Subscribers on page 181

nas-port-extended-format

Syntax

```
nas-port-extended-format {
  adapter-width width;
  ae-width width;
  port-width width;
  pw-width width;
  slot-width width;
  stacked-vlan-width width;
  vlan-width width;
  atm {
    adapter-width width;
    port-width width:
    slot-width width;
    vci-width width:
    vpi-width width;
  }
}
```

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.
ae-width option added in Junos OS Release 12.1.
atm option added in Junos OS Release 12.3R3 and supported in later 12.3R*x* releases.
atm option supported in Junos OS Release 13.2 and later releases. (Not supported in Junos OS Release 13.1.)
pw-width option added in Junos OS Release 15.1.

Description Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.

Options **adapter-width *width***—Number of bits in the adapter field.

ae-width *width*—Number of bits in the aggregated Ethernet identifier field.

port-width *width*—Number of bits in the port field.

pw-width *width*—Number of bits in the pseudowire field. Appears in the Cisco NAS-Port-Info AVP (100).

slot-width *width*—Number of bits in the slot field.

stacked-vlan-width *width*—Number of bits in the SVLAN ID field.

vlan-width *width*—Number of bits in the VLAN ID field.

NOTE: The total of the widths must not exceed 32 bits, or the configuration will fail.

Required Privilege Level

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

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 342
- *Configuring RADIUS Server Parameters for Subscriber Access*

nas-port-extended-format (Interfaces)

Syntax

```
nas-port-extended-format {
  adapter-width width;
  ae-width width;
  port-width width;
  slot-width width;
  stacked;
  stacked-vlan-width width;
  vci-width width:
  vlan-width width;
  vpi-width width;
}
```

Hierarchy Level [edit interfaces *interface-name* radius-options nas-port-options *nas-port-options-name*]

Release Information Statement introduced in Junos OS Release 12.3.
Options **vci-width** and **vpi-width** introduced in Junos OS Release 12.3R3 and supported in later 12.3R*x* releases.
Options **vci-width** and **vpi-width** supported in Junos OS Release 13.2 and later releases. (Not supported in Junos OS Release 13.1.)

Description Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.

Options **adapter-width *width***—Number of bits in the adapter field.

ae-width *width*—Number of bits in the aggregated Ethernet identifier field.

port-width *width*—Number of bits in the port field.

slot-width *width*—Number of bits in the slot field.

stacked—Include stacked VLAN IDs, in addition to VLAN IDs, in the NAS-Port extended format.

stacked-vlan-width *width*—Number of bits in the SVLAN ID field.

vci-width *width*—Number of bits in the ATM virtual circuit identifier (VCI) field.

vlan-width *width*—Number of bits in the VLAN ID field.

vpi-width *width*—Number of bits in the ATM virtual path identifier (VPI) field.

NOTE: Each field can be 0 through 32 bits wide; however, the total of the widths of all fields must not exceed 32 bits, or the configuration fails.

The router may truncate the values of individual fields depending on the bit width you specify.

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

Related Documentation
- *Configuring RADIUS NAS-Port Options for Subscriber Access per Physical Interface, VLAN, or Stacked VLAN*
- *Guidelines for Configuring RADIUS NAS-Port Options for Subscriber Access per Physical Interface, VLAN, or Stacked VLAN*

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 571

no-gratuitous-arp-request

Syntax no-gratuitous-arp-request;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.6 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For Ethernet interfaces and pseudowire logical interfaces, do not respond to gratuitous ARP requests.

Default Gratuitous ARP responses are enabled on all 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 Gratuitous ARP*
- *gratuitous-arp-reply*

no-keepalives (Dynamic Profiles)

Syntax no-keepalives;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]

Release Information Statement introduced before Junos OS Release 7.4.
Support of the **[edit dynamic-profiles *profile-name*]** hierarchy level introduced in Junos OS Release 9.5.
Support of the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]** hierarchy level introduced in Junos OS Release 10.1.

Description Disable the sending of keepalives.

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

Related Documentation

- *Dynamic Profiles Overview*
- *Configuring Dynamic Authentication for PPP Subscribers*

no-vlan-id-validate

Syntax no-vlan-id-validate;

Hierarchy Level [edit logical-systems *logical-system-name* protocols l2circuit neighbor *address* interface *interface-name*],
[edit protocols l2circuit neighbor *address* interface *interface-name*]

Release Information Statement introduced in Junos OS Release 13.1.

Description Uniquely identify a Layer 2 circuit for either a standard pseudowire or a redundant pseudowire.

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

Related Documentation

- *Configuring Interfaces for Layer 2 Circuits*
- *Pseudowire Subscriber Logical Interfaces Overview*
- *Configuring a Pseudowire Subscriber Logical Interface*
- *Configuring Layer 2 Circuit Signaling for Pseudowire Subscriber Logical Interfaces*

oam-on-svlan (Ethernet Interfaces)

Syntax oam-on-svlan;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 13.1.

Description Enable propagation of the Ethernet IEEE 802.1ag Operation, Administration, and Maintenance (OAM) state of a static single-tagged service VLAN (S-VLAN) logical interface to the dynamic or static double-tagged customer VLAN (C-VLAN) logical interface and associated subscriber interfaces configured on the S-VLAN. The static S-VLAN logical interface must be configured with Ethernet OAM connectivity fault management (CFM) on a Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet physical interface. The C-VLAN logical interface must have the same S-VLAN (outer) tag as the S-VLAN logical interface.

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

Related Documentation

- Configuring Ethernet OAM Support for Service VLANs with Double-Tagged Customer VLANs on page 52
- Ethernet OAM Support for Service VLANs Overview on page 49

option-18 (Interface-ID for DHCPv6 Autosense VLANs)

Syntax option-18;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 13.2.

Description Specify that Option 18 (Interface-ID) information received in the innermost DHCPv6 Relay-Forward message header is concatenated with the username during the subscriber authentication process.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32
- *Inserting DHCPv6 Interface-ID Option (Option 18) In DHCPv6 Packets*
- *Creating Unique Usernames for DHCP Clients*
- Using DHCP Option 18 and Option 37 in Authentication Usernames for DHCPv6 Autosense VLANs on page 34
- **option-37 (Relay Agent Remote-ID for DHCPv6 Autosense VLANs) on page 506**

option-37 (Relay Agent Remote-ID for DHCPv6 Autosense VLANs)

Syntax option-37;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 13.2.

Description Specify that Option 37 (DHCPv6 Relay Agent Remote-ID) information, received in the innermost DHCPv6 Relay-Forward message header, is concatenated with the username during the subscriber authentication process.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32
- *relay-agent-remote-id*
- *Creating Unique Usernames for DHCP Clients*
- *Inserting DHCPv6 Interface-ID Option (Option 18) In DHCPv6 Packets*
- Using DHCP Option 18 and Option 37 in Authentication Usernames for DHCPv6 Autosense VLANs on page 34
- option-18 (Interface-ID for DHCPv6 Autosense VLANs) on page 505

option-82

Syntax option-82 <circuit-id> <remote-id>;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 10.0.
Options **circuit-id** and **remote-id** introduced in Junos OS Release 11.4.

Description Specify that the option 82 information from the client PDU is concatenated with the username during the subscriber authentication process.

For autosense VLANs, you can additionally specify Option 82 suboption information that is concatenated with the username. You can specify either both or neither of the Agent Circuit ID (suboption 1) and Agent Remote ID (suboption 1). If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If you specify that neither suboption is supplied, the raw payload of Option 82 from the PDU is concatenated to the username.

NOTE: **The option 82 value used in creating the username is based on the option 82 value that is encoded in the incoming DHCP discover packet. The use of suboptions is supported for DHCPv4 only.**

Options **none**—Use the raw payload of Option 82 from the PDU.

circuit-id—(Optional) Use the Agent Circuit ID suboption (suboption 1).

remote-id—(Optional) Use the Agent Remote ID suboption (suboption 2).

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32
- Using DHCP Option 82 Suboptions in Authentication Usernames for Autosense VLANs on page 33

output (Dynamic Service Sets)

Syntax

```
output {
  service-set service-set-name {
  service-filter filter-name;
  }
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service],
[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos–interface–unit” family *family* service]

Release Information

Statement introduced in Junos OS Release 9.5.
Support of the **[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit” family *family* service]** hierarchy level introduced in Junos OS Release 10.1.

Description

Define the output service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

The remaining statement is explained separately.

Options

service-set-name—Name of the service set.

Required Privilege Level

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

Related Documentation

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

output-traffic-control-profile (Dynamic CoS Definition)

Syntax output-traffic-control-profile (*profile-name* | $junos-cos-traffic-control-profile);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.2.
Variable **$junos-cos-traffic-control-profile** introduced in Junos OS Release 11.2.

Description Apply an output traffic scheduling and shaping profile to the logical interface.

Options ***profile-name***—Name of the traffic-control profile to be applied to this interface

$junos-cos-traffic-control-profile—Variable for the traffic-control profile that is specified for the logical interface. The variable is replaced with the traffic-control profile when the subscriber is authenticated at login.

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

Related Documentation

- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile*
- *Using the CLI to Modify Traffic-Control Profiles That Are Currently Applied to Subscribers*
- traffic-control-profiles on page 552

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*

override

Syntax override tag *vlan-tag* dynamic-profile *profile name*;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges]

Release Information Statement introduced in Junos OS Release 11.2.

Description Override dynamic profile assignment to individual VLANs that are already part of a previously defined VLAN range and dynamic profile.

Options ***vlan-tag***—VLAN tag that you want to override.

profile-name—Name of the dynamic profile that you want to use when overriding the specified VLAN tag.

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

Related Documentation

- Overriding the Dynamic Profile Used for an Individual VLAN on page 23
- Configuring an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17

packet-types (Dynamic VLAN Authentication)

Syntax packet-types [*packet-types*]

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication]

Release Information Statement introduced in Junos OS Release 14.1.

Description Specify one or more packet types to trigger authentication of an auto-configured dynamic VLAN. The packet types must be a subset of the packet types configured in the VLAN dynamic profile to trigger creation of the dynamic VLAN.

Options ***packet-type***—One or more of the following packet types that triggers VLAN authentication:

- **any**—Any packet type.
- **dhcp-v4**—IPv4 DHCP packet type.
- **dhcp-v6**—IPv6 DHCP packet type.
- **inet**—IPv4 Ethernet and ARP packet type.
- **inet6**—IPv6 Ethernet packet type.
- **pppoe**—Point-to-Point Protocol over Ethernet packet type.

NOTE: The pppoe VLAN Ethernet packet type option is supported only for MIC and MPC interfaces.

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

Related Documentation

- Configuring Subscriber Packet Types to Trigger VLAN Authentication on page 32
- Subscriber Packet Type Authentication Triggers for Dynamic VLANs on page 29

pap (Dynamic PPP)

Syntax pap;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" ppp-options],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit" ppp-options]

Release Information Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-interface-unit" ppp-options]** hierarchy level introduced in Junos OS Release 12.2.

Description Specify PAP authentication in a PPP dynamic profile.

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

Related Documentation

- *Dynamic Profiles Overview*
- *Configuring Dynamic Authentication for PPP Subscribers*
- *Attaching Dynamic Profiles to Static PPP Subscriber Interfaces*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

passive (CHAP)

Syntax passive;

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Do not challenge the peer, but respond if challenged. If you omit this statement from the configuration, the interface always challenges its peer.

For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

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

Related Documentation

- *Configuring Passive Mode*
- *Junos OS System Basics Configuration Guide*

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*

post-service-filter (Dynamic Service Sets)

Syntax post-service-filter *filter-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service input],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family* service input]

Release Information Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input]** hierarchy level introduced in Junos OS Release 10.1.

Description Define the filter to be applied to traffic after service processing. The filter is applied only if a service set is configured and selected. You can configure a postservice filter on the input side of the interface only. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***filter-name***—Identifier for the post-service filter.

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

Related Documentation

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

pp0 (Dynamic PPPoE)

Syntax

```
pp0 {
  unit logical-unit-number {
    keepalives interval seconds;
    no-keepalives;
    pppoe-options {
      underlying-interface interface-name;
      server;
    }
    ppp-options {
      aaa-options aaa-options-name;
      authentication [ authentication-protocols ];
      chap {
        challenge-length minimum minimum-length maximum maximum-length;
      }
      initiate-ncp (ip | ipv6 | dual-stack-passive)
      ipcp-suggest-dns-option;
      mru size;
      mtu (size | use-lower-layer);
      on-demand-ip-address;
      pap;
      peer-ip-address-optional;
    }
    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;
        }
        output filter-name {
          precedence precedence;
        }
      }
    }
  }
}
```

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

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the dynamic PPPoE logical interface in a dynamic profile. When the router creates a dynamic PPPoE logical interface on an underlying Ethernet interface configured with PPPoE (**ppp-over-ether**) encapsulation, it uses the information in the dynamic profile to determine the properties of the dynamic PPPoE logical 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

- Configuring a PPPoE Dynamic Profile on page 136
- *Configuring Dynamic Authentication for PPP Subscribers*
- For information about creating static PPPoE interfaces, see *Configuring PPPoE*

ppp-options

Syntax

```
ppp-options {
  authentication [ authentication-protocols ];
    mru size;
  mtu (size | use-lower-layer);
  chap {
    access-profile name;
    challenge-length minimum minimum-length maximum maximum-length;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  initiate-ncp (ip | ipv6 | dual-stack-passive)
  ipcp-suggest-dns-option;
  lcp-max-conf-req number
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-max-conf-req number
  ncp-restart-timer milliseconds;
  on-demand-ip-address
  pap {
    access-profile name;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
```

Hierarchy Level

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

Release Information Statement introduced before Junos OS Release 7.4.

Description On interfaces with PPP encapsulation, configure PPP-specific interface properties.

For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

BEST PRACTICE: On inline service (si) interfaces for L2TP, only the **chap** and **pap** statements are typically used for subscriber management. We recommend that you leave the other statements subordinate to **ppp-options**—including those subordinate to **chap** and **pap**—at their default values.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Configuring the PPP Challenge Handshake Authentication Protocol*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

ppp-options (Dynamic PPP)

Syntax

```
ppp-options {
  aaa-options aaa-options-name;
  authentication [ authentication-protocols ];
  mru size;
  mtu (size | use-lower-layer);
  chap {
    challenge-length minimum minimum-length maximum maximum-length;
  }
  initiate-ncp (ip | ipv6 | dual-stack-passive)
  ipcp-suggest-dns-option;
  mru size;
  mtu (size | use-lower-layer);
  on-demand-ip-address;
  pap;
  peer-ip-address-optional;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit”],
[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit
  “$junos-interface-unit”]

Release Information

Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit “$junos-interface-unit”]** hierarchy level introduced in Junos OS Release 12.2.

Description

Configure PPP-specific interface properties in a dynamic profile.

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

- *Dynamic Profiles Overview*
- *Configuring Dynamic Authentication for PPP Subscribers*
- *Attaching Dynamic Profiles to Static PPP Subscriber Interfaces*
- *Applying PPP Attributes to L2TP LNS Subscribers per Inline Service Interface*

ppp-subscriber-services

Syntax ppp-subscriber-services (disable | enable);

Hierarchy Level [edit chassis]

Release Information Statement introduced in Junos OS Release 10.2.

Description Enable dynamic PPP subscriber services on non-PPPoE interfaces on certain PICs.

NOTE: When you include this statement, the relevant PICs restart. This action disrupts subscribers already logged in through those PICs. You can confirm completion of the restart by issuing the **show chassis pic fpc-slot** ***slot-number*** **pic-slot** ***slot-number*** command.

Options **disable**—Disable subscriber services.

enable—Enable subscriber services.

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

Related Documentation

- *show chassis pic*
- Attaching Dynamic Profiles to MLPPP Bundles on page 311
- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 310

pppoe-options

Syntax

```
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
```

Hierarchy Level

[edit interfaces pp0 unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces pp0 unit *logical-unit-number*]

Release Information

Statement introduced before Junos OS Release 7.4.
client Statement introduced in Junos OS Release 8.5.
server Statement introduced in Junos OS Release 8.5.

Description

Configure PPP over Ethernet-specific interface properties.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- *Configuring a PPPoE Interface*

pppoe-options (Dynamic PPPoE)

Syntax

```
pppoe-options {
  underlying-interface interface-name;
  server;
}
```

Hierarchy Level

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

Release Information

Statement introduced in Junos OS Release 10.1.

Description

Configure the underlying interface and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- Configuring a PPPoE Dynamic Profile on page 136
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136

pppoe-underlying-options (Dynamic VLAN Interface Sets)

Syntax

```
pppoe-underlying-options {
  max-sessions number;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces interface-set "$junos-interface-set-name"]

Release Information Statement introduced in Junos OS Release 12.2.

Description Configure PPPoE-specific interface properties in the dynamic profile that defines the agent circuit identifier (ACI) interface set. An ACI interface set is a logical collection of subscriber interfaces that originate at the same household or on the same access-loop port. Configuring PPPoE-specific interface properties for an ACI interface set enables you to apply these attributes to all subscribers on a per-household basis.

The remaining statement is explained separately.

NOTE: When you configure PPPoE-specific interface properties for an ACI interface set, only the max-sessions statement is currently supported.

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

Related Documentation

- Configuring Dynamic VLANs Based on Agent Circuit Identifier Information on page 38
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

pppoe-underlying-options (Static and Dynamic Subscribers)

Syntax

```
pppoe-underlying-options {
  access-concentrator name;
  dynamic-profile profile-name;
  direct-connect
  duplicate-protection;
  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> <filter [aci]>;
}
```

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

Release Information Statement introduced in Junos OS Release 10.0.

Description Configure PPPoE-specific interface properties for the underlying interface on which the router creates a static or dynamic PPPoE logical interface. The underlying interface must be configured with PPPoE (**ppp-over-ether**) encapsulation.

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 PPPoE* (for static interfaces)
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Assigning a Service Name Table to a PPPoE Underlying Interface on page 196

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 *interface-name* unit *logical-unit-number* filter input *filter-name*],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* 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*
- *Understanding Dynamic Firewall Filters*
- *Classic Filters Overview*
- *Fast Update Filters Overview*
- *Basic Classic Filter Syntax*
- *Basic Fast Update Filter Syntax*

profile (Access)

Syntax

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

```
      cell-overhead;
      encapsulation-overhead bytes;
      framed-ip-address ip-address;
      framed-pool framed-pool;
      idle-timeout seconds;
      interface-id interface-id;
      keepalive seconds;
      primary-dns primary-dns;
      primary-wins primary-wins;
      secondary-dns secondary-dns;
      secondary-wins secondary-wins;
    }
    user-group-profile profile-name;
  }
  domain-name-server;
  domain-name-server-inet;
  domain-name-server-inet6;
  preauthentication-order preauthentication-method;
  provisioning-order (gx-plus | jsrc | pcrf);
  radius {
    accounting-server [ ip-address ];
    attributes {
      exclude {
        ...
      }
      ignore {
        framed-ip-netmask;
        input-filter;
        logical-system:routing-instance;
        output-filter;
      }
    }
    authentication-server [ ip-address ];
    options {
      accounting-session-id-format (decimal | description);
      calling-station-id-delimiter delimiter-character;
      calling-station-id-format {
        agent-circuit-id;
        agent-remote-id;
        interface-description;
        interface-text-description;
        mac-address;
        nas-identifier;
        stacked-vlan;
        vlan;
      }
      chap-challenge-in-request-authenticator;
      client-accounting-algorithm (direct | round-robin);
      client-authentication-algorithm (direct | round-robin);
      coa-dynamic-variable-validation;
      ethernet-port-type-virtual;
      interface-description-format {
        exclude-adapter;
        exclude-sub-interface;
      }
      juniper-dsl-attributes;
```

```
        nas-identifier identifier-value;
        nas-port-extended-format {
          adapter-width width;
          ae-width width;
          port-width width;
          pw-width width;
          slot-width width;
          stacked-vlan-width width;
          vlan-width width;
          atm {
            adapter-width width;
            port-width width:
            slot-width width;
            vci-width width:
            vpi-width width;
          }
        }
        nas-port-id-delimiter delimiter-character;
        nas-port-id-format {
          agent-circuit-id;
          agent-remote-id;
          interface-description;
          interface-text-description;
          nas-identifier;
          order {
            agent-circuit-id;
            agent-remote-id;
            interface-description;
            interface-text-description;
            nas-identifier;
            postpend-vlan-tags;
          }
          postpend-vlan-tags;
        }
        nas-port-type {
          ethernet {
            port-type;
          }
        }
        revert-interval interval;
        service-activation {
          dynamic-profile (optional-at-login | required-at-login);
          extensible-service (optional-at-login | required-at-login);
        }
        vlan-nas-port-stacked-format;
      }
      preauthentication-server ip-address;
    }
    radius-server server-address {
      accounting-port port-number;
      accounting-retry number;
      accounting-timeout seconds;
      dynamic-request-port
      port port-number;
      preauthentication-port port-number;
      preauthentication-secret password;
```

```
        retry attempts;
        routing-instance routing-instance-name;
        secret password;
        max-outstanding-requests value;
        source-address source-address;
        timeout seconds;
    }
    service {
        accounting-order (activation-protocol | radius);
    }
    session-options {
        client-idle-timeout minutes;
        client-idle-timeout-ingress-only;
        client-session-timeoutminutes;
        strip-user-name {
            delimiter [ delimiter ];
            parse-direction (left-to-right | right-to-left);
        }
    }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced before Junos OS Release 7.4.

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

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

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

The remaining statements are explained separately.

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

Related Documentation

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

proxy-arp (Dynamic Profiles)

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*

qualified-next-hop (Access)

Syntax qualified-next-hop *next-hop*;

Hierarchy Level [edit routing-options access route *ip-prefix</prefix-length>*]

Release Information Statement introduced in Junos OS Release 10.1.
Statement introduced in Junos OS Release 12.3 for ACX Series routers.

Description Configure the qualified next-hop address for an access route.

Options *next-hop*—Specific qualified next-hop address you want to assign to the access route.

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

radius-realm

Syntax radius-realm *radius-realm-string*;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify that the user-defined RADIUS realm string is appended as a last piece to the username and used by RADIUS to direct the authentication request to a profile that does not allocates addresses.

Options *radius-realm-string*—A string to describe the RADIUS realm.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

ranges (Dynamic Stacked VLAN)

Syntax ranges (any | *low-tag–high-tag*),(any | *low-tag–high-tag*);

Hierarchy Level [edit interfaces *interface-name* auto-configure stacked-vlan-ranges dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure VLAN ranges for dynamic, auto-sensed stacked VLANs.

Options **any**—The entire VLAN range.

low-tag—The lower limit of the VLAN range.

high-tag—The upper limit of the VLAN range.

Range: 1 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 an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20

ranges (Dynamic VLAN)

Syntax ranges (any | *low-tag*)-(any | *high-tag*);

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure VLAN ranges for dynamic, auto-sensed VLANs.

Options **any**—The entire VLAN range.

low-tag—The lower limit of the VLAN range.

high-tag—The upper limit of the VLAN range.

Range: 1 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 an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17

route (Access)

Syntax

route *ip-prefix</prefix-length>* {
  metric *route-cost*;
  next-hop *next-hop*;
  preference *route-distance*;
  qualified-next-hop *next-hop*;
  tag *tag-number*;
}

Hierarchy Level [edit routing-options access]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the parameters for access routes.

Options *ip-prefix</prefix-length>*—Specific route prefix that you want to assign to the access route.

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.

routing-instance (PPPoE Service Name Tables)

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Use in conjunction with the **dynamic-profile** statement at the same hierarchy levels to specify the routing instance in which to instantiate a dynamic PPPoE interface. You can associate a routing instance with a named service entry, **empty** service entry, or **any** service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.

The routing instance associated with a service entry in a PPPoE service name table overrides the routing instance associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.

If you include the **routing-instance** statement at the **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level, you cannot also include the **static-interface** statement at this level. The **routing-instance** and **static-interface** statements are mutually exclusive for ACI/ARI pair configurations.

Options *routing-instance-name*—Name of the routing instance in which the router instantiates the dynamic PPPoE interface.

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 on page 195
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 201

routing-options

Syntax

routing-options { ... }

For information on the complete list of **routing-options**, see the *Protocol-Independent Routing Properties Feature Guide* .

Hierarchy Level

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

Release Information

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

Description

Configure protocol-independent routing properties.

Required Privilege Level

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

Related Documentation

- *Protocol-Independent Routing Properties Feature Guide*

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*

rpf-check (interfaces)

Syntax

```
rpf-check {
  fail-filter filter-name;
  mode loose;
}
```

Hierarchy Level

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

Release Information

Statement introduced before Junos OS Release 7.4.
Support for interface **ps0** (pseudowire subscriber logical interface device) added in Junos OS Release 15.1.

Description

Check whether traffic is arriving on an expected path. You can include this statement with the **inet** or **inet6** protocol family only.

The **mode** statement is explained separately.

Options

fail-filter—A filter to evaluate when packets are received on the interface. If the RPF check fails, this optional filter is evaluated. If the fail filter is not configured, the default action is to silently discard the packet.

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 Strict Mode*
- *Configuring Unicast RPF Loose Mode*
- *Example: Configuring Unicast Reverse-Path-Forwarding Check*
- *Configuring a Pseudowire Subscriber Logical Interface Device*

schedulers (CoS)

Syntax

```
schedulers {
  scheduler-name {
    adjust-minimum rate;
    adjust-percent percentage;
    buffer-size (seconds | percent percentage | remainder | temporal microseconds);
    drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol
      (any | non-tcp | tcp) drop-profile profile-name;
    excess-priority [ low | medium-low | medium-high | high | none];
    excess-rate (percent percentage | proportion value);
    priority priority-level;
    shaping-rate (percent percentage | rate);
    transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
  }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1X48 for PTX Series routers.

Description Specify the scheduler name and parameter values.

Options ***scheduler-name***—Name of the scheduler to be configured.

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

- *How Schedulers Define Output Queue Properties*
- *Default Schedulers Overview*
- *Configuring Schedulers*
- *Configuring a Scheduler*

server

Syntax server;

Hierarchy Level [edit interfaces pp0 unit *logical-unit-number* pppoe-options],
[edit logical-systems *logical-system-name* interfaces pp0 unit *logical-unit-number* pppoe-options]

Release Information Statement introduced in Junos OS Release 8.5.

Description Configure the router to operate in the PPPoE server mode. Supported on M120 and M320 Multiservice Edge Routers and MX Series Universal Edge Routers operating as access concentrators.

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

Related Documentation

- *Configuring the PPPoE Server Mode*

server (Dynamic PPPoE)

Syntax server;

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

Release Information Statement introduced in Junos OS Release 10.1.

Description In a dynamic profile, configure the router to act as a PPPoE server, also known as a remote access concentrator, when a PPPoE logical interface is dynamically created.

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

Related Documentation

- Configuring a PPPoE Dynamic Profile on page 136
- Subscriber Interfaces and PPPoE Overview on page 129

service (Dynamic Service Sets)

Syntax

```
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;
    }
  }
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* 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 9.5.
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.

Description

Define the service sets and filters to be applied to an interface. This statement is not supported for **family inet6**.

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

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

service (PPPoE)

Syntax

```
service service-name {
  drop;
  delay seconds;
  terminate;
  dynamic-profile profile-name;
  routing-instance routing-instance-name;
  max-sessions number;
  agent-specifier {
    aci circuit-id-string ari remote-id-string {
      drop;
      delay seconds;
      terminate;
      dynamic-profile profile-name;
      routing-instance routing-instance-name;
      static-interface interface-name;
    }
  }
}
```

Hierarchy Level [edit protocols pppoe service-name-tables *table-name*]

Release Information Statement introduced in Junos OS Release 10.0.
any, **dynamic-profile**, **routing-instance**, **max-sessions**, and **static-interface** options introduced in Junos OS Release 10.2.

Description Specify the action taken by the interface on receipt of a PPPoE Active Discovery Initiation (PADI) control packet for the specified named service, **empty** service, or **any** service in a PPPoE service name table. You can also specify the dynamic profile and routing instance that the router uses to instantiate a dynamic PPPoE interface, and the maximum number of active PPPoE sessions that the router can establish with the specified service.

Default The default action is terminate.

Options ***service-name***—Service entry in the PPPoE service name table:

- ***service-name***—Named service entry of up to 32 characters; for example, **premiumService**. You can configure a maximum of 512 named service entries across all PPPoE service name tables on the router.
- **empty**—Service entry of zero length that represents an unspecified service. Each PPPoE service name table includes one **empty** service entry by default.
- **any**—Default service for non-empty service entries that do not match the named or **empty** service entries configured in the PPPoE service name table. Each PPPoE service name table includes one **any** service entry by default.

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 PPPoE Service Name Tables on page 195
- Assigning a Service to a Service Name Table and Configuring the Action Taken When the Client Request Includes a Non-zero Service Name Tag on page 199
- Configuring the Action Taken When the Client Request Includes an Empty Service Name Tag on page 197
- Configuring the Action Taken for the Any Service on page 198

service-device-pool (L2TP)

Syntax service-device-pool *pool-name*;

Hierarchy Level [edit services l2tp tunnel-group *name*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Assign a pool of service interfaces to the tunnel group to balance traffic across.

NOTE: The service interface configuration is required for static LNS sessions. Either the service interface configuration or the service device pool configuration can be used for dynamic LNS sessions.

Options ***pool-name***—Name of the service device pool.

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

Related Documentation

- *Configuring an L2TP Tunnel Group for LNS Sessions with Inline Services Interfaces*

service-filter (Dynamic Service Sets)

Syntax service-filter *filter-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service input service-set *service-set-name*],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service output service-set *service-set-name*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input service-set *service-set-name*],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output service-set *service-set-name*]

Release Information Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input service-set *service-set-name*]** and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output service-set *service-set-name*]** hierarchy levels introduced in Junos OS Release 10.1.

Description Define the filter to be applied to traffic before it is accepted for service processing. Configuration of a service filter is optional; if you include the **service-set** statement without a **service-filter** definition, the router software assumes that the match condition is true and selects the service set for processing automatically. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***filter-name***—Identifies the filter to be applied in service processing.

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

Related Documentation

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

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 on page 195
- Assigning a Service Name Table to a PPPoE Underlying Interface on page 196
- Configuring the PPPoE Family for an Underlying Interface on page 140

service-name-tables

Syntax

```
service-name-tables table-name {
  service service-name {
    drop;
    delay seconds;
    terminate;
    dynamic-profile profile-name;
    routing-instance routing-instance-name;
    max-sessions number;
    agent-specifier {
      aci circuit-id-string ari remote-id-string {
        drop;
        delay seconds;
        terminate;
        dynamic-profile profile-name;
        routing-instance routing-instance-name;
        static-interface interface-name;
      }
    }
  }
}
```

Hierarchy Level [edit protocols pppoe]

Release Information Statement introduced in Junos OS Release 10.0.
dynamic-profile, **routing-instance**, **max-sessions**, and **static-interface** options introduced in Junos OS Release 10.2.

Description Create and configure a PPPoE service name table. Specify the action taken for each service and remote access concentrator on receipt of a PPPoE Active Discovery Initiation (PADI) packet. You can also specify the dynamic profile and routing instance that the router uses to instantiate a dynamic PPPoE interface, and the maximum number of active PPPoE sessions that the router can establish with the specified service. A maximum of 32 PPPoE service name tables is supported per router.

Options ***table-name***—Name of the PPPoE service name table, a string of up to 32 alphanumeric characters.

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 PPPoE Service Name Tables on page 195
- Creating a Service Name Table on page 195

service-set (Dynamic Service Sets)

Syntax

service-set *service-set-name* {
  service-filter *filter-name*;
}

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service input],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service output],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output]

Release Information

Statement introduced in Junos OS Release 9.5.
Support at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input]** and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output]** hierarchy levels introduced in Junos OS Release 10.1.

Description

Define one or more service sets in a dynamic profile. Service sets are applied to an interface. If you define multiple service sets, the router software evaluates the filters in the order in which they appear in the configuration. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options

service-set-name—Name of the service set.

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

- *Dynamic Service Sets Overview*
- *Associating Service Sets with Interfaces in a Dynamic Profile*

short-cycle-protection (Static and Dynamic Subscribers)

Syntax short-cycle-protection <lockout-time-min *minimum-seconds*> <lockout-time-max *maximum-seconds*> <filter [aci]> ;

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 demux0 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 11.4.

Description Configure the router to temporarily prevent (lock out) a failed or short-lived (also known as short-cycle) PPPoE subscriber session from reconnecting for a default or configurable period of time. You can optionally override the default lockout time, 1 through 300 seconds (5 minutes), by specifying the minimum lockout time and maximum lockout time as part of the **short-cycle-protection** statement. You can optionally specify the lockout based on the ACI, which locks out all PPPoE subscriber sessions that come from the same household and share the same ACI string.

You can configure PPPoE subscriber session lockout, also known as short-cycle protection, for VLAN, VLAN demux, and PPPoE-over-ATM dynamic subscriber interfaces. Enabling PPPoE subscriber session lockout reduces excessive loading on the router, prevents failed or short-lived sessions from disrupting other sessions on the same underlying interface, and preserves valuable system resources.

Options **filter aci**—(Optional) Use the agent circuit identifier (ACI) lockout for all subscriber sessions.

lockout-time-min *minimum-seconds*—(Optional) Use the specified minimum lockout time for failed or short-lived PPPoE subscriber sessions. The *minimum-seconds* value must be less than or equal to the *maximum-seconds* value. Setting *minimum-seconds* and *maximum-seconds* to the same value causes the lockout time to become fixed at that value.

Range: 1 through 86400 (24 hours)

Default: 1

lockout-time-max *maximum-seconds*—(Optional) Use the specified maximum lockout time for failed or short-lived PPPoE subscriber sessions. The *maximum-seconds* value must be equal to or greater than the *minimum-seconds* value. Setting *maximum-seconds* and *minimum-seconds* to the same value causes the lockout time to become fixed at that value.

Range: 1 through 86400 (24 hours)

Default: 300 (5 minutes)

Required Privilege Level

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

Related Documentation

- Configuring Lockout of PPPoE Subscriber Sessions on page 177
- PPPoE Subscriber Session Lockout Overview on page 171
- Understanding the Lockout Period for PPPoE Subscriber Session Lockout on page 175
- Configuring Dynamic PPPoE Subscriber Interfaces on page 136
- Example: Configuring a Static PPPoE Subscriber Interface on a Static Underlying VLAN Demux Interface over Aggregated Ethernet on page 145

stacked-vlan-ranges

Syntax

```
stacked-vlan-ranges {
  access-profile profile-name;
  authentication {
    packet-types [packet-types];
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      interface-name;
      mac-address;
      option-18
      option-37
      option-82;
      radius-realm radius-realm-string;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name {
    accept (any | dhcp-v4 | inet);
    access-profile vlan-dynamic-profile-name;
    ranges (any | low-tag–high-tag),(any | low-tag–high-tag);
  }
  override;
}
```

Hierarchy Level [edit interfaces *interface-name* auto-configure]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure multiple VLANs. Each VLAN is assigned a VLAN ID number from the range.

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 an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Configuring Interfaces to Support Both Single and Stacked VLANs on page 22

stacked-vlan-tagging

Syntax stacked-vlan-tagging;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For Gigabit Ethernet IQ interfaces, Gigabit Ethernet, 10-Gigabit Ethernet LAN/WAN PIC, and 100-Gigabit Ethernet Type 5 PIC with CFP, enable stacked VLAN tagging for all logical interfaces on the physical interface.

For pseudowire subscriber interfaces, enable stacked VLAN tagging for logical interfaces on the pseudowire service.

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 Gigabit Ethernet VLAN Tags Overview*
- *vlan-tags (Stacked VLAN Tags)*

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*

terminate (PPPoE Service Name Tables)

Syntax

terminate;

Hierarchy Level

[edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information

Statement introduced in Junos OS Release 10.0.
Support at **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level introduced in Junos OS Release 10.2.

Description

Direct the router to immediately respond to a PPPoE Active Discovery Initiation (PADI) control packet received from a PPPoE client by sending the client a PPPoE Active Discovery Offer (PADO) packet. The PADO packet contains the name of the access concentrator (router) that can service the client request. The **terminate** action is the default action for a named service entry, **empty** service entry, **any** service entry, or agent circuit identifier/agent remote identifier (ACI/ARI) pair in a PPPoE service name table.

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 on page 195

traffic-control-profiles

Syntax

```
traffic-control-profiles profile-name {
  adjust-minimum rate;
  atm-service (cbr | rtvbr | nrtvbr);
  delay-buffer-rate (percent percentage | rate);
  excess-rate (percent percentage  | proportion value );
  excess-rate-high (percent percentage | proportion value);
  excess-rate-low (percent percentage | proportion value);
  guaranteed-rate (percent percentage | rate) <burst-size bytes>;
  max-burst-size cells;
  overhead-accounting (frame-mode | cell-mode | frame-mode-bytes | cell-mode-bytes)
    <bytes (byte-value)>;
  peak-rate rate;
  scheduler-map map-name;
  shaping-rate (percent percentage | rate) <burst-size bytes>;
  shaping-rate-excess-high rate [ burst-size bytes ];
  shaping-rate-excess-low rate [ burst-size bytes ];
  shaping-rate-priority-high rate [ burst-size bytes ];
  shaping-rate-priority-low rate [ burst-size bytes ];
  shaping-rate-priority-medium rate [ burst-size bytes ];
  strict-priority-scheduler;
  sustained-rate rate;
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced in Junos OS Release 7.6.

Description For Gigabit Ethernet IQ, Channelized IQ PICs, FRF.15 and FRF.16 LSQ interfaces, Enhanced Queuing (EQ) DPCs, and PTX Series routers only, configure traffic shaping and scheduling profiles. For Enhanced EQ PICs, EQ DPCs, and PTX Series routers only, you can include the **excess-rate** statement.

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

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

- *Oversubscribing Interface Bandwidth*
- *Understanding Scheduling on PTX Series Routers*
- *output-traffic-control-profile*

traffic-control-profiles (Dynamic CoS Definition)

Syntax

```
traffic-control-profiles profile-name {
  adjust-minimum rate;
  delay-buffer-rate (percent percentage | rate);
  excess-rate (percent percentage | proportion value | percent $junos-cos-excess-rate);
  excess-rate-high (percent percentage | proportion value);
  excess-rate-low (percent percentage | proportion value);
  guaranteed-rate (percent percentage | rate) <burst-size  bytes>;
  overhead-accounting (frame-mode | cell-mode) <bytes byte-value>;
  scheduler-map map-name;
  shaping-rate (percent percentage | rate | predefined-variable) <burst-size  bytes>;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure traffic shaping and scheduling profiles.

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

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

- *Guidelines for Configuring Dynamic CoS for Subscriber Access*
- *Configuring Traffic Scheduling and Shaping for Subscriber Access*
- *Using the CLI to Modify Traffic-Control Profiles That Are Currently Applied to Subscribers*
- output-traffic-control-profile on page 509

underlying-interface

Syntax underlying-interface *interface-name*;

Hierarchy Level [edit interfaces pp0 unit *logical-unit-number* pppoe-options],
[edit interfaces demux0 unit *logical-unit-number* demux-options],
[edit logical-systems *logical-system-name* interfaces demux0 unit *logical-unit-number* demux-options],
[edit logical-systems *logical-system-name* interfaces pp0 unit *logical-unit-number* pppoe-options],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* interfaces demux0 unit *logical-unit-number* demux-options],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* interfaces pp0 unit *logical-unit-number* pppoe-options]

Release Information Statement introduced before Junos OS Release 7.4.
Support for aggregated Ethernet added in Junos OS Release 9.4.

Description Configure the interface on which PPP over Ethernet is running.

For demux interfaces, configure the underlying interface on which the demultiplexing (demux) interface is running.

Options *interface-name*—Name of the interface on which PPP over Ethernet or demux is running. For example, **at-0/0/1.0** (ATM VC), **fe-1/0/1.0** (Fast Ethernet interface), **ge-2/0/0.0** (Gigabit Ethernet interface), **ae1.0** (for IP demux on an aggregated Ethernet interface), or **ae1** (for VLAN demux on an aggregated Ethernet interface).

NOTE: **Demux interfaces are currently supported on Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet interfaces, or aggregated Ethernet devices.**

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

Related Documentation

- *Configuring an IP Demultiplexing Interface*
- *Configuring a VLAN Demultiplexing Interface*
- *Configuring the PPPoE Underlying Interface*
- *Junos OS Interfaces and Routing Configuration Guide*

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 67
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 69
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133
- For information about static underlying interfaces, see the *Junos OS Network Interfaces Library for Routing Devices*

underlying-interface (Dynamic PPPoE)

Syntax underlying-interface *interface-name*;

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

Release Information Statement introduced in Junos OS Release 10.1.

Description In a dynamic profile, configure the underlying interface on which the router creates the dynamic PPPoE logical interface.

Options ***interface-name***—Variable used to specify the name of the underlying interface on which the PPPoE logical interface is dynamically created. In the **underlying-interface *interface-name*** statement for dynamic PPPoE logical interfaces, you must use the predefined variable **$junos-underlying-interface** in place of ***interface-name***. When the router creates the dynamic PPPoE interface, the **$junos-underlying-interface** predefined variable is dynamically replaced with the name of the underlying interface supplied by the network when the subscriber logs in.

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

Related Documentation

- Configuring a PPPoE Dynamic Profile on page 136
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

unit

Syntax

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



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

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



```
  queue-length number;
}
short-sequence;
targeted-distribution;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      (input | output | input output);
    }
  }
  access-concentrator name;
  address address {
    ... the address subhierarchy appears after the main [edit interfaces interface-name unit
      logical-unit-number family family-name] hierarchy ...
  }
  bundle interface-name;
  core-facing;
  demux-destination {
    destination-prefix;
  }
  demux-source {
    source-prefix;
  }
  direct-connect;
  duplicate-protection;
  dynamic-profile profile-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list [filter-names];
    output filter-name;
    output-list [filter-names];
  }
  interface-mode (access | trunk);
  ipsec-sa sa-name;
```



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

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

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

Release Information Statement introduced before Junos OS Release 7.4.

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

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

Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces. 0 through 16,385 for all other static interface types.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

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

unit (Dynamic Demux Interface)

Syntax

```
unit logical-unit-number {
  demux-options {
    underlying-interface interface-name
  }
  family family {
    access-concentrator name;
    address address;
    demux-source {
      source-address;
    }
    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 67

unit (Dynamic Interface Sets)

Syntax

```
unit logical-unit-number {
  advisory-options {
    downstream-rate rate;
    upstream-rate rate;
  }
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces interface-set *interface-set-name* interface *interface-name*]

Release Information

Statement introduced in Junos OS Release 10.4.

Description

Apply the logical interface unit to the interface set.

Options

logical-unit-number—One of the following options:

- **$junos-underlying-interface-unit**—For static VLANs, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP when it accesses the subscriber network.
- **$junos-interface-unit**—For dynamic demux and dynamic PPPoE interfaces, 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 or PPP when it accesses the subscriber network.
- *value*—Specific unit number of the interface you want to assign to the dynamic-profile

Range: 0 through 1,073,741,823.

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 VLAN Subscriber Interfaces Based on Agent Circuit Identifier Information on page 43
- *Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile*
- *Configuring an Interface Set of Subscribers in a Dynamic Profile*
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*
- *Guidelines for Configuring Dynamic CoS for Subscriber Access*

unit (Dynamic PPPoE)

Syntax

```
unit logical-unit-number {
  keepalives interval seconds;
  no-keepalives;
  pppoe-options {
    underlying-interface interface-name;
    server;
  }
  ppp-options {
    aaa-options aaa-options-name;
    authentication [ authentication-protocols ];
    mru size;
    mtu (size | use-lower-layer);
    chap {
      challenge-length minimum minimum-length maximum maximum-length;
    }
    initiate-ncp (ip | ipv6 | dual-stack-passive)
    ipcp-suggest-dns-option;
    mru size;
    mtu (size | use-lower-layer);
    on-demand-ip-address;
    pap;
    peer-ip-address-optional;
  }
  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;
      }
      output filter-name {
        precedence precedence;
      }
    }
  }
  filter {
    input filter-name;
    output filter-name;
  }
```


}

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces pp0]

Release Information Statement introduced in Junos OS Release 10.1.

Description In a dynamic profile, configure a logical unit number for the dynamic PPPoE logical interface. You must configure a logical interface to be able to use the router.

Options ***logical-unit-number***—Variable used to specify the unit number when the PPPoE logical interface is dynamically created. In the **unit** ***logical-unit-number*** statement for dynamic PPPoE logical interfaces, you must use the predefined variable **$junos-interface-unit** in place of ***logical-unit-number***. The **$junos-interface-unit** predefined variable is dynamically replaced with the unit number supplied by the router 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 a PPPoE Dynamic Profile on page 136
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

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;
        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;
          }
          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>;
        keepalives {
          interval seconds;
          }
        ppp-options {
          chap;
          pap;
        }
        vlan-id number;
        vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
      }
      filter {
        input filter-name {
          shared-name  filter-shared-name;
        }
        output filter-name {
          shared-name  filter-shared-name;
        }
      }
    }
```

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 on page 41
- Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information on page 42
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

unnumbered-address (PPP)

Syntax unnumbered-address *interface-name* destination *address* destination-profile *profile-name*;

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

Release Information Statement introduced before Junos OS Release 7.4.

Description For interfaces with PPP encapsulation, enable the local address to be derived from the specified interface.

Options ***interface-name***—Interface from which the local address is derived. The interface name must include a logical unit number and must have a configured address.

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 IPCP Options for Interfaces with PPP Encapsulation*
- *address*
- *negotiate-address*
- *Junos OS System Basics Configuration Guide*

unnumbered-address (Dynamic PPPoE)

Syntax unnumbered-address *interface-name*;

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

Release Information Statement introduced in Junos OS Release 10.1.

Description For dynamic PPPoE interfaces, enable the local address to be derived from the specified interface. Configuring unnumbered Ethernet interfaces enables IP processing on the interface without assigning an explicit IP address to the interface.

Options ***interface-name***—Interface from which the local address is derived. The interface name must include a logical unit number and must have a configured address.

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

Related Documentation

- Configuring a PPPoE Dynamic Profile on page 136
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 133

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.
Support for the **$junos-preferred-source-address** and **$junos-preferred-source-ipv6-address** predefined variables introduced 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** predefined 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 dynamic value by using the **$junos-routing-instance** predefined variable. In addition, whatever static unnumbered interface you specify must belong to that routing instance; otherwise, the profile instantiation fails.
- 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.

NOTE: When you specify a static logical interface for the unnumbered interface in a dynamic profile that includes the **$junos-routing-instance** predefined variable, you must not configure a preferred source address, whether with the **$junos-preferred-source-address** predefined variable, the **$junos-preferred-source-ipv6-address** predefined variable, or the **preferred-source-address** statement. Configuring the preferred source address in this circumstance causes a commit failure.

When defining the **unnumbered-address** statement using the **$junos-loopback-interface** predefined variable, keep the following in mind:

- To use the **$junos-loopback-interface** predefined variable, the dynamic profile must also contain the **routing-instance** statement configured with the **$junos-routing-instance** predefined 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 **$junos-preferred-source-address** predefined variable for the inet family, or the **$junos-preferred-source-ipv6-address** predefined 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 **$junos-preferred-source-address** or the **$junos-preferred-source-ipv6-address** predefined variables, keep the following in mind:

- You must configure the **unnumbered-address** statement using the **$junos-loopback-interface** predefined variable.
- You must configure the **routing-instance** statement using the **$junos-routing-instance** predefined 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

- *Dynamic Profiles Overview*

use-primary (DHCP Local Server)

Syntax use-primary *primary-profile-name*;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dynamic-profile *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* dynamic-profile *profile-name*],
[edit system services dhcp-local-server dynamic-profile *profile-name*],
[edit system services dhcp-local-server group *group-name* dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Specify the dynamic profile to configure as the primary dynamic profile. The primary dynamic profile is instantiated when the first subscriber or DHCP client logs in. Subsequent subscribers (or clients) are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber (or client) logs out, the next subscriber (or client) that logs in is assigned the primary dynamic profile.

Options ***primary-profile-name***—Name of the dynamic profile to configure as the primary dynamic profile

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

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces on page 104

username-include

Syntax

```
username-include {
  circuit-id;
  circuit-type;
  delimiter delimiter-character;
  domain-name domain-name-string;
  interface-name;
  mac-address;
  option-18;
  option-37;
  option-82 <circuit-id> <remote-id>;
  radius-realm radius-realm-string;
  remote-id;
  user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit interfaces *interface-name* auto-configure vlan-ranges authentication],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication]

Release Information

Statement introduced in Junos OS Release 10.0.

Description

Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The username takes the format ***user-prefix mac-address circuit-type circuit-id remote-id option–82 interface-name domain-name radius-realm***. By default, each component is separated by a period (.), but you can specify a different delimiter with the **delimiter** statement.

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 VLAN Interface Username Information for AAA Authentication on page 32
- Using DHCP Option 82 Suboptions in Authentication Usernames for Autosense VLANs on page 33
- Using DHCP Option 18 and Option 37 in Authentication Usernames for DHCPv6 Autosense VLANs on page 34
- *Configuring a Username for Authentication of Out-of-Band Triggered Dynamic VLANs*

user-prefix

Syntax user-prefix *user-prefix-string*;

Hierarchy Level [edit interfaces *interface-name* auto-configure vlan-ranges authentication username-include],
[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication username-include]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify the user prefix that is concatenated with the username during the subscriber authentication process.

Options ***user-prefix-string***—The user prefix string.

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

Related Documentation

- Configuring VLAN Interface Username Information for AAA Authentication on page 32

vci

Syntax vci *vpi-identifier*.*vci-identifier*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*],
[edit logical-systems *logical-system-name* interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces at-*fpc/pic/port* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for the QFX Series.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.

Description For ATM point-to-point logical interfaces only, configure the virtual circuit identifier (VCI) and virtual path identifier (VPI).

To configure a VPI for a point-to-multipoint interface, specify the VPI in the *multipoint-destination* statement.

VCIs 0 through 31 are reserved for specific ATM values designated by the ATM Forum.

Options ***vci-identifier***—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the highest-numbered VC configured for the interface with the **maximum-vcs** option of the **vpi** statement.

Range: 0 through 4089 or 0 through 65,535 with promiscuous mode, with VCIs 0 through 31 reserved.

vpi-identifier—ATM virtual path identifier.

Range: 0 through 255

Default: 0

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

Related Documentation

- *Configuring a Point-to-Point ATM1 or ATM2 IQ Connection*
- *Applying Scheduler Maps to Logical ATM Interfaces*
- *multipoint-destination*
- *promiscuous-mode*
- *vpi (ATM CCC Cell-Relay Promiscuous Mode)*

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 Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 69

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.

Options *number*—A valid VLAN identifier. When used for input VLAN maps, you can specify the **$junos-vlan-map-id** predefined variable to dynamically obtain the VLAN identifier.

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-ranges

Syntax

```
vlan-ranges {
  access-profile profile-name;
  authentication {
    packet-types [packet-types];
    password password-string;
    username-include {
      circuit-type;
      circuit-id;
      delimiter delimiter-character;
      domain-name domain-name-string;
      interface-name;
      mac-address;
      option-18;
      option-37;
      option-82 <circuit-id> <remote-id>;
      radius-realm radius-realm-string;
      remote-id;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name {
    accept (any | dhcp-v4 | inet);
    accept-out-of-band protocol;
    access-profilevlan-dynamic-profile-name;
    ranges (any | low-tag)–(any | high-tag);
  }
  override;
}
```

Hierarchy Level [edit interfaces *interface-name* auto-configure]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure multiple VLANs. Each VLAN is assigned a VLAN ID number from the range.

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 an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
- Configuring Interfaces to Support Both Single and Stacked VLANs on page 22

vlan-tagging

Syntax

vlan-tagging;

Hierarchy Level

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

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
Statement introduced in Junos OS Release 13.2 for PTX Series Routers.
Statement introduced in Junos OS Release 14.1X53-D10 for the QFX Series.

Description

For Fast Ethernet and Gigabit Ethernet interfaces, aggregated Ethernet interfaces configured for VPLS, and pseudowire subscriber interfaces, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.

NOTE: On EX Series switches except for EX4300 and EX9200 switches, the **vlan-tagging** and **family ethernet-switching** statements cannot be configured on the same interface. Interfaces on EX2200, EX3200, EX3300, EX4200, and EX4500 switches are set to **family ethernet-switching** by the default factory configuration. EX6200 and EX8200 switch interfaces do not have a default **family** setting.

Required Privilege Level

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

Related Documentation

- *802.1Q VLANs Overview*
- *vlan-id*
- *Configuring a Layer 3 Subinterface (CLI Procedure)*
- *Configuring Tagged Aggregated Ethernet Interfaces*
- *Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch*

vlan-tagging (Dynamic)

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 an Interface to Use the Dynamic Profile Configured to Create Stacked VLANs on page 20
- Configuring an Interface to Use the Dynamic Profile Configured to Create Single-Tag VLANs on page 17
- *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 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.

NOTE: On the network-to-network (NNI) or egress interfaces of provider edge (PE) routers, you cannot configure the **inner-range *tpid. vid1—vid2*** option with the **vlan-tags** statement for ISP-facing interfaces.

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 on page 548

vpi (Define Virtual Path)

Syntax

```
vpi vpi-identifier {
  maximum-vcs maximum-vcs;
  oam-liveness {
    up-count cells;
    down-count cells;
  }
  oam-period (disable | seconds);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
      length);
    queue-length number;
  }
}
```

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM interfaces, configure the virtual path (VP).

NOTE: Certain options apply only to specific platforms.

Options *vpi-identifier*—ATM virtual path identifier. This is one of the VPIs that you define in the vci statement. (For a list of hierarchy levels at which you can include the **vci** statement, see vci.)

Range: 0 through 255

The remaining statements are explained separately.

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

Related Documentation

- *Configuring the Maximum Number of ATM1 VCs on a VP*
- *multipoint-destination*
- *promiscuous-mode*
- vci on page 576

CHAPTER 38

Operational Commands

clear auto-configuration interfaces

Syntax **clear auto-configuration interfaces** ***interface-name***

Release Information Command introduced in Junos OS Release 9.5.

Description Clear dynamically created VLAN interfaces.

NOTE: For the clear command to be successful, no interface bindings (for example, DHCP server bindings) can exist on the dynamic interface.

Options *interface-name*—Name of a physical or logical interface.

Required Privilege Level view

Related Documentation

- *Broadband Subscriber VLANs and Interfaces Feature Guide*
- Verifying and Managing Dynamic VLAN Configuration on page 26

List of Sample Output
clear auto-configuration interfaces (All Interfaces) on page 586
clear auto-configuration interfaces (Single Dynamically Created Interface) on page 586

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear auto-configuration interfaces (All Interfaces)

```
user@host> clear auto-configuration interfaces ge-1/0/0
10 interfaces removed from device ge-1/0/0
```

clear auto-configuration interfaces (Single Dynamically Created Interface)

```
user@host> clear auto-configuration interfaces ge-1/0/0.1073741824
Interface ge-1/0/0.1073741824 deleted
```


clear auto-configuration interfaces interface-set

Syntax clear auto-configuration interfaces interface-set *interface-set-name*

Release Information Command introduced in Junos OS Release 12.2.

Description Clear a specified dynamic agent circuit identifier (ACI) interface set on the router. An ACI interface set is a logical collection of dynamic VLAN subscriber interfaces that originate at the same household or on the same access-loop port.

You can clear only those ACI interface sets that have no active subscriber interface members. If the ACI interface set that you want to clear still has valid member interfaces, you must first remove these interfaces before issuing the **clear auto-configuration interfaces interface-set *interface-set-name*** command.

Options *interface-set-name*—Name of the empty ACI interface set that you want to clear. Use the ACI interface set name generated by the router, such as aci-1003-ge-1/0/0.4001, and not the actual agent circuit identifier string found in the DHCP or PPPoE control packets. To view the names of the ACI interface sets configured on the router, you can issue the **show subscribers** command.

Required Privilege Level view

Related Documentation

- Clearing Agent Circuit Identifier Interface Sets on page 46

List of Sample Output clear auto-configuration interfaces interface-set on page 587
clear auto-configuration interfaces interface-set (Error Message for ACI Interface Set with Active Members) on page 587

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear auto-configuration interfaces interface-set

```
user@host> clear auto-configuration interfaces interface-set aci-1003-ge-1/0/0.4001
Interface-set aci-1003-ge-1/0/0.4001 deleted
```

clear auto-configuration interfaces interface-set (Error Message for ACI Interface Set with Active Members)

```
user@host> clear auto-configuration interfaces interface-set aci-1005-ge-1/0/0.2800
error: Interface set aci-1005-ge-1/0/0.2800 has references.
```


clear pppoe lockout

Syntax

clear pppoe lockout
<aci *circuit-id* | mac-address *mac-address* >
<underlying-interfaces *underlying-interface-name*>

Release Information

Command introduced in Junos OS Release 11.4 on MX Series routers.
aci option introduced in Junos OS Release 13.3.

Description

Clear the lockout condition for the PPPoE client associated with the specified media access control (MAC) source address or agent circuit identifier (ACI) value.

Options

none—Clear the lockout condition for the PPPoE clients associated with all MAC source addresses on all PPPoE underlying interfaces.

aci ***circuit-id***—(Optional) Clear the lockout condition for the PPPoE client associated with the specified ACI value. To clear the lockout condition by a specified ACI value, you must specify the **filter aci** option in the **short-cycle-protection** statement when you configure PPPoE subscriber session lockout. If the **filter aci** option is missing from the **short-cycle-protection** statement , no PPPoE client sessions are cleared using the ACI filter. The **aci** option and the **mac-address** option are mutually exclusive.

mac-address ***mac-address***—(Optional) Clear the lockout condition for the PPPoE client associated with the specified MAC source address. The **mac-address** option and the **aci** option are mutually exclusive.

underlying-interfaces ***underlying-interface-name***—(Optional) Clear the lockout condition for all PPPoE clients associated with the specified PPPoE underlying interface.

Required Privilege Level

clear

Related Documentation

- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

List of Sample Output

Sample Output

clear pppoe lockout (All MAC Source Addresses on All Underlying Interfaces)

```
user@host> clear pppoe lockout
```


clear pppoe lockout mac-address (Specified MAC Source Address)

`user@host>` **clear pppoe lockout mac-address 00:00:5e:00:53:30**

clear pppoe lockout mac-address underlying-interfaces (Specified MAC Source Address on Specified Underlying Interface)

`user@host>` **clear pppoe lockout mac-address 00:00:5e:00:53:30 underlying-interfaces ge-1/0/0.101**

clear pppoe lockout underlying-interfaces (All MAC Source Addresses on Specified Underlying Interface)

`user@host>` **clear pppoe lockout underlying-interfaces ge-1/0/0.101**

clear pppoe lockout underlying-interfaces aci (ACI on Specified Underlying Interface)

`user@host>` **clear pppoe lockout underlying-interfaces demux0.214 aci “Relay-identifier atm 3/0:100\.*”**

clear pppoe lockout atm-identifier

Syntax

clear pppoe lockout atm-identifier device-name *device-name* vpi *vpi-identifier* vci *vci-identifier* <aci *circuit-id* | mac-address *mac-address* >

Release Information

Command introduced in Junos OS Release 15.2 on MX Series routers.

Description

Clear the lockout condition for the PPPoE client associated with the specified ATM encapsulation type and, optionally, media access control (MAC) source address or agent circuit identifier (ACI) value. Because the lockout condition persists even in the absence of an underlying interface or after automatic removal of the VLAN or VLAN demux interface, using the **clear pppoe lockout atm-identifier** command enables you to clear the lockout condition for PPPoE clients by specifying ATM identifying characteristics instead of the ATM interface name.

The following characteristics comprise the ATM encapsulation type identifier:

- Device name (physical interface or aggregated Ethernet bundle)
- Virtual path identifier (VPI)
- Virtual circuit identifier (VCI)

Options

circuit-id—(Optional) ACI value associated with the PPPoE client for which you want to clear lockout. To clear the lockout condition by a specified ACI value, you must specify the **filter aci** option in the **short-cycle-protection** statement when you configure PPPoE subscriber session lockout. If the **filter aci** option is missing from the **short-cycle-protection** statement, no PPPoE client sessions are cleared using the ACI filter. The **aci** option and the **mac-address** option are mutually exclusive.

device-name—Name of the ATM physical interface or aggregated Ethernet bundle associated with the PPPoE client for which you want to clear lockout.

mac-address—(Optional) MAC address value associated with the PPPoE client for which you want to clear lockout. The **mac-address** option and the **aci** option are mutually exclusive.

vci-identifier—ATM VCI value associated with the PPPoE client for which you want to clear lockout.

Range: 0 through 65535

vpi-identifier—ATM VPI value associated with the PPPoE client for which you want to clear lockout.

Range: 0 through 255

Required Privilege Level

clear

Related Documentation

- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

Sample Output

clear pppoe lockout atm-identifier device-name vpi vci (PPPoE Client with Specified VPI and VCI on ATM Physical Interface)

`user@host>` **clear pppoe lockout atm-identifier device-name at-1/0/0 vpi 10 vci 40**

clear pppoe lockout atm-identifier device-name vpi vci aci (PPPoE Client with Specified VPI and VCI on Aggregated Ethernet Bundle Where ACI Matches Regular Expression)

`user@host>` **clear pppoe lockout atm-identifier device-name ae1 vpi 1 vci 30 aci ““Relay-identifier atm 1/0:100\.*”**

clear pppoe lockout atm-identifier device-name vpi vci mac-address (PPPoE Client with Specified VPI, VCI, and MAC Address on ATM Logical Interface)

`user@host>` **clear pppoe lockout atm-identifier device-name at-1/1/0.20 vpi 1 vci 20 mac-address 00:00:5e:00:53:30**

clear pppoe lockout vlan-identifier

Syntax

clear pppoe lockout vlan-identifier device-name *device-name*
<aci *circuit-id* | mac-address *mac-address* >
<svlan-id *svlan-identifier*>
<vlan-id *vlan-identifier*>

Release Information

Command introduced in Junos OS Release 15.2 on MX Series routers.

Description

Clear the lockout condition for the PPPoE client associated with the specified VLAN encapsulation type and, optionally, media access control (MAC) source address and agent circuit identifier (ACI) value. Because the lockout condition persists even in the absence of an underlying interface or after automatic removal of the VLAN or VLAN demux interface, using the **clear pppoe lockout vlan-identifier** command enables you to clear the lockout condition for PPPoE clients by specifying VLAN identifying characteristics rather than by specifying the underlying interface name.

The following characteristics comprise the VLAN encapsulation type identifier:

- Device name (physical interface or aggregated Ethernet bundle)
- Stacked VLAN (S-VLAN) ID (also known as the *outer tag*)
- VLAN ID (also known as the *inner tag*)

You can configure PPPoE subscriber session lockout, also known as PPPoE short-cycle protection, for VLAN, VLAN demux, and PPPoE-over-ATM dynamic subscriber interfaces.

Options

circuit-id—(Optional) ACI value associated with the PPPoE client for which you want to clear lockout. To clear the lockout condition by a specified ACI value, you must specify the **filter aci** option in the **short-cycle-protection** statement when you configure PPPoE subscriber session lockout. If the **filter aci** option is missing from the **short-cycle-protection** statement, no PPPoE client sessions are cleared using the ACI filter. The **aci** option and the **mac-address** option are mutually exclusive.

device-name—Name of the Ethernet physical interface or aggregated Ethernet bundle associated with the PPPoE client for which you want to clear lockout.

mac-address—(Optional) MAC address value associated with the PPPoE client for which you want to clear lockout. The **mac-address** option and the **aci** option are mutually exclusive.

svlan-identifier—(Optional) A valid S-VLAN identifier associated with the PPPoE client for which you want to clear lockout.

Range: 1 through 4094

vlan-identifier—(Optional) A valid VLAN identifier associated with the PPPoE client for which you want to clear lockout.

Range: 1 through 4094

Required Privilege Level clear

Related Documentation

- Clearing Lockout of PPPoE Subscriber Sessions on page 179
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

List of Sample Output

Sample Output

clear pppoe lockout vlan-identifier device-name (Untagged VLAN on Aggregated Ethernet Bundle)

`user@host>` **clear pppoe lockout vlan-identifier device-name ae3**

clear pppoe lockout vlan-identifier device-name vlan-id (Single-Tagged VLAN on Gigabit Ethernet Interface)

`user@host>` **clear pppoe lockout vlan-identifier device-name ge-2/0/0 vlan-id 2000**

clear pppoe lockout vlan-identifier device-name svlan-id vlan-id aci (Dual-Tagged VLAN on 10-Gigabit Ethernet Interface Where ACI Matches Regular Expression)

`user@host>` **clear pppoe lockout vlan-identifier device-name xe-1/0/0 svlan-id 10 vlan-id 20 aci ““Relay-identifier atm 1/0:100\.*”**

clear pppoe lockout vlan-identifier device-name svlan-id vlan-id mac-address (Dual-Tagged VLAN on Aggregated Ethernet Bundle with Specified MAC Address)

`user@host>` **clear pppoe lockout vlan-identifier device-name ae0 svlan-id 1 vlan-id 100 mac-address 00:00:5e:00:53:30**

clear pppoe statistics

Syntax

clear pppoe statistics
<interface *interface-name*>
<*underlying-interface-name*>

Release Information

Command introduced before Junos OS Release 7.4.
underlying-interface-name option introduced in Junos OS Release 9.5.

Description

Reset PPPoE session statistics information.

Options

none—Reset PPPoE statistics for all interfaces.

underlying-interface-name—(Optional) Reset PPPoE statistics for the specified underlying PPPoE interface.

Required Privilege Level

clear

Related Documentation

- show pppoe statistics on page 734

List of Sample Output

clear pppoe statistics on page 594
clear pppoe statistics on page 594

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear pppoe statistics

```
user@host> clear pppoe statistics
```

clear pppoe statistics

```
user@host> clear pppoe statistics ge-4/0/3.2
```


show dhcp server binding

Syntax

show dhcp server binding
<*address*>
<*interfaces-vlan*><brief | detail | summary>
<interface *interface-name*>
<*interfaces-vlan*>
<*interfaces-wildcard*>
<logical-system *logical-system-name*>
<routing-instance *routing-instance-name*>

Release Information

Command introduced in Junos OS Release 9.0.
Options *interfaces-vlan* and *interfaces-wildcard* added in Junos OS Release 12.1.

Description

Display the address bindings in the client table on the extended Dynamic Host Configuration Protocol (DHCP) local server.

NOTE: If you delete the DHCP server configuration, DHCP server bindings might still remain. To ensure that DHCP bindings are removed, issue the **clear dhcp server binding** command before you delete the DHCP server configuration.

Options

address—(Optional) Display DHCP binding information for a specific client identified by one of the following entries:

- *ip-address*—The specified IP address.
- *mac-address*—The specified MAC address.
- *session-id*—The specified session ID.

brief | detail | summary—(Optional) Display the specified level of output about active client bindings. The default is **brief**, which produces the same output as **show dhcp server binding**.

interface *interface-name*—(Optional) Display information about active client bindings on the specified interface. You can optionally filter on VLAN ID and SVLAN ID.

interfaces-vlan—(Optional) Show the binding state information on the interface VLAN ID and S-VLAN ID.

interfaces-wildcard—(Optional) The set of interfaces on which to show the binding state information. This option supports the use of the wildcard character (*).

logical-system *logical-system-name*—(Optional) Display information about active client bindings for DHCP clients on the specified logical system.

routing-instance *routing-instance-name*—(Optional) Display information about active client bindings for DHCP clients on the specified routing instance.

Required Privilege Level view

Related Documentation

- *Clearing DHCP Bindings for Subscriber Access*
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- *clear dhcp server binding*

List of Sample Output

Output Fields Table 12 on page 596 lists the output fields for the **show dhcp server binding** command. Output fields are listed in the approximate order in which they appear.

Table 12: show dhcp server binding Output Fields

Field Name	Field Description	Level of Output
number clients, (*number* init, *number* bound, *number* selecting, *number* requesting, *number* renewing, *number* releasing)	Summary counts of the total number of DHCP clients and the number of DHCP clients in each state.	summary
IP address	IP address of the DHCP client.	brief detail
Session Id	Session ID of the subscriber session.	brief detail
Hardware address	Hardware address of the DHCP client.	brief detail
Expires	Number of seconds in which lease expires.	brief detail

Table 12: show dhcp server binding Output Fields *(continued)*

Field Name	Field Description	Level of Output
State	State of the address binding table on the extended DHCP local server: • **BOUND**—Client has active IP address lease. • **FORCERENEW**—Client has received forcerenew message from server. • **INIT**—Initial state. • **RELEASE**—Client is releasing IP address lease. • **RENEWING**—Client sending request to renew IP address lease. • **REQUESTING**—Client requesting a DHCP server. • **SELECTING**—Client receiving offers from DHCP servers.	**brief** **detail**
Interface	Interface on which the request was received.	**brief**
Lease Expires	Date and time at which the client's IP address lease expires.	**detail**
Lease Expires in	Number of seconds in which lease expires.	**detail**
Lease Start	Date and time at which the client's IP address lease started.	**detail**
Lease time violated	Lease time violation has occurred.	**detail**
Last Packet Received	Date and time at which the router received the last packet.	**detail**
Incoming Client Interface	Client's incoming interface.	**detail**
Client Interface Svlan Id	S-VLAN ID of the client's incoming interface.	**detail**
Client Interface Vlan Id	VLAN ID of the client's incoming interface.	**detail**
Demux Interface	Name of the IP demultiplexing (demux) interface.	**detail**
Server IP Address or **Server Identifier**	IP address of DHCP server.	**detail**
Server Interface	Interface of DHCP server.	**detail**
Client Pool Name	Name of address pool used to assign client IP address lease.	**detail**

Table 12: show dhcp server binding Output Fields *(continued)*

Field Name	Field Description	Level of Output
Liveness Detection State	State of the liveness detection status for a subscriber's Bidirectional Forwarding Detection (BFD) protocol session: NOTE: This output field displays status only when liveness detection has been explicitly configured for a subscriber and the liveness detection protocol is actively functioning for that subscriber. • **DOWN**—Liveness detection has been enabled for a subscriber but the broadband network gateway (BNG) detects that the liveness detection session for the BFD protocol is in the **DOWN** state. A liveness detection session that was previously in an **UP** state has transitioned to a **DOWN** state, beginning with a liveness detection failure, and ending with the deletion of the client binding. The **DOWN** state is reported only during this transition period of time. • **UNKNOWN**—Liveness detection has been enabled for a subscriber but the actual liveness detection state has not yet been determined. The **UNKNOWN** state is reported after a DHCP subscriber initially logs in while the underlying liveness detection protocol handshake, such as BFD, is still processing and the BFD session has not yet reached the **UP** state. • **UP**—Liveness detection has been enabled for a subscriber, and the BNG and the subscriber or client have *both* determined that the liveness detection session for the BFD protocol is in the **UP** state. • **WENT_DOWN**—State is functionally equivalent to the **DOWN** state. A liveness detection session that was previously in an **UP** state has transitioned to a **DOWN** state implying a liveness detection failure. The **WENT_DOWN** state applies to the internal distribution of the liveness detection mechanism between the Junos DHCP Daemon for Subscriber Services (JDHCPd), the BFD plug-in within the Broadband Edge Subscriber Management Daemon (BBE-SMGD), and the Packet Forwarding Engine.	**detail**
ACI Interface Set Name	Internally generated name of the dynamic agent circuit identifier (ACI) interface set.	**detail**
ACI Interface Set Index	Index number of the dynamic ACI interface set.	**detail**
ACI Interface Set Session ID	Identifier of the dynamic ACI interface set entry in the session database.	**detail**

Sample Output

show dhcp server binding

`user@host>` **show dhcp server binding**

```
IP address          Session Id  Hardware address   Expires     State      Interface
198.51.100.15       6          00:00:5e:00:53:01  86180       BOUND      ge-1/0/0.0

198.51.100.16       7          00:00:5e:00:53:02  86180       BOUND      ge-1/0/0.0

198.51.100.17       8          00:00:5e:00:53:03  86180       BOUND      ge-1/0/0.0

198.51.100.18       9          00:00:5e:00:53:04  86180       BOUND      ge-1/0/0.0

198.51.100.19       10         00:00:5e:00:53:05  86180       BOUND      ge-1/0/0.0
```

show dhcp server binding detail

```
user@host> show dhcp server binding detail
Client IP Address:  198.51.100.15
     Hardware Address:             00:00:5e:00:53:01
     State:                       BOUND(LOCAL_SERVER_STATE_BOUND_ON_INTF_DELETE)

     Lease Expires:                2009-07-21 10:10:25 PDT
     Lease Expires in:             86151 seconds
     Lease Start:                  2009-07-20 10:10:25 PDT
     Incoming Client Interface:    ge-1/0/0.0
     Server Ip Address:            198.51.100.9
     Server Interface:             none
     Session Id:                   6
     Client Pool Name:             6
     Liveness Detection State:     UP
 Client IP Address:            198.51.100.16
     Hardware Address:             00:00:5e:00:53:02
     State:                       BOUND(LOCAL_SERVER_STATE_BOUND_ON_INTF_DELETE)

     Lease Expires:                2009-07-21 10:10:25 PDT
     Lease Expires in:             86151 seconds
     Lease Start:                  2009-07-20 10:10:25 PDT
     Lease time violated:          yes
     Incoming Client Interface:    ge-1/0/0.0
     Server Ip Address:            198.51.100.9
     Server Interface:             none
     Session Id:                   7
     Client Pool Name:             7
     Liveness Detection State:     UP
```

show dhcp server binding detail (ACI Interface Set Configured)

```
user@host> show dhcp server binding detail
Client IP Address:  198.51.100.14
     Hardware Address:             00:00:5e:00:53:02
     State:                        BOUND(LOCAL_SERVER_STATE_BOUND)
     Lease Expires:                2012-03-13 09:53:32 PDT
     Lease Expires in:             82660 seconds
     Lease Start:                  2012-03-12 10:23:32 PDT
     Last Packet Received:         2012-03-12 10:23:32 PDT
     Incoming Client Interface:    demux0.1073741827
     Client Interface Svlan Id:    1802
     Client Interface Vlan Id:     302
     Demux Interface:              demux0.1073741832
     Server Identifier:            198.51.100.202
     Session Id:                   11
     Client Pool Name:             poolA
     Client Profile Name:          DEMUXprofile
     Liveness Detection State:     UP
```



```
      ACI Interface Set Name:       aci-1002-demux0.1073741827
      ACI Interface Set Index:      2
      ACI Interface Set Session ID: 6
```

show dhcp server binding interface <vlan-id>

```
user@host> show dhcp server binding interface ge-1/1/0:100
IP address        Session Id  Hardware address   Expires     State      Interface
198.51.100.15      6            00:00:5e:00:53:01   86124       BOUND
ge-1/1/0:100
```

show dhcp server binding interface <svlan-id>

```
user@host> show dhcp server binding interface ge-1/1/0:10-100
IP address        Session Id  Hardware address   Expires     State      Interface
198.51.100.16      7           00:00:5e:00:53:02   86124       BOUND
ge-1/1/0:10-100
```

show dhcp server binding <ip-address>

```
user@host> show dhcp server binding 198100.19
IP address        Session Id  Hardware address   Expires     State      Interface
198.51.100.19      10          00:00:5e:00:53:05  86081       BOUND      ge-1/0/0.0
```

show dhcp server binding <session-id>

```
user@host> show dhcp server binding 6
IP address        Session Id  Hardware address   Expires     State      Interface
198.51.100.15      6           00:00:5e:00:53:01  86124       BOUND      ge-1/0/0.0
```

show dhcp server binding summary

```
user@host> show dhcp server binding summary
3 clients, (2 init, 1 bound, 0 selecting, 0 requesting, 0 renewing, 0 releasing)
```

show dhcp server binding <interfaces-vlan>

```
user@host> show dhcp server binding ge-1/0/0:100-200
IP address        Session Id  Hardware address   Expires     State      Interface
192.168.0.17       42          00:00:5e:00:53:02   86346       BOUND
ge-1/0/0.1073741827
192.168.0.16       41          00:00:5e:00:53:01   86346       BOUND
ge-1/0/0.1073741827
```

show dhcp server binding <interfaces-wildcard>

```
user@host> show dhcp server binding ge-1/3/*
IP address        Session Id  Hardware address   Expires     State      Interface
192.168.0.9        24          00:00:5e:00:53:04   86361       BOUND
ge-1/3/0.110
192.168.0.8        23          00:00:5e:00:53:03   86361       BOUND
ge-1/3/0.110
192.168.0.7        22          00:00:5e:00:53:02   86361       BOUND
ge-1/3/0.110
```


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 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 616
show interfaces extensive (10-Gigabit Ethernet, WAN PHY Mode) on page 619
show interfaces extensive (10-Gigabit Ethernet, DWDM OTN PIC) on page 621
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode) on page 623
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Transmit-Only) on page 623
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Receive-Only) on page 624

Output Fields See Table 13 on page 602 for the output fields for the **show interfaces** (10–Gigabit Ethernet) command.

Table 13: 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: • **Online**—Autonegotiation is manually configured as online. • **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 13: 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 13: 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. • **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. • **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. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes. For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 13 on page 602.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **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. • **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. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **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. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 13: 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: • **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. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **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. • **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. • **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. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface. NOTE: In DPCs that are not of the enhanced type, such as DPC 40x 1GE R, DPCE 20x 1GE + 2x 10GE R, or DPCE 40x 1GE R, you might notice a discrepancy in the output of the **show interfaces** command because incoming packets might be counted in the Egress queues section of the output. This problem occurs on non-enhanced DPCs because the egress queue statistics are polled from IMQ (Inbound Message Queuing) block of the I-chip. The IMQ block does not differentiate between ingress and egress WAN traffic; as a result, the combined statistics are displayed in the egress queue counters on the Routing Engine. In a simple VPLS scenorio, if there is no MAC entry in DMAC table (by sending unidirectional traffic), traffic is flooded and the input traffic is accounted in IMQ. For bidirectional traffic (MAC entry in DMAC table), if the outgoing interface is on the same I-chip then both ingress and egress statistics are counted in a combined way. If the outgoing interface is on a different I-chip or FPC, then only egress statistics are accounted in IMQ. This behavior is expected with non-enhanced DPCs	**detail extensive**
Queue counters (Egress)	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**

Table 13: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
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. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **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 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**. • **None**—There are no active defects or alarms. • **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. • **efec**—Enhanced forward error correction (EFEC) is configured to defect and correct bit errors. • **gfec**—G.709 Forward error correction (GFEC) mode is configured to detect and correct bit errors. • **none**—FEC mode is not configured.	**detail extensive**
OTN Rate	OTN mode. • **fixed-stuff-bytes**—Fixed stuff bytes 11.0957 Gbps. • **no-fixed-stuff-bytes**—No fixed stuff bytes 11.0491 Gbps. • **pass-through**—Enable OTN passthrough mode. • **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. • **Corrected Errors**—The count of corrected errors in the last second. • **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**

Table 13: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
OTN FEC alarms	OTN FEC excessive or degraded error alarms triggered on the interface. • **FEC Degrade**—OTU FEC Degrade defect. • **FEC Excessive**—OTU FEC Excessive Error defect.	**detail extensive**
OTN OC	OTN OC defects triggered on the interface. • **LOS**—OC Loss of Signal defect. • **LOF**—OC Loss of Frame defect. • **LOM**—OC Loss of Multiframe defect. • **Wavelength Lock**—OC Wavelength Lock defect.	**detail extensive**
OTN OTU	OTN OTU defects detected on the interface • **AIS**—OTN AIS alarm. • **BDI**—OTN OTU BDI alarm. • **IAE**—OTN OTU IAE alarm. • **TTIM**—OTN OTU TTIM alarm. • **SF**—OTN ODU bit error rate fault alarm. • **SD**—OTN ODU bit error rate defect alarm. • **TCA-ES**—OTN ODU ES threshold alarm. • **TCA-SES**—OTN ODU SES threshold alarm. • **TCA-UAS**—OTN ODU UAS threshold alarm. • **TCA-BBE**—OTN ODU BBE threshold alarm. • **BIP**—OTN ODU BIP threshold alarm. • **BBE**—OTN OTU BBE threshold alarm. • **ES**—OTN OTU ES threshold alarm. • **SES**—OTN OTU SES threshold alarm. • **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. • **Bit errors**—The number of seconds during which at least one bit error rate (BER) occurred while the PCS receiver is operating in normal mode. • **Errored blocks**—The number of seconds when at least one errored block occurred while the PCS receiver is operating in normal mode.	**detail extensive**

Table 13: 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: • **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 14 on page 616 • **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets. • **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). • **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. • **MAC control frames**—Number of MAC control frames. • **MAC pause frames**—Number of MAC control frames with **pause** operational code. • **Oversized frames**—Number of frames that exceed 1518 octets. • **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. • **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. • **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. • **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 13: 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. • **Input packet count**—Number of packets received from the MAC hardware that the filter processed. • **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address. • **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). • **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. • **Output packet count**—Number of packets that the filter has given to the MAC hardware. • **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. • **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. • **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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **PHY Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**

Table 13: 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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **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. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

Table 13: 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. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

Table 13: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output

Autonegotiation information	Information about link autonegotiation.
	• **Negotiation status:**
	  ◦ **Incomplete**—Ethernet interface has the speed or link mode configured.
	  ◦ **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
	  ◦ **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner:**
	  ◦ **Link mode**—Depending on the capability of the attached Ethernet device, either **Full-duplex** or **Half-duplex**.
	  ◦ **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).
	  ◦ **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.
	• **Local resolution**—Information from the link partner:
	  ◦ **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).
	  ◦ **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: • **Destination slot**—FPC slot number.	**extensive**

Table 13: 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. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **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. • **Priority**—Queue priority: **low** or **high**. • **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 13: 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. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **pop**—The outer VLAN tag of the incoming frame is removed. • **swap**—The outer VLAN tag of the incoming frame is overwritten with the user specified VLAN tag information. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **push-push**—Two VLAN tags are pushed in from the incoming frame. • **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. • **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user specified VLAN tag value. • **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. • **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: • Source Family Inet • 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. • **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. • **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 13: 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. 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 13: 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 14 on page 616 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 14 on page 616, 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 14: 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: Input bytes: 496 bytes per packet, representing the Layer 2 packet MAC statistics: 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: Input bytes: 478 bytes per packet, representing the Layer 3 packet	
Outbound physical interface	**show interfaces ge-0/0/0 extensive**	Traffic statistics: Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes MAC statistics: 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: 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: 00:00:5e:00:53:f6, Hardware address: 00:00:5e:00:53: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: 192.0.2/24, Local: 192.0.2.1, Broadcast: 192.0.2.255,
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: 00:00:5e:00:53:9d, Hardware address: 00:00:5e:00:53:9d
  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: 00:00:5e:00:53:72, Hardware address: 00:00:5e:00:53:72
  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: 00:00:5e:00:53:83, Hardware address: 00:00:5e:00:53:83
  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: 00:00:5e:00:53:83, Hardware address: 00:00:5e:00:53:83
  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: 192.0.2/24, Local: 192.0.2.1, Broadcast: 192.0.2.255,
Generation: 139
    Protocol multiservice, MTU: Unlimited, Generation: 146, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

show interfaces (ATM)

Syntax

show interfaces at-*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 and T Series routers only) Display status information about the specified ATM interface.

Options

at-*fpc/pic/port*—Display standard information about the specified ATM 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 the SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (ATM, IMA Group) on page 641
show interfaces extensive (ATM IMA Group) on page 642
show interfaces (ATM1, SONET Mode) on page 643
show interfaces brief (ATM1, SONET Mode) on page 644
show interfaces detail (ATM1, SONET Mode) on page 644
show interfaces extensive (ATM1, SONET Mode) on page 645
show interfaces (ATM2, SDH Mode) on page 647
show interfaces brief (ATM2, SDH Mode) on page 648
show interfaces detail (ATM2, SDH Mode) on page 649
show interfaces extensive (ATM2, SDH Mode) on page 650
show interfaces (ATM2, SONET Mode) on page 653
show interfaces brief (ATM2, SONET Mode) on page 654
show interfaces detail (ATM2, SONET Mode) on page 655
show interfaces extensive (ATM2, SONET Mode) on page 657

Output Fields

Table 15 on page 626 lists the output fields for the **show interfaces** (ATM) command. Output fields are listed in the approximate order in which they appear.

Table 15: ATM show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
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
Description	Configured interface description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface: • **ATM-CCC-CELL-RELAY**—ATM cell relay for CCC. • **ATM-CCC-VC-MUX**—ATM virtual circuit (VC) for CCC. • **ATM-CISCO-NLPID**—Cisco-compatible ATM NLPID encapsulation. • **ATM-MIPP-LLC**—ATM MLPPP over ATM Adaptation Layer 5 (AAL5)/logical link control (LLC). • **ATM-NLPID**—ATM NLPID encapsulation. • **ATM-PPP-LLC**—ATM PPP over AAL5/LLC. • **ATM-PPP-VC-MUX**—ATM PPP over raw AAL5. • **ATM-PVC**—ATM permanent virtual circuits. • **ATM-SNAP**—ATM LLC/SNAP encapsulation. • **ATM-TCC-SNAP**—ATM LLC/SNAP for translational cross-connection. • **ATM-TCC-VC-MUX**—ATM VC for translational cross-connection. • **ATM-VC-MUX**—ATM VC multiplexing. • **ETHER-OVER-ATM-LLC**—Ethernet over ATM (LLC/SNAP) encapsulation. • **ETHER-VPLS-OVER-ATM-LLC**—Ethernet VPLS over ATM (bridging) encapsulation.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
***framing* Mode**	Framing mode: **SONET** or **SDH**.	All levels
Speed	Speed at which the interface is running as represented by the interface type (for example, **OC3**, **ADSL2+**, and **SHDSL(2-wire)**.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
Payload scrambler	Whether payload scrambling is enabled.	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

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
CoS queues	Number of CoS queues configured.	**detail extensive** none
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Current address	Ethernet MAC address for this interface for Ethernet over ATM encapsulation.	**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).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Statistics for traffic on the interface. • **Input bytes**—Number of bytes received on the interface • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface whose definitions are as follows: • **Errors**—Sum of the incoming frame aborts and frame check sequence (FCS) errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism. • **Invalid VCs**—Number of cells that arrived for a nonexistent VC. • **Framing errors**—Sum of AAL5 packets that have FCS errors, reassembly timeout errors, and length errors. • **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. • **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. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 15: ATM 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: • **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 up, or another problem occurs. If the number of carrier transitions increments quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If it increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained so long in shared packet SDRAM 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. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. NOTE: Physical interface queue counters of ATM2 PICs displayed by the **show interfaces at-*fpc/pic/port* detail** command show the packet forwarding stream statistics associated with the ATM2 ports. Since multiple ports of the ATM2 PICs (except for the ATM2 dual-port OC12) share one packet forwarding stream, the physical interface queue counters reflect the aggregate of ATM2 port statistics.	**detail extensive**
SONET alarms **SONET defects**	SONET media-specific defects that prevent the interface from passing packets. When a defect persists for a certain period, 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 light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.	**detail extensive** none

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET PHY	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SONET section	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault signal failure • **BERR-SD**—Bit error rate defect signal degradation • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, 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 light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SDH PHY**, **SDH regenerator section**, **SDH multiplex section**, and **SDH path**.	All levels

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—Alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section)	**extensive**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. This byte is allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. This bye is used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—These bytes are allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	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**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ATM Status	ATM state information: • **HCS State**—Status of the header check sequence. ATM uses the HCS field in the cell header in the cell delineation process to frame ATM cell boundaries. The HCS is an FCS-8 calculation over the first four octets of the ATM cell header. • **LOC**—Current loss of cell (LOC) delineation state. **OK** means that no LOC is currently asserted.	**extensive**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ATM Statistics	ATM statistics for the interface: • **Uncorrectable HCS errors**—Number of cells dropped because the cell delineation failed. These errors most likely indicate that a SONET/SDH layer problem has occurred. • **Correctable HCS errors**—Number of correctable HCS errors that occurred. The cell delineation process can recover from these errors and locate the ATM cell boundary, although the framing process is not quite stable. The ATM cell is not dropped. This counter increases when the cell delineation process changes its state from **present** to **sync** (for example, when a cable is plugged into the interface). The following error statistics are from the framer: • **Tx cell FIFO overruns**—Number of overruns in the transmit FIFO. • **Rx cell FIFO overruns**—Number of overruns in the receive FIFO. • **Rx cell FIFO underruns**—Number of underruns in the receive FIFO. • **Input cell count**—Number of ATM cells received by the interface (not including idle cells). • **Output cell count**—Number of ATM cells transmitted by the interface (including idle cells). • **Output idle cell count**—Number of idle cells sent by the port. When ATM has nothing to send, it sends idle cells to fill the time slot. • **Output VC queue drops**—Number of packets dropped by a port on the PIC. Packets are dropped because of queue limits on the VCs. The following error statistics are from the SAR: • **Input no buffers**—Number of AAL5 packets dropped because no channel blocks or buffers were available to handle them. • **Input length errors**—Number of AAL5 packets dropped because their length was incorrect. Usually, these errors occur because a cell has been corrupted or lost, or because the length field was corrupted. They can also mean the AAL5 length field was zero. • **Input timeouts**—Number of AAL5 packets dropped because of a reassembly timeout. • **Input invalid VCs**—Number of AAL5 packets dropped because the header was unrecognized (because the VC was not correct or not configured). • **Input bad CRCs**—Number of AAL5 packets dropped because of frame check sequence errors. • **Input OAM cell no buffers**—Number of received OAM cells or raw cells dropped because no buffers were available to handle them. • **L2 circuit out-of-sequence packets**—(Layer 2 AAL5 mode) Number of AAL5 packets that are out of sequential order. • **Denied packets count**—The number of packets dropped due to VLAN priority deny packets or due to an error forwarding configuration that might cause a negative frame length, that is, the stripping size is larger than the packet size.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number.	**extensive**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **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. • **Priority**—Queue priority: **low** or **high**. • **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**

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

VPI	(ATM2) Virtual path identifier information:
	• **Flags**—VPI flags can be one or more of the following:
	  ◦ **Active** (virtual path is up)
	  ◦ **OAM** (operation and maintenance is enabled)
	  ◦ **Shaping** (shaping is configured)
	• **CBR, Peak**
	• **OAM, Period**—Interval at which OAM F4 loopback cells are sent.
	• **Up count**—Number of F4 OAM cells required to consider the virtual path up; the range is **1** through **255**.
	• **Down count**—Number of F4 OAM cells required to consider the virtual path down; the range is **1** through **255**.
	• **Total down time**—Total number of seconds the VPI has been down since it was opened, using the format **Total down time:** ***hh:mm:ss*** or **Never.**
	• **Last down**—Time of last **Down** transition, using the format **Last down:** ***hh:mm:ss*** **ago** or **Never**.
	• **OAM F4 cell statistics**—(Nonpromiscuous mode) OAM F4 statistics:
	  ◦ **Total received**—Number of OAM F4 cells received.
	  ◦ **Total sent**—Number of OAM F4 cells sent.
	  ◦ **Loopback received**—Number of OAM F4 loopback cells received.
	  ◦ **Loopback sent**—Number of OAM F4 loopback cells sent.
	  ◦ **Last received**—Time at which the last OAM F4 cell was received.
	  ◦ **Last sent**—Time at which the last OAM F4 cell was sent.
	  ◦ **RDI received**—Number of OAM F4 cells received with the remote defect indication bit set.
	  ◦ **RDI sent**—Number of OAM F4 cells sent with the RDI bit set.
	  ◦ **AIS received**—Number of OAM F4 cells received with the alarm indication signal bit set.
	  ◦ **AIS sent**—Number of OAM F4 cells sent with the AIS bit set.
	Traffic statistics:
	• **Input bytes**—Number of bytes received on the VPI.
	• **Output bytes**—Number of bytes transmitted on the VPI.
	• **Input packets**—Number of packets received on the VPI.
	• **Output packets**—Number of packets transmitted on the VPI.
		detail extensive none

Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 15: ATM show interfaces Output Fields *(continued)*

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

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

VCI	Virtual circuit identifier number and information:
	• **Flags**—VCI flags:
	  ◦ **Active**—VCI is up and in working condition.
	  ◦ **CCC down**—VCI CCC is not in working condition.
	  ◦ **Closed**—VCI is closed because the user disabled the logical or physical interface from the CLI.
	  ◦ **Configured**—VCI is configured.
	  ◦ **Down**—VCI is not in working condition. The VCI might have alarms, defects, F5 AIS/RDI, or no response to OAM loopback cells.
	  ◦ **ILMI**—VCI is up and in working condition.
	  ◦ **OAM**—OAM loopback is enabled.
	  ◦ **Multicast**—VCI is a multicast VCI or DLCI.
	  ◦ **Multipoint destination**—VCI is configured as a multipoint destination.
	  ◦ **None**—No VCI flags.
	  ◦ **Passive-OAM**—Passive OAM is enabled.
	  ◦ **Shaping**—Shaping is enabled.
	  ◦ **Sustained**—Shaping rate is set to **Sustained**.
	  ◦ **Unconfigured**—VCI is not configured.
	• **Total down time**—Total number of seconds the VCI has been down, using the format **Total down time:** ***hh:mm:ss*** or**Never**.
	• **Last down**—Time of last **Down** transition, using the format **Last down:** ***hh:mm:ss***.
	• **EPD threshold**—(ATM2 only) Threshold at which a packet is dropped when the queue size (in number of cells) exceeds the early packet-discard (EPD) value.
		All levels

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

VCI (continued)	• **Transmit weight cells**—(ATM2 only) Amount of bandwidth assigned to this queue.
	• **ATM per-VC transmit statistics**:
	  ◦ **Tail queue packet drops**—Number of packets dropped because of bandwidth constraints. This value indicates that packets are queued to send out at a rate faster than allowed.
	• **OAM F4 cell statistics**—(Nonpromiscuous mode) OAM F4 statistics:
	  ◦ **Total received**—Number of OAM F4 cells received.
	  ◦ **Total sent**—Number of OAM F4 cells sent.
	  ◦ **Loopback received**—Number of OAM F4 loopback cells received.
	  ◦ **Loopback sent**—Number of OAM F4 loopback cells sent.
	  ◦ **Last received**—Time at which the last OAM F4 cell was received.
	  ◦ **Last sent**—Time at which the last OAM F4 cell was sent.
	  ◦ **RDI received**—Number of OAM F4 cells received with the remote defect indication bit set.
	  ◦ **RDI sent**—Number of OAM F4 cells sent with the RDI bit set.
	  ◦ **AIS received**—Number of OAM F4 cells received with the alarm indication signal bit set.
	  ◦ **AIS sent**—Number of OAM F4 cells sent with the AIS bit set.
	• **Traffic statistics**—Number and rate of bytes and packets received and transmitted on the physical interface.
	  ◦ **Input bytes**—Number of bytes received on the interface.
	  ◦ **Output bytes**—Number of bytes transmitted on the interface.
	  ◦ **Input packets**—Number of packets received on the interface
	  ◦ **Output packets**—Number of packets transmitted on the interface.
		All levels

IMA group properties	• **Version**—The specified IMA specification version, either IMA 1.0 or IMA 1.1.
	• **Frame length**—The specified frame size, which can be 32, 64, 128, or 256.
	• **Differential delay**—Maximum differential delay among links in milliseconds.
	• **Symmetry**—Either Common Transmit Clock or Independent Transmit Clock timing mode.
	• **Transmit clock**—The specified IMA clock mode, either common or independent.
	• **Minimum links**—The number of minimum active links specified in both transmit and receive directions.
	  ◦ **Transmit**—The per-PIC limit on the number of minimum active links in the transmit direction.
	  ◦ **Receive**—The per-PIC limit on the number of minimum active links in the receive direction.
	• **Frame synchronization**—The specified IMA frame synchronization state transition variables (Alpha, Beta, and Gamma) and their specified values.
	  ◦ **Alpha**—The number of consecutive invalid ICP cells for IFSM.
	  ◦ **Beta**—The number of consecutive errored ICP cells for IFSM.
	  ◦ **Gamma**—The number of consecutive valid ICP cells for IFSM.
	• **Links**—The number of IMA links assigned to the IMA group.
		detail extensive none

Table 15: ATM show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA group alarms	• **Start-up-FE**—Far-end group alarm status • **Config-Aborted**—Near-end configuration aborted group alarm status • **Config-Aborted-FE**—Far-end configuration aborted group alarm status • **Insufficient-Links**—Near-end insufficient links group alarm status • **Insufficient-Links-FE**—Far-end insufficient links group alarm status • **Blocked-FE**—Far-end blocked group alarm status • **GR-Timing-Mismatch**—Group timing mismatch alarm status	**detail extensive** none
IMA group defects	• **Start-up-FE**—Far-end group defect status • **Config-Aborted**—Near-end configuration aborted group defect status • **Config-Aborted-FE**—Far-end configuration aborted group defect status • **Insufficient-Links**—Near-end insufficient links group defect status • **Insufficient-Links-FE**—Far-end insufficient links group defect status • **Blocked-FE**—Far-end blocked group defect status • **GR-Timing-Mismatch**—Group timing mismatch defect status	**detail extensive** none
IMA Group state	Near-end and far-end group status	**detail extensive** none
IMA group media	IMA group media status, including seconds, count and state for the following media parameters: • **FC** • **FC-FE** • **Addr-Mismatch** • **Running** • **UAS**	**detail extensive** none

Sample Output

show interfaces (ATM, IMA Group)

```
user@host> show interfaces at-1/0/0
Physical interface: at-1/0/0, Enabled, Physical link is Up
  IMA group properties:
    Version               : 1.1
    Frame length          : 128
    Differential delay    : 25 milliseconds
    Symmetry              : Symmetrical Configuration and Operation
    Transmit clock        : Common
    Minimum links         : Transmit: 1, Receive: 1
    Frame synchronization: Alpha: 2, Beta: 2, Gamma: 1
    Links                 : None
  IMA group alarms   : Start-up-FE Config-Aborted Config-Aborted-FE
Insufficient-Links Insufficient-Links-FE Blocked-FE GR-Timing-Mismatch
  IMA group defects : Start-up-FE Config-Aborted Config-Aborted-FE
Insufficient-Links Insufficient-Links-FE Blocked-FE GR-Timing-Mismatch
  IMA Group state:
    Near end : Start up
    Far  end : Start up
  IMA group media:         Seconds        Count  State
```



```
  FC                                        0
  FC-FE                                     0
  Addr-Mismatch                             0
  Running                      0
  UAS                          0
```

show interfaces extensive (ATM IMA Group)

```
user@host> show interfaces at-0/0/10 extensive
Physical interface: at-0/0/10, Enabled, Physical link is Up
   Interface index: 178, SNMP ifIndex: 540, Generation: 531
  Link-level type: ATM-PVC, MTU: 2048, Speed: Unspecified, Loopback: None, Payload
 scrambler: Enabled
   Device flags   : Present Running
   Link flags     : None
   CoS queues     : 8 supported, 4 maximum usable queues
   Hold-times     : Up 0 ms, Down 0 ms
   Current address: 00:00:5e:00:53:0a
   Last flapped   : 2012-03-16 16:49:15 PDT (2d 07:12 ago)
   Statistics last cleared: 2012-03-16 16:56:58 PDT (2d 07:05 ago)
   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, Invalid VCs: 0, Framing errors: 0, Policed discards:
0, L3 incompletes: 0, L2 channel errors: 0,
     L2 mismatch timeouts: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors:
0, Resource errors: 0
   IMA group properties:
     Version               : 1.1
     Frame length          : 128
     Differential delay    : 25 milliseconds
     Symmetry              : Symmetrical Configuration and Operation
     Transmit clock        : Common
     Minimum links         : Transmit: 1, Receive: 1
     Frame synchronization: Alpha: 2, Beta: 2, Gamma: 1
     Link #1               : t1-0/0/4             up
   IMA Group alarms    : None
   IMA Group defects   : None

   IMA Group state:
     Near end : Operational
     Far  end : Operational
   IMA group media:         Seconds        Count  State
     FC                                      0
     FC-FE                                   0
     Addr-Mismatch                           0
     Running                 198306
     UAS                          0
   ATM status:
     HCS state:     Sync
     LOC      :       OK
```



```
  ATM Statistics:
    Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
 0, Rx cell FIFO overruns: 0,
    Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 0, Output
 idle cell count: 0,
    Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
 timeouts: 0, Input invalid VCs: 0,
     Input bad CRCs: 0, Input OAM cell no buffers: 0
   Packet Forwarding Engine configuration:
     Destination slot: 0
     VPI 2
       Flags: Active
       Total down time: 0 sec, Last down: Never
         Traffic statistics:
          Input  bytes  :                     0
          Output bytes  :                     0
          Input  packets:                     0
          Output packets:                     0

   Logical interface at-0/0/10.602 (Index 71) (SNMP ifIndex 1057) (Generation
17226)
     Flags: Point-To-Point SNMP-Traps CCC-Down 0x0 Encapsulation:
ATM-CCC-Cell-Relay
     L2 circuit cell bundle size: 1, bundle timeout: 125 usec, timeout count: 0
     L2 circuit out-of-sequence count: 0, denied packets count: 0
```

show interfaces (ATM1, SONET Mode)

```
user@host> show interfaces at-1/0/0
Physical interface: at-1/0/0, Enabled, Physical link is Up
  Interface index: 300, SNMP ifIndex: 194
  Description: to allspice at-1/0/0
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:00:5e:00:53:fe
  Last flapped   : 2006-02-24 14:28:12 PST (6d 01:51 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None

  Logical interface at-1/0/0.0 (Index 64) (SNMP ifIndex 204)
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.220.24/30, Local: 192.168.220.26,
        Broadcast: 192.168.220.27
    Protocol iso, MTU: 4470
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Input packets : 0
        Output packets: 0
```

show interfaces brief (ATM1, SONET Mode)

```
user@host> show interfaces at-1/0/0 brief
Physical interface: at-1/0/0, Enabled, Physical link is Up
  Description: to allspice at-1/0/0
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None

  Logical interface at-1/0/0.0
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
    inet  192.168.220.26/30
    iso
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
```

show interfaces detail (ATM1, SONET Mode)

```
user@host> show interfaces at-1/0/0 detail
Physical interface: at-1/0/0, Enabled, Physical link is Up
  Interface index: 300, SNMP ifIndex: 194, Generation: 183
  Description: to allspice at-1/0/0
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:fe
  Last flapped   : 2006-02-24 14:28:12 PST (6d 01:55 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
  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

  SONET alarms   : None
  SONET defects  : None

  Logical interface at-1/0/0.0 (Index 64) (SNMP ifIndex 204) (Generation 5)
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
```

```
 Output bytes  :                    0
 Input  packets:                    0
 Output packets:                    0
Transit statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                    0                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                    0                    0 pps
Protocol inet, MTU: 4470, Generation: 13, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 192.168.220.24/30, Local: 192.168.220.26,
    Broadcast: 192.168.220.27, Generation: 14
Protocol iso, MTU: 4470, Generation: 14, Route table: 0
  Flags: None
VCI 0.128
  Flags: Active
  Total down time: 0 sec, Last down: Never
  ATM per-VC transmit statistics:
   Tail queue packet drops: 0
  Traffic statistics:
   Input  bytes  :                    0
   Output bytes  :                    0
   Input  packets:                    0
   Output packets:                    0
```

show interfaces extensive (ATM1, SONET Mode)

```
user@host> show interfaces at-1/0/0 extensive
Physical interface: at-1/0/0, Enabled, Physical link is Up
  Interface index: 300, SNMP ifIndex: 194, Generation: 183
  Description: to allspice at-1/0/0
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:fe
  Last flapped   : 2006-02-24 14:28:12 PST (6d 01:56 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, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,

    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

    Resource errors: 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

SONET alarms   : None
SONET defects  : None
SONET PHY:           Seconds        Count  State
  PLL Lock                 0            0  OK
  PHY Light                0            0  OK
SONET section:
  BIP-B1                   0            0
  SEF                      0            0  OK
  LOS                      0            0  OK
  LOF                      0            0  OK
  ES-S                     0
  SES-S                    0
  SEFS-S                   0
SONET line:
  BIP-B2                   0            0
  REI-L                    0            0
  RDI-L                    0            0  OK
  AIS-L                    0            0  OK
  BERR-SF                  0            0  OK
  BERR-SD                  0            0  OK
  ES-L                     0
  SES-L                    0
  UAS-L                    0
  ES-LFE                   0
  SES-LFE                  0
  UAS-LFE                  0
SONET path:
  BIP-B3                   0            0
  REI-P                    0            0
  LOP-P                    0            0  OK
  AIS-P                    0            0  OK
  RDI-P                    0            0  OK
  UNEQ-P                   1            1  OK
  PLM-P                    0            0  OK
  ES-P                     1
  SES-P                    1
  UAS-P                    0
  ES-PFE                   0
  SES-PFE                  0
  UAS-PFE                  0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x13, C2(cmp) : 0x13, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x13, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
ATM status:
  HCS state:     Sync
  LOC      :       OK
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0,
  Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 0,
  Output idle cell count: 0, Output VC queue drops: 0, Input no buffers: 0,
```



```
    Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,
    Input bad CRCs: 0, Input OAM cell no buffers: 0
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    CoS transmit queue          Bandwidth         Buffer      Priority    Limit
                       %             bps     %     usec
    0 best-effort      95       147744000    95        0           low    none
    3 network-control   5         7776000     5        0           low    none

  Logical interface at-1/0/0.0 (Index 64) (SNMP ifIndex 204) (Generation 5)
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                   0 bps
     Output bytes  :                    0                   0 bps
     Input  packets:                    0                   0 pps
     Output packets:                    0                   0 pps
    Protocol inet, MTU: 4470, Generation: 13, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.220.24/30, Local: 192.168.220.26,
        Broadcast: 192.168.220.27, Generation: 14
    Protocol iso, MTU: 4470, Generation: 14, Route table: 0
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
```

show interfaces (ATM2, SDH Mode)

```
user@host> show interfaces at-0/2/1
Physical interface: at-0/2/1, Enabled, Physical link is Up
  Interface index: 154, SNMP ifIndex: 42
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SDH mode, Speed: OC3,

  Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:00:5e:00:53:3f
  Last flapped   : 2006-03-24 13:29:58 PST (00:04:48 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SDH   alarms   : None
```

```
  SDH   defects  : None
    VPI 0
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                    0
         Output packets:                    0

  Logical interface at-0/2/1.0 (Index 75) (SNMP ifIndex 51)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-SNAP
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.12.6, Local: 10.0.12.5
    Protocol iso, MTU: 4470
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 0
        Input packets : 0
        Output packets: 0

  Logical interface at-0/2/1.32767 (Index 76) (SNMP ifIndex 50)
    Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    Input packets : 0
    Output packets: 0
    VCI 0.4
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 0, Transmit weight cells: 0
        Input packets : 0
        Output packets: 0
```

show interfaces brief (ATM2, SDH Mode)

```
user@host> show interfaces at-0/2/1 brief
Physical interface: at-0/2/1, Enabled, Physical link is Up
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SDH mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  Logical interface at-0/2/1.0
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-SNAP
    inet  10.0.12.5        --> 10.0.12.6
    iso
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 0

  Logical interface at-0/2/1.32767
    Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    VCI 0.4
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 0, Transmit weight cells: 0
```

show interfaces detail (ATM2, SDH Mode)

```
user@host> show interfaces at-0/2/1 detail
Physical interface: at-0/2/1, Enabled, Physical link is Up
  Interface index: 154, SNMP ifIndex: 42, Generation: 40
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SDH mode, Speed: OC3,

  Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:3f
  Last flapped   : 2006-03-24 13:29:58 PST (00:05:10 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
  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

  SDH   alarms   : None
  SDH   defects  : None
    VPI 0
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Traffic statistics:
         Input  bytes  :                    0
         Output bytes  :                    0
         Input  packets:                    0
         Output packets:                    0

  Logical interface at-0/2/1.0 (Index 75) (SNMP ifIndex 51) (Generation 25)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-SNAP
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 4470, Generation: 62, Route table: 0
      Flags: None
```



```
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.12.6, Local: 10.0.12.5, Broadcast: Unspecified,
        Generation: 58
    Protocol iso, MTU: 4470, Generation: 63, Route table: 0
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 0
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
  Logical interface at-0/2/1.32767 (Index 76) (SNMP ifIndex 50) (Generation 26)
    Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    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
    VCI 0.4
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 0, Transmit weight cells: 0
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
```

show interfaces extensive (ATM2, SDH Mode)

```
user@host> show interfaces at-0/2/1 extensive
Physical interface: at-0/2/1, Enabled, Physical link is Up
  Interface index: 154, SNMP ifIndex: 42, Generation: 40
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SDH mode, Speed: OC3,

  Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:3f
  Last flapped   : 2006-03-24 13:29:58 PST (00:06:49 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
```



```
Input errors:
  Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,

  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  Resource errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 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

SDH   alarms   : None
SDH   defects  : None
SDH PHY:              Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 1            1  OK
SDH regenerator section:
  RS-BIP8                   2         8828
  OOF                       2            2  OK
  LOS                       2            1  OK
  LOF                       2            1  OK
  RS-ES                     4
  RS-SES                    3
  RS-SEFS                   2
SDH multiplex section:
  MS-BIP24                  2          771
  MS-FEBE                   1        17476
  MS-FERF                   2            1  OK
  MS-AIS                    2            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  MS-ES                     4
  MS-SES                    2
  MS-UAS                    0
  MS-ES-FE                  3
  MS-SES-FE                 2
  MS-UAS-FE                 0
SDH path:
  HP-BIP8                   1            6
  HP-FEBE                   1          251
  HP-LOP                    0            0  OK
  HP-AIS                    2            1  OK
  HP-FERF                   3            2  OK
  HP-UNEQ                   1            1  OK
  HP-PLM                    2            1  OK
  HP-ES                     4
  HP-SES                    3
  HP-UAS                    0
  HP-ES-FE                  3
  HP-SES-FE                 3
  HP-UAS-FE                 0
Received SDH overhead:
```

```
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x13, C2(cmp) : 0x13, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SDH overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x13, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
  ATM status:
    HCS state:     Sync
    LOC      :       OK
  ATM Statistics:
    Uncorrectable HCS errors: 0, Correctable HCS errors: 0,
    Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
    Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 0,
    Output idle cell count: 0, Output VC queue drops: 0, Input no buffers: 0,
    Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,
    Input bad CRCs: 0, Input OAM cell no buffers: 0
  Packet Forwarding Engine configuration:
    Destination slot: 0
    VPI 0
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Traffic statistics:
         Input  bytes  :                    0
         Output bytes  :                    0
         Input  packets:                    0
         Output packets:                    0

  Logical interface at-0/2/1.0 (Index 75) (SNMP ifIndex 51) (Generation 25)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-SNAP
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 4470, Generation: 62, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.12.6, Local: 10.0.12.5, Broadcast: Unspecified,
        Generation: 58
    Protocol iso, MTU: 4470, Generation: 63, Route table: 0
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 0
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
```



```
      Input  packets:                    0
      Output packets:                    0
  Logical interface at-0/2/1.32767 (Index 76) (SNMP ifIndex 50) (Generation 26)
    Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    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
    VCI 0.4
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 0, Transmit weight cells: 0
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
```

show interfaces (ATM2, SONET Mode)

```
user@host> show interfaces at-0/3/1
Physical interface: at-0/3/1, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 67
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:00:5e:00:53:5e
  Last flapped   : 2006-03-13 17:46:36 PST (16:01:12 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None
    VPI 0
      Flags: Active, OAM, Shaping
      CBR, Peak: 50kbps
      OAM, Period 30 sec, Up count: 10, Down count: 10
      Total down time: 0 sec, Last down: Never
     OAM F4 cell statistics:
      Total received: 4, Total sent: 4
      Loopback received: 4, Loopback sent: 4
      RDI received: 0, RDI sent: 0
      AIS received: 0
  Traffic statistics:
         Input  packets:                    4
         Output packets:                   30
    VPI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
         Input  packets:                    0
```



```
       Output packets:                    0
  Logical interface at-0/3/1.0 (Index 78) (SNMP ifIndex 77)
    Flags: Point-To-Point Copy-PLP-To-CLP SNMP-Traps 0x4000
    Encapsulation: ATM-SNAP
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.59.5, Local: 10.0.59.6
    Protocol iso, MTU: 4470
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 10
        Input packets : 0
        Output packets: 0

  Logical interface at-0/3/1.32767 (Index 79) (SNMP ifIndex 76)
    Flags: Point-To-Multipoint Copy-PLP-To-CLP No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    Input packets : 4
    Output packets: 30
    VCI 0.16
      Flags: Active, ILMI
      Total down time: 0 sec, Last down: Never
      EPD threshold: 0, Transmit weight cells: 0
        Input packets : 0
        Output packets: 26
    VCI 0.4
      Flags: Active, OAM
      OAM, Period 30 sec, Up count: 10, Down count: 10
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 0
        Input packets : 4
        Output packets: 4
     OAM F4 cell statistics:
      Total received: 4, Total sent: 4
      Loopback received: 4, Loopback sent: 4
      RDI received: 0, RDI sent: 0
      AIS received: 0, AIS sent: 0
```

show interfaces brief (ATM2, SONET Mode)

```
user@host> show interfaces at-0/3/1 brief
Physical interface: at-0/3/1, Enabled, Physical link is Up
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None

  Logical interface at-0/3/1.0
    Flags: Point-To-Point Copy-PLP-To-CLP SNMP-Traps 0x4000
    Encapsulation: ATM-SNAP
    inet  10.0.59.6        --> 10.0.59.5
    iso
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 10
```



```
Logical interface at-0/3/1.32767
  Flags: Point-To-Multipoint Copy-PLP-To-CLP No-Multicast SNMP-Traps 0x4000
  Encapsulation: ATM-VCMUX
  VCI 0.16
    Flags: Active, ILMI
    Total down time: 0 sec, Last down: Never
    EPD threshold: 0, Transmit weight cells: 0
  VCI 0.4
    Flags: Active, OAM
    Total down time: 0 sec, Last down: Never
    EPD threshold: 2129, Transmit weight cells: 0
```

show interfaces detail (ATM2, SONET Mode)

```
user@host> show interfaces at-0/3/1 detail
Physical interface: at-0/3/1, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 67, Generation: 22
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:5e
  Last flapped   : 2006-03-13 17:46:36 PST (16:02:39 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  312                    0 bps
   Output bytes  :                 2952                    0 bps
   Input  packets:                    6                    0 pps
   Output packets:                   50                    0 pps
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   44                   44                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   6                    6                    0

  SONET alarms   : None
  SONET defects  : None
    VPI 0
      Flags: Active, OAM, Shaping
      CBR, Peak: 50kbps
      OAM, Period 30 sec, Up count: 10, Down count: 10
      Total down time: 0 sec, Last down: Never
     OAM F4 cell statistics:
      Total received: 6, Total sent: 6
      Loopback received: 6, Loopback sent: 6
      Last received: 00:00:29, Last sent: 00:00:29
      RDI received: 0, RDI sent: 0
      AIS received: 0
        Traffic statistics:
         Input  bytes  :                  312
         Output bytes  :                 2952
         Input  packets:                    6
         Output packets:                   50
```

```
    VPI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
        Traffic statistics:
         Input  bytes  :                  0
         Output bytes  :                  0
         Input  packets:                  0
         Output packets:                  0

  Logical interface at-0/3/1.0 (Index 78) (SNMP ifIndex 77) (Generation 20)
    Flags: Point-To-Point Copy-PLP-To-CLP SNMP-Traps 0x4000
    Encapsulation: ATM-SNAP
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
    Local statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
    Transit statistics:
     Input  bytes  :                  0                    0 bps
     Output bytes  :                  0                    0 bps
     Input  packets:                  0                    0 pps
     Output packets:                  0                    0 pps
    Protocol inet, MTU: 4470, Generation: 38, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.59.5, Local: 10.0.59.6, Broadcast: Unspecified,
        Generation: 44
    Protocol iso, MTU: 4470, Generation: 39, Route table: 0
      Flags: None
    VCI 0.128
      Flags: Active
      Total down time: 0 sec, Last down: Never
      EPD threshold: 2129, Transmit weight cells: 10
      ATM per-VC transmit statistics:
       Tail queue packet drops: 0
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  Logical interface at-0/3/1.32767 (Index 79) (SNMP ifIndex 76) (Generation 21)
    Flags: Point-To-Multipoint Copy-PLP-To-CLP No-Multicast SNMP-Traps 0x4000
    Encapsulation: ATM-VCMUX
    Traffic statistics:
     Input  bytes  :                360
     Output bytes  :               3302
     Input  packets:                  6
     Output packets:                 50
    Local statistics:
     Input  bytes  :                360
     Output bytes  :               3302
     Input  packets:                  6
     Output packets:                 50
    VCI 0.16
      Flags: Active, ILMI
      Total down time: 0 sec, Last down: Never
```



```
          EPD threshold: 0, Transmit weight cells: 0
          ATM per-VC transmit statistics:
           Tail queue packet drops: 0
          Traffic statistics:
           Input  bytes  :                     0
           Output bytes  :                  2640
           Input  packets:                     0
           Output packets:                    44
        VCI 0.4
          Flags: Active, OAM
          OAM, Period 30 sec, Up count: 10, Down count: 10
          Total down time: 0 sec, Last down: Never
          EPD threshold: 2129, Transmit weight cells: 0
          ATM per-VC transmit statistics:
           Tail queue packet drops: 0
          Traffic statistics:
           Input  bytes  :                   312
           Output bytes  :                   312
           Input  packets:                     6
           Output packets:                     6
         OAM F4 cell statistics:
          Total received: 6, Total sent: 6
          Loopback received: 6, Loopback sent: 6
          Last received: 00:00:29, Last sent: 00:00:29
          RDI received: 0, RDI sent: 0
          AIS received: 0, AIS sent: 0
```

show interfaces extensive (ATM2, SONET Mode)

```
user@host> show interfaces at-0/3/1 extensive
Physical interface: at-0/3/1, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 67, Generation: 22
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5e:00:53:5e
  Last flapped   : 2006-03-13 17:46:36 PST (16:04:12 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  520                    0 bps
   Output bytes  :                 4240                    0 bps
   Input  packets:                   10                    0 pps
   Output packets:                   72                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,

    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

    Resource errors: 0
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   62                   62                    0

    1 expedited-fo                   0                    0                    0
```

```
  2 assured-forw                 0                    0                    0

  3 network-cont                10                   10                    0

SONET alarms   : None
SONET defects  : None
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    0            0
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      0
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      0
  SES-L                     0
  UAS-L                     0
  ES-LFE                    0
  SES-LFE                   0
  UAS-LFE                   0
SONET path:
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    1            1  OK
  PLM-P                     0            0  OK
  ES-P                      1
  SES-P                     1
  UAS-P                     0
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x13, C2(cmp) : 0x13, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x13, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
ATM status:
  HCS state:     Sync
  LOC      :       OK
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0,
  Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 0,
  Output idle cell count: 0, Output VC queue drops: 0, Input no buffers: 0,
```



```
  Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
  Destination slot: 0
  VPI 0
    Flags: Active, OAM, Shaping
    CBR, Peak: 50kbps
    OAM, Period 30 sec, Up count: 10, Down count: 10
    Total down time: 0 sec, Last down: Never
   OAM F4 cell statistics:
    Total received: 10, Total sent: 10
    Loopback received: 10, Loopback sent: 10
    Last received: 00:00:02, Last sent: 00:00:02
    RDI received: 0, RDI sent: 0
    AIS received: 0
      Traffic statistics:
       Input  bytes  :                520
       Output bytes  :               4240
       Input  packets:                 10
       Output packets:                 72
  VPI 10
    Flags: Active
    Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0

Logical interface at-0/3/1.0 (Index 78) (SNMP ifIndex 77) (Generation 20)
  Flags: Point-To-Point Copy-PLP-To-CLP SNMP-Traps 0x4000
  Encapsulation: ATM-SNAP
  Traffic statistics:
   Input  bytes  :                0
   Output bytes  :                0
   Input  packets:                0
   Output packets:                0
  Local statistics:
   Input  bytes  :                0
   Output bytes  :                0
   Input  packets:                0
   Output packets:                0
  Transit statistics:
   Input  bytes  :                0                    0 bps
   Output bytes  :                0                    0 bps
   Input  packets:                0                    0 pps
   Output packets:                0                    0 pps
  Protocol inet, MTU: 4470, Generation: 38, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.0.59.5, Local: 10.0.59.6, Broadcast: Unspecified,
      Generation: 44
  Protocol iso, MTU: 4470, Generation: 39, Route table: 0
    Flags: None
  VCI 0.128
    Flags: Active
    Total down time: 0 sec, Last down: Never
    EPD threshold: 2129, Transmit weight cells: 10
    ATM per-VC transmit statistics:
     Tail queue packet drops: 0
    Traffic statistics:
```



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

Logical interface at-0/3/1.32767 (Index 79) (SNMP ifIndex 76) (Generation 21)
  Flags: Point-To-Multipoint Copy-PLP-To-CLP No-Multicast SNMP-Traps 0x4000
  Encapsulation: ATM-VCMUX
  Traffic statistics:
   Input  bytes  :                660
   Output bytes  :               5473
   Input  packets:                 11
   Output packets:                 83
  Local statistics:
   Input  bytes  :                660
   Output bytes  :               5473
   Input  packets:                 11
   Output packets:                 83
  VCI 0.16
    Flags: Active, ILMI
    Total down time: 0 sec, Last down: Never
    EPD threshold: 0, Transmit weight cells: 0
    ATM per-VC transmit statistics:
     Tail queue packet drops: 0
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                 4320
     Input  packets:                    0
     Output packets:                   72
  VCI 0.4
    Flags: Active, OAM
    OAM, Period 30 sec, Up count: 10, Down count: 10
    Total down time: 0 sec, Last down: Never
    EPD threshold: 2129, Transmit weight cells: 0
    ATM per-VC transmit statistics:
     Tail queue packet drops: 0
    Traffic statistics:
     Input  bytes  :                  572
     Output bytes  :                  572
     Input  packets:                   11
     Output packets:                   11
   OAM F4 cell statistics:
    Total received: 11, Total sent: 11
    Loopback received: 11, Loopback sent: 11
    Last received: 00:00:18, Last sent: 00:00:18
    RDI received: 0, RDI sent: 0
    AIS received: 0, AIS sent: 0
```

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

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 on page 45

List of Sample Output

show interfaces (Gigabit Ethernet) on page 677
show interfaces (Gigabit Ethernet on MX Series Routers) on page 678
show interfaces extensive (Gigabit Ethernet on MX Series Routers showing interface transmit statistics configuration) on page 678
show interfaces brief (Gigabit Ethernet) on page 678
show interfaces detail (Gigabit Ethernet) on page 679
show interfaces extensive (Gigabit Ethernet IQ2) on page 680
show interfaces (Gigabit Ethernet Unnumbered Interface) on page 683
show interfaces (ACI Interface Set Configured) on page 684

Output Fields

Table 16 on page 662 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 17 on page 676.

Table 16: 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: • **Online**—Autonegotiation is manually configured as online. • **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 16: 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 16: 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. • **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. • **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. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes. 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: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **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. • **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. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **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. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 16: 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: • **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. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. 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. • **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. • **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. • **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. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface. NOTE: In DPCs that are not of the enhanced type, such as DPC 40x 1GE R, DPCE 20x 1GE + 2x 10GE R, or DPCE 40x 1GE R, you might notice a discrepancy in the output of the **show interfaces** command because incoming packets might be counted in the Egress queues section of the output. This problem occurs on non-enhanced DPCs because the egress queue statistics are polled from IMQ (Inbound Message Queuing) block of the I-chip. The IMQ block does not differentiate between ingress and egress WAN traffic; as a result, the combined statistics are displayed in the egress queue counters on the Routing Engine. In a simple VPLS scenario, if there is no MAC entry in DMAC table (by sending unidirectional traffic), traffic is flooded and the input traffic is accounted in IMQ. For bidirectional traffic (MAC entry in DMAC table), if the outgoing interface is on the same I-chip then both ingress and egress statistics are counted in a combined way. If the outgoing interface is on a different I-chip or FPC, then only egress statistics are accounted in IMQ. This behavior is expected with non-enhanced DPCs	**detail extensive**

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Queue counters (Egress)	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. 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**
Queue counters (Ingress)	CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **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**. • **None**—There are no active defects or alarms. • **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. • **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. • **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: • **Corrected Errors**—Count of corrected errors in the last second. • **Corrected Error Ratio**—Corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits.	**detail extensive**

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

Field Name	Field Description	Level of Output
PCS statistics	(10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device. • **Bit errors**—Number of seconds during which at least one bit error rate (BER) occurred while the PCS receiver is operating in normal mode. • **Errored blocks**—Number of seconds when at least one errored block occurred while the PCS receiver is operating in normal mode.	**detail extensive**

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

<table>
<tr><th>Field Name</th><th>Field Description</th><th>Level of Output</th></tr>
<tr><td>MAC statistics</td><td>Receive and Transmit statistics reported by the PIC's MAC subsystem, including the following:

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.
Unicast packets, Broadcast packets, and Multicast packets—Number of unicast, broadcast, and multicast packets.
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).
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.
MAC control frames—Number of MAC control frames.
MAC pause frames—Number of MAC control frames with pause operational code.
Oversized frames—There are two possible conditions regarding the number of oversized frames:
Packet length exceeds 1518 octets, or
Packet length exceeds MRU
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.
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.
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.

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.
Code violations—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.”
</td><td>extensive</td></tr>
<tr><td>OTN Received Overhead Bytes</td><td>APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08</td><td>extensive</td></tr>
<tr><td>OTN Transmitted Overhead Bytes</td><td>APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08</td><td>extensive</td></tr>
</table>

Table 16: 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. • **Input packet count**—Number of packets received from the MAC hardware that the filter processed. • **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address. • **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). • **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. • **Output packet count**—Number of packets that the filter has given to the MAC hardware. • **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. • **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. • **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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **PHY Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**

Table 16: 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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

Table 16: 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: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Autonegotiation information	Information about link autonegotiation. • **Negotiation status:** ◦ **Incomplete**—Ethernet interface has the speed or link mode configured. ◦ **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation. ◦ **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful. • **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful. • **Link partner**—Information from the remote Ethernet device: ◦ **Link mode**—Depending on the capability of the link partner, either **Full-duplex** or **Half-duplex**. ◦ **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). ◦ **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. • **Local resolution**—Information from the local Ethernet device: ◦ **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). ◦ **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: • **Destination slot**—FPC slot number.	**extensive**

Table 16: 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. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **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. • **Priority**—Queue priority: **low** or **high**. • **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 16: 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. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **pop**—The outer VLAN tag of the incoming frame is removed. • **swap**—The outer VLAN tag of the incoming frame is overwritten with the user-specified VLAN tag information. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **push-push**—Two VLAN tags are pushed in from the incoming frame. • **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. • **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user-specified VLAN tag value. • **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. • **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: • Source Family Inet • 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
Neighbor Discovery Protocol (NDP)Queue Statistics	NDP statistics for protocol **inet6** under logical interface statistics. • **Max nh cache**—Maximum interface neighbor discovery nexthop cache size. • **New hold nh limit**—Maximum number of new unresolved nexthops. • **Curr nh cnt**—Current number of resolved nexthops in the NDP queue. • **Curr new hold cnt**—Current number of unresolved nexthops in the NDP queue. • **NH drop cnt**—Number of NDP requests not serviced.	All levels
Dynamic Profile	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	Name of the service name table for the interface configured with a PPPoE family.	**detail extensive** none

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Max Sessions	Maximum number of PPPoE logical interfaces that can be activated on the underlying interface.	**detail extensive** none
Duplicate Protection	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. • **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. • **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. 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**

Table 16: show interfaces (Gigabit Ethernet) Output Fields *(continued)*

Field Name	Field Description	Level of Output
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 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 17: 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: Input bytes: 496 bytes per packet, representing the Layer 2 packet MAC statistics: Received octets: 500 bytes per packet, representing the Layer 2 packet + 4 bytes	The additional 4 bytes are for the CRC.

Table 17: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type *(continued)*

Interface Type	Sample Command	Byte and Octet Counts Include	Comments
Inbound logical interface	**show interfaces ge-0/3/0.50 extensive**	Traffic statistics: Input bytes: 478 bytes per packet, representing the Layer 3 packet	
Outbound physical interface	**show interfaces ge-0/0/0 extensive**	Traffic statistics: Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes MAC statistics: 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: 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: 00:00:5e:00:53:7c, Hardware address: 00:00:5e:00:53:7c
  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: 00:00:5e:00:53:c0, Hardware address: 00:00:5e:00:53:76
  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: Up SNMP-Traps 0x4004000 Encapsulation: ENET2
    Input packets : 10232
    Output packets: 10294
    Protocol inet, MTU: 1500
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 203.0.113/24, Local: 203.0.113.1, Broadcast: 203.0.113.255
   Protocol inet6, MTU: 1500
    Max nh cache: 4, New hold nh limit: 100000, Curr nh cnt: 4, Curr new hold
cnt: 4, NH drop cnt: 0
      Flags: Is-Primary
      Addresses, Flags: Is-Default Is-Preferred Is-Primary
        Destination: 2001:db8:/32, Local: 2001:db8::5
      Addresses, Flags: Is-Preferred
        Destination: 2001:db8:1::/32, Local: 2001:db8:223:9cff:fe9f:3e78
    Protocol multiservice, MTU: Unlimited
      Flags: Is-Primary
```

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: 00:00:5e:00:53:7c, Hardware address: 00:00:5e:00:53:7c
  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: 00:00:5e:00:53:74, Hardware address: 00:00:5e:00:53:74
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: 203.0.113/24, Local: 203.0.113.2, Broadcast: 203.0.113.255,
       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 16 on page 662.

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: 00:00:5e:00:53:f8, Hardware address: 00:00:5e:00:53: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: 203.0.113.22
```


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 (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

(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 691
show interfaces (PPPoE over Aggregated Ethernet) on page 691
show interfaces brief (PPPoE) on page 691
show interfaces detail (PPPoE) on page 692
show interfaces extensive (PPPoE on M120 and M320 Routers) on page 693

Output Fields

Table 18 on page 685 lists the output fields for the **show interfaces** (PPPoE) command. Output fields are listed in the approximate order in which they appear.

Table 18: 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
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none

Table 18: show interfaces (PPPoE) Output Fields *(continued)*

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

Table 18: 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 physical interface if IPv6 statistics tracking is enabled. NOTE: These fields include dropped traffic and exception traffic, as those fields are not separately defined. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface: • **Errors**—Sum of incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of 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: • **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. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of B chip Tx drops and IXP Tx net transmit drops.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number (which reflects its initialization sequence).	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 18: show interfaces (PPPoE) Output Fields *(continued)*

Field Name	Field Description	Level of Output
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: • LCP restart timer—Length of time (in milliseconds) between successive Link Control Protocol (LCP) configuration requests. • NCP restart timer—Length of time (in milliseconds) between successive Network Control Protocol (NCP) configuration requests.	**detail**
PPPoE	PPPoE status: • **State**—State of the logical interface (**up** or **down**). • **Session ID**—PPPoE session ID. • **Service name**—Type of service required. Can be used to indicate an Internet service provider (ISP) name or a class or quality of service. • **Configured AC name**—Configured access concentrator name. • **Auto-reconnect timeout**—Time after which to try to reconnect after a PPPoE session is terminated, in seconds. • **Idle Timeout**—Length of time (in seconds) that a connection can be idle before disconnecting. • **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**
IPv6 transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled. NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
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**

Table 18: show interfaces (PPPoE) Output Fields *(continued)*

Field Name	Field Description	Level of Output
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. 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. • **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. • **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**. • **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.
	
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time the last keepalive packet was received, in the format ***hh*:*mm*:*ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time the last keepalive packet was sent, in the format ***hh*:*mm*:*ss***.
	
	(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
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	none **detail extensive**

Table 18: show interfaces (PPPoE) Output Fields *(continued)*

Field Name	Field Description	Level of Output
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **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.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **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
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: 00:00:5e:00:53:01,
      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: 203.0.113.1
```

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 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: 00:00:5e:00:53:12,
      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: 203.0.113.2, Local: 203.0.113.1, 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 on page 45

List of Sample Output

show interfaces demux0 (Demux) on page 701
show interfaces demux0 (PPPoE over Aggregated Ethernet) on page 702
show interfaces demux0 extensive (Targeted Distribution for Aggregated Ethernet Links) on page 703
show interfaces demux0 (ACI Interface Set Configured) on page 703

Output Fields Table 19 on page 695 lists the output fields for the **show interfaces** demux0 (Demux Interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	**brief detail extensive** none

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**brief detail extensive** none
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

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Physical info	Information about the physical interface.	**detail extensive**
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
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. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. • **IPv6 transit statistics**—Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled. NOTE: These fields include dropped traffic and exception traffic, as those fields are not separately defined. • **Input bytes**—Number of bytes received on the interface • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface whose definitions are as follows: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant packet threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**extensive**
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	none
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **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

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
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: • **Underlying interface**—The underlying interface that the demux interface uses. • **Index**—Index number of the logical interface. • **Family**—Protocol family configured on the logical interface. • **Source prefixes, total**—Total number of source prefixes for the underlying interface. • **Destination prefixes, total**—Total number of destination prefixes for the underlying interface. • **Prefix**—**inet** family prefix.	**detail extensive** none
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.
	• **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set.
	• **Input packets, Output packets**—Number of packets received and transmitted on the interface set.
	• **IPv6 transit statistics**—Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.
	NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router.
	  ◦ **Input bytes**—Number of bytes received on the interface.
	  ◦ **Output bytes**—Number of bytes transmitted on the interface.
	  ◦ **Input packets**—Number of packets received on the interface.
	  ◦ **Output packets**—Number of packets transmitted on the interface.
		detail extensive

Local statistics	Number of transit bytes and packets received and transmitted on the local interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	Number and rate of bytes and packets transiting the switch. NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
IPv6 Transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled. NOTE: The packet and byte counts in these fields include traffic that is dropped and does not leave the router. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input packets	Number of packets received on the interface.	none
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

Table 19: show interfaces demux0 (Demux Interfaces) Output Fields *(continued)*

Field Name	Field Description	Level of Output
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
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 demux0 (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: 203.0.113/24
    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: 203.0.113/24, Local: 203.0.113.13, Broadcast: 203.0.113.255,

        Generation: 434
```

show interfaces demux0 (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 demux0 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: 203.0.113.202
      Addresses, Flags: Primary Is-Default Is-Primary
        Local: 203.0.113.119
    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 interface-set (Ethernet Interface Set)

Syntax

show interfaces interface-set *interface-set-name*
<detail | terse>

Release Information

Command introduced in Junos OS Release 8.5.

Description

Display information about the specified gigabit or 10-Gigabit Ethernet interface set.

You can also use the **show interfaces interface-set** command to display information about agent circuit identifier (ACI) interface sets.

Options

interface-set *interface-set-name*—Display information about the specified Gigabit Ethernet, 10-Gigabit Ethernet, or ACI interface set.

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

Required Privilege Level

view

Related Documentation

- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45

List of Sample Output

show interfaces interface-set terse on page 705
show interfaces interface-set detail on page 705
show interfaces interface-set (ACI Interface Set) on page 706
show interfaces interface-set (L2BSA and PPPoE Subscribers) on page 706

Output Fields

Table 20 on page 704 describes the information for the **show interfaces interface-set** command.

Table 20: Ethernet show interfaces interface-set Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Interface set	Name of the interface set or sets.	All levels
Interface set index	Index number of the interface set. For ACI interface sets, the following fields are displayed: • **ACI VLAN**—ACI interface set that the router uses to create dynamic VLAN subscriber interfaces based on the agent circuit identifier value. • **PPPoE**—Dynamic PPPoE subscriber interface that the router creates using the ACI interface set.	**detail** none
Agent Circuit ID	For ACI interface sets, string in DHCP or PPPoE control packets that uniquely identifies the subscriber's access node and and the DSL line on the access node.	**detail** none
Max Sessions	For dynamic PPPoE subscriber interfaces, maximum number of PPPoE logical interfaces that that can be activated on the underlying interface.	**detail** none

Table 20: Ethernet show interfaces interface-set Output Fields *(continued)*

Field Name	Field Description	Level of Output
Max Sessions VSA Ignore	For dynamic PPPoE subscriber interfaces, whether the router is configured to ignore (clear) the PPPoE maximum session value returned by RADIUS in the Max-Clients-Per-Interface Juniper Networks VSA [26-143] and restore the PPPoE maximum session value on the underlying interface to the value configured with the **max-sessions** statement: **Off** (default) or **On**.	**detail** none
Traffic statistics	Number and rate of bytes and packets received and transmitted on the specified interface set. • **Input bytes, Output bytes**—Number of bytes and number of bytes per second received and transmitted on the interface set • **Input packets, Output packets**—Number of packets and number of packets per second received and transmitted on the interface set.	**detail**
Egress queues supported	Total number of egress queues supported on the specified interface set.	**detail**
Egress queues in use	Total number of egress queues used on the specified interface set.	**detail**
Queue counters	**Queued packets**, **Transmitted packets**, and **Dropped packets** statistics for the four forwarding classes.	**detail**
Members	List of all interface sets or, for ACI interface sets, list of all subscriber interfaces belonging to the specified ACI interface set.	**detail** none

Sample Output

show interfaces interface-set terse

```
user@host> show interfaces interface-set terse
Interface set:
   iflset-xe-11/3/0-0
   ge-1/0/1-0
   ge-1/0/1-2
```

show interfaces interface-set detail

```
user@host> show interfaces interface-set iflset-xe-11/3/0-0 detail
Interface set: iflset-xe-11/3/0-0
  Interface set index: 19
  Traffic statistics:
   Output bytes  :            751017840            401673504 bps
   Output packets:             11044380               738377 pps
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets    Dropped packets
    0 best-effort            211091327             11044380          199995746
    1 expedited-fo                   0                    0                  0
    2 assured-forw                   0                    0                  0
    3 network-cont                   0                    0                  0
  Members:
   xe-11/3/0.0
```

show interfaces interface-set (ACI Interface Set)

```
user@host> show interfaces interface-set
Interface set: aci-1001-demux0.1073741826
  Interface set index: 1
    ACI VLAN:
      Agent Circuit ID: aci-ppp-dhcp-dvlan-60
    PPPoE:
      Max Sessions: 3, Max Sessions VSA Ignore: Off
  Members:
   pp0.1073741827
```

show interfaces interface-set (L2BSA and PPPoE Subscribers)

```
user@host> show interfaces interface-set
Interface set: ge-1/0/4
  Interface set index: 6
  Members:
   ge-1/0/4.1073741908
   pp0.1073741907
```


show ppp interface

Syntax show ppp interface *interface-name*
<extensive| terse>

Release Information Command introduced in Junos OS Release 7.5.

Description Display information about PPP interfaces.

Options *interface-name*—Name of a logical interface.

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

Required Privilege Level view

List of Sample Output
show ppp interface on page 715
show ppp interface extensive on page 715
show ppp interface terse on page 715

Output Fields Table 21 on page 707 lists the output fields for the **show ppp interface** command. Output fields are listed in the approximate order in which they appear.

Table 21: show ppp interface Output Fields

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

Table 21: show ppp interface Output Fields *(continued)*

Field Name	Field Description	Level of Output
Keepalive settings	Keepalive settings for the PPP sessions on the L2TP network server (LNS). LNS based PPP sessions are supported only on service interfaces (si). • **Interval**—Time in seconds between successive keepalive requests. Keepalive aging timeout is calculated as a product of the **interval** and **Down-count** values. If the keepalive aging timeout is greater than 180 seconds, the keepalive packets are handled by the Routing Engine. If the aging timeout is less than or equal to 180 seconds, the packets are handled by the Packet Forwarding Engine. • **Up-count**—The number of keepalive packets a destination must receive to change a link's status from down to up. • **Down-count**—The number of keepalive packets a destination must fail to receive before the network takes down a link.	**extensive**
RE Keepalive statistics	Keepalive statistics for the packets handled by the Routing Engine. • **LCP echo req Tx**—LCP echo requests sent from the Routing Engine. • **LCP echo req Rx**—LCP echo requests received at the Routing Engine. • **LCP echo rep Tx**—LCP echo responses sent from the Routing Engine. • **LCP echo rep Rx**—LCP echo responses received at the Routing Engine. • **LCP echo req timeout**—Number of keepalive packets where the keepalive aging timer has expired. • **LCP Rx echo req Magic Num Failures**—LCP echo requests where the magic numbers shared between the PPP peers during LCP negotiation did not match. • **LCP Rx echo rep Magic Num Failures**—LCP echo responses where the magic numbers shared between the PPP peers during LCP negotiation did not match.	**extensive**

Table 21: show ppp interface Output Fields *(continued)*

Field Name	Field Description	Level of Output
LCP	**LCP information:** • **State**—LCP protocol state (all platforms except M120 and M320 routers): ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received. ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received. ◦ **Closed**—Link is not available for traffic. ◦ **Opened**—Link is administratively available for traffic. ◦ **Req-sent**—An attempt has been made to configure the connection. • **State**—LCP protocol state (M120 and M320 routers): ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received. ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received. ◦ **Closed**—Link is available (up), but no Open has occurred. ◦ **Closing**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received. ◦ **Opened**—Link is administratively available for traffic. A Configure-Ack has been both sent and received. ◦ **Req-sent**—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received. ◦ **Starting**—An administrative Open has been initiated, but the lower layer is still unavailable (Down). ◦ **Stopped**—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack. ◦ **Stopping**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received. • **Last started**—LCP state start time. • **Last completed**—LCP state completion time.	extensive

Table 21: show ppp interface Output Fields *(continued)*

Field Name	Field Description	Level of Output
	• **Negotiated options**: ◦ **ACFC**—Address and-Control Field Compression. A configuration option that provides a method to negotiate the compression of the Data Link Layer Address and Control fields. ◦ **Asynchronous map**—Asynchronous control character map. A configuration option used on asynchronous links such as telephone lines to identify control characters that must be replaced by a two-character sequence to prevent them from being interpreted by equipment used to establish the link. ◦ **Authentication protocol**—Protocol used for authentication. This option provides a method to negotiate the use of a specific protocol for authentication. It requires a peer to authenticate itself before allowing network-layer protocol packets to be exchanged. By default, authentication is not required. ◦ **Authentication algorithm**—Type of authentication algorithm. The Message Digest algorithm (MD5) is the only algorithm supported. ◦ **Endpoint discriminator class**—For multilink PPP (MLPPP), a configuration option that identifies the system transmitting the packet. This option advises a system that the peer on this link could be the same as the peer on another existing link. ◦ **Magic number**—A configuration option that provides a method to detect looped-back links and other data-link layer anomalies. By default, the magic number is not negotiated. ◦ **MRU**—Maximum receive unit. A configuration option that may be sent to inform the peer that the implementation can receive larger packets, or to request that the peer send smaller packets. The default value is 1500 octets. ◦ **MRRU**—For multilink PPP, the maximum receive reconstructed unit. A configuration option that specifies the maximum number of octets in the Information fields of reassembled packets. ◦ **Multilink header suspendable classes**—For MLPPP, an LCP option that advises the peer that the implementation wishes to receive fragments with a format given by the code number, with the maximum number of suspendable classes given. ◦ **Multilink header format classes**—For MLPPP, an LCP option that advises the peer that the implementation wishes to receive fragments with a format given by the code number. ◦ **PFC**—Protocol-Field-Compression. A configuration option that provides a method to negotiate the compression of the PPP Protocol field. ◦ **short sequence**—For MLPPP, an option that advises the peer that the implementation wishes to receive fragments with short, 12-bit sequence numbers.	

Table 21: show ppp interface Output Fields *(continued)*

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

Table 21: show ppp interface Output Fields *(continued)*

Field Name	Field Description	Level of Output
IPCP	Internet Protocol Control Protocol (IPCP) information. • **State**—(All platforms except M120 and M320 routers) One of the following values: ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received. ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received. ◦ **Closed**—Link is not available for traffic. ◦ **Opened**—Link is administratively available for traffic. ◦ **Req-sent**—An attempt has been made to configure the connection. • **State**—(M120 and M320 routers) One of the following values: ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received. ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received. ◦ **Closed**—Link is available (up), but no Open has occurred. ◦ **Closing**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received. ◦ **Opened**—Link is administratively available for traffic. A Configure-Ack has been both sent and received. ◦ **Req-sent**—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received. ◦ **Starting**—An administrative Open has been initiated, but the lower layer is still unavailable (Down). ◦ **Stopped**—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack. ◦ **Stopping**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received. • **Last started**—IPCP state start time. • **Last completed**—IPCP state authentication completion time. • **Negotiated options:** ◦ **compression protocol**—Negotiate the use of a specific compression protocol. By default, compression is not enabled. ◦ **local address**—Desired local address of the sender of a Configure-Request. If all four octets are set to zero, the peer provides the IP address. ◦ **primary DNS server**—Negotiate with the remote peer to select the address of the primary DNS server to be used on the local end of the link. ◦ **primary WINS server**—Negotiate with the remote peer to select the address of the primary WINS server to be used on the local end of the link. ◦ **remote address**—IP address of the remote end of the link in dotted quad notation. ◦ **secondary DNS server**—Negotiate with the remote peer to select the address of the secondary DNS server to be used on the local end of the link. ◦ **secondary WINS server**—Negotiate with the remote peer to select the address of the secondary WINS server to be used on the local end of the link. • **Negotiation mode**—PPP Network Control Protocol (NCP) negotiation mode configured for IPCP: **Active** or **Passive**	extensive

Table 21: show ppp interface Output Fields *(continued)*

Field Name	Field Description	Level of Output

IPV6CP	Internet Protocol version 6 Control Protocol (IPv6CP) information.
	• **State**—(All platforms except M120 and M320 routers) One of the following values:
	  ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received.
	  ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.
	  ◦ **Closed**—Link is not available for traffic.
	  ◦ **Opened**—Link is administratively available for traffic.
	  ◦ **Req-sent**—An attempt has been made to configure the connection.
	• **State**—(M120 and M320 routers) One of the following values:
	  ◦ **Ack-rcvd**—A Configure-Request has been sent and a Configure-Ack has been received.
	  ◦ **Ack-sent**—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.
	  ◦ **Closed**—Link is available (up), but no Open has occurred.
	  ◦ **Closing**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.
	  ◦ **Opened**—Link is administratively available for traffic. A Configure-Ack has been both sent and received.
	  ◦ **Req-sent**—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.
	  ◦ **Starting**—An administrative Open has been initiated, but the lower layer is still unavailable (Down).
	  ◦ **Stopped**—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.
	  ◦ **Stopping**—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.
	• **Last started**—IPV6CP state start time.
	• **Last completed**—IPV6CP state authentication completion time.
	• **Negotiated options**:
	  ◦ **local interface identifier**—Desired local address of the sender of a Configure-Request. If all four octets are set to zero, the peer provides the IP address.
	  ◦ **remote interface identifier**—IP address of the remote end of the link in dotted quad notation.
	• **Negotiation mode**—PPP Network Control Protocol (NCP) negotiation mode configured for IPv6CP: **Active** or **Passive**
		extensive

Table 21: show ppp interface Output Fields *(continued)*

<table>
<tr><th>Field Name</th><th>Field Description</th><th>Level of Output</th></tr>
<tr><td>OSINLCP State</td><td>OSI Network Layer Control Protocol (OSINLCP) protocol state information (all platforms except M120 and M320 routers):

State:

Ack-rcvd—Configure-Request has been sent and Configure-Ack has been received.
Ack-sent—Configure-Request and Configure-Ack have both been sent, but Configure-Ack has not yet been received.
Closed—Link is not available for traffic.
Opened—Link is administratively available for traffic.
Req-sent—Attempt has been made to configure the connection.

Last started—OSINLCP state start time.
Last completed—OSINCLP state completion time.
</td><td>extensive</td></tr>
<tr><td>TAGCP</td><td>TAGCP information.

State—(All platforms except M120 and M320 routers) One of the following values:

Ack-rcvd—A Configure-Request has been sent and a Configure-Ack has been received.
Ack-sent—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.
Closed—Link is not available for traffic.
Opened—Link is administratively available for traffic.
Req-sent—An attempt has been made to configure the connection.

State—(M120 and M320 routers) One of the following values:

Ack-rcvd—A Configure-Request has been sent and a Configure-Ack has been received.
Ack-sent—A Configure-Request and a Configure-Ack have both been sent, but a Configure-Ack has not yet been received.
Closed—Link is available (up), but no Open has occurred.
Closing—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.
Opened—Link is administratively available for traffic. A Configure-Ack has been both sent and received.
Req-sent—An attempt has been made to configure the connection. A Configure-Request has been sent but a Configure-Ack has not yet been received.
Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down).
Stopped—The system is waiting for a Down event after the This-Layer-Finished action, or after sending a Terminate-Ack.
Stopping—A Terminate-Request has been sent but a Terminate-Ack has not yet been received.

Last started—TAGCP state start time.
Last completed—TAGCP state authentication completion time.
</td><td>extensive
none</td></tr>
</table>

Sample Output

show ppp interface

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

show ppp interface extensive

```
user@host> show ppp interface si-0/0/3.0 extensive

    Session si-0/0/3.0, Type: PPP, Phase: Network
        Keepalive settings: Interval 30 seconds, Up-count 1, Down-count 3
RE Keepalive statistics:
  LCP echo req Tx        :  657 (last sent 00:50:10 ago)
  LCP echo req Rx        :    0 (last seen: never)
  LCP echo rep Tx        :    0
  LCP echo rep Rx        :  657
  LCP echo req timout    :    0
  LCP Rx echo req Magic Num Failures :    0
  LCP Rx echo rep Magic Num Failures :    0
LCP
  State: Opened
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  Negotiated options:
    Authentication protocol: PAP, Magic number: 2341124815, MRU: 4470
Authentication: PAP
  State: Success
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
IPCP
  State: Opened
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  Negotiated options:
    Local address: 203.0.113.21, Remote address: 203.0.113.22
  Negotiation mode: Active
IPV6CP
  State: Opened
  Last started: 2007-01-29 10:43:50 PST
  Last completed: 2007-01-29 10:43:50 PST
  Negotiated options:
    Local interface identifier: 2a0:a522:64:d319, Remote interface identifier: 0:0:0:c
  Negotiation mode: Passive
```

show ppp interface terse

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

show pppoe interfaces

Syntax

show pppoe interfaces
<brief | detail
<pp0.*logical*>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display session-specific information about PPPoE interfaces.

Options

none—Display interface information for all PPPoE interfaces.

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

pp0.*logical*—(Optional) Name of an interface. The logical unit number for static interfaces can be a value from 0 through 16385. The logical unit number for dynamic interfaces can be a value from 1073741824 through the maximum number of logical interfaces supported on your router.

Required Privilege Level

view

Related Documentation

- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45

List of Sample Output

show pppoe interfaces on page 718
show pppoe interfaces (Status for the Specified Interface) on page 718
show pppoe interfaces brief on page 718
show pppoe interfaces detail on page 719
show pppoe interfaces (PPPoE Subscriber Interface with ACI Interface Set) on page 719

Output Fields

Table 22 on page 716 lists the output fields for the **show pppoe interfaces** command. Output fields are listed in the approximate order in which they appear. Not all fields are displayed for PPPoE interfaces on M120 and M320 routers in server mode.

Table 22: show pppoe interfaces Output Fields

Field Name	Field Description	Level of Output
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
State	State of the logical interface: **up** or **down**.	All levels
Session ID	Session ID.	All levels
Type	Origin of the logical interface: **Static** or **Dynamic**. Indicates whether the interface was statically or dynamically created.	**detail extensive** none

Table 22: show pppoe interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Service name	Type of service required (can be used to indicate an ISP name or a class or quality of service).	**detail extensive** none
Configured AC name	Configured access concentrator name.	**detail extensive** none
Session AC name	Name of the access concentrator.	**detail extensive** none
Remote MAC address or **Remote MAC**	MAC address of the remote side of the connection, either the access concentrator or the PPPoE client.	All levels
Session uptime	Length of time the session has been up, in *hh:mm:ss*.	**detail extensive** none
Dynamic Profile	Name of the dynamic profile that was used to create this interface. If the interface was statically created, this field is not displayed.	**detail extensive** none
Underlying interface	Interface on which PPPoE is running.	All levels
Agent Circuit ID	Agent circuit identifier (ACI) that corresponds to the DSLAM interface that initiated the client service request. An asterisk is interpreted as a wildcard character and can appear at the beginning, the end, or both the beginning and end of the string. If the agent circuit ID is not configured, this field is not displayed.	**detail extensive** none
Agent Remote ID	Agent remote identifier that corresponds to the subscriber associated with the DSLAM interface that initiated the service request. An asterisk is interpreted as a wildcard character and can appear at the beginning, the end, or both at the beginning and end of the string. If the agent remote ID is not configured, this field is not displayed.	**detail extensive** none
ACI Interface Set	Internally-generated name of the dynamic ACI interface set, if configured, and the set index number of the ACI entry in the session database.	**detail extensive** none

Table 22: show pppoe interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Packet Type	Number of packets sent and received during the PPPoE session, categorized by packet type and packet errors: • **PADI**—PPPoE Active Discovery Initiation packets. • **PADO**—PPPoE Active Discovery Offer packets. • **PADR**—PPPoE Active Discovery Request packets. • **PADS**—PPPoE Active Discovery Session-Confirmation packets. • **PADT**—PPPoE Active Discovery Termination packets. • **Service name error**—Packets for which the Service-Name request could not be honored. • **AC system error**—Packets for which the access concentrator experienced an error in performing the host request. For example, the host had insufficient resources to create a virtual circuit. • **Generic error**—Packets that indicate an unrecoverable error occurred. • **Malformed packets**—Malformed or short packets that caused the packet handler to discard the frame as unreadable. • **Unknown packets**—Unrecognized packets.	**extensive**

Sample Output

show pppoe interfaces

```
user@host> show pppoe interfaces
pp0.0 Index 66
  State: Down, Session ID: None,
  Service name: None, Configured AC name: sapphire,
  Session AC name: None, Remote MAC address: 00:00:5e:00:53:00,
  Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
  Underlying interface: at-5/0/0.0 Index 71
```

show pppoe interfaces (Status for the Specified Interface)

```
user@host> show pppoe interfaces pp0.1073741827
pp0.1073741827 Index 70
  State: Session Up, Session ID: 30, Type: Dynamic,
  Session AC name: velorum,
  Remote MAC address: 00:00:5e:00:53:c1,
  Session uptime: 16:45:46 ago,
  Underlying interface: ge-2/0/3.1 Index 73
  Service name: premium
  Dynamic Profile: PppoeProfile
  Agent Circuit ID: velorum-ge-2/0/3
  Agent Remote ID: westford
```

show pppoe interfaces brief

```
user@host> show pppoe interfaces brief
Interface        Underlying             State       Session    Remote
                 interface                          ID         MAC
pp0.0            ge-2/0/3.2             Session Up  27         00:00:5e:00:53:c1
pp0.1            ge-2/0/3.2             Session Up  28         00:00:5e:00:53:c1
pp0.1073741824   ge-2/0/3.1             Session Up  29         00:00:5e:00:53:c1
```



```
pp0.1073741825  ge-2/0/3.1           Session Up  30          00:00:5e:00:53:c1
pp0.1073741826  ge-2/0/3.1           Session Up  31          00:00:5e:00:53:c1
```

show pppoe interfaces detail

```
user@host> show pppoe interfaces detail
pp0.0 Index 66
  State: Down, Session ID: None, Type: Static,
  Service name: None, Configured AC name: sapphire,
  Session AC name: None, Remote MAC address: 00:00:5e:00:53:00,
  Auto-reconnect timeout: 100 seconds, Idle timeout: Never,
  Underlying interface: at-5/0/0.0 Index 71
```

show pppoe interfaces (PPPoE Subscriber Interface with ACI Interface Set)

```
user@host> show pppoe interfaces pp0.1073741827
pp0.1073741827 Index 346
  State: Session Up, Session ID: 4, Type: Dynamic,
  Service name: AGILENT, Remote MAC address: 00:00:5e:00:53:62,
  Session AC name: nbc,
  Session uptime: 6d 02:22 ago,
  Dynamic Profile: aci-vlan-pppoe-profile,
  Underlying interface: demux0.1073741826 Index 345
  Agent Circuit ID: aci-ppp-dhcp-dvlan-50
  ACI Interface Set: aci-1002-demux0.1073741826 Index 2
```

show pppoe lockout

Syntax

show pppoe lockout
<*underlying-interface-name*>

Release Information

Command introduced in Junos OS Release 11.4.

Description

Display summary information about PPPoE clients currently undergoing lockout or currently in a lockout grace period on all PPPoE underlying logical interfaces or on a specified PPPoE underlying logical interface. You can configure PPPoE subscriber session lockout, also known as short-cycle protection, for VLAN, VLAN demux, and PPPoE-over-ATM dynamic subscriber interfaces.

Options

none—Display information about the lockout condition and the lockout grace period for PPPoE clients on all PPPoE underlying logical interfaces.

underlying-interface-name—(Optional) Name of the PPPoE underlying logical interface. If you do not specify an underlying interface, the router iteratively displays output for all existing clients undergoing lockout per PPPoE underlying logical interface.

Required Privilege Level

view

Related Documentation

- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

List of Sample Output

show pppoe lockout (ACI-Based Short-Cycle Protection) on page 721
show pppoe lockout (MAC Address-Based Short-Cycle Protection) on page 721
show pppoe lockout (Short-Cycle Protection Not Configured) on page 722

Output Fields

Table 23 on page 720 lists the output fields for the **show pppoe lockout** command. Output fields are listed in the approximate order in which they appear.

Table 23: show pppoe lockout Output Fields

Field Name	Field Description
underlying-interface-name	Name of the PPPoE underlying logical interface.
Index	Index number of the logical interface, which reflects its initialization sequence.
Device	Name of the physical interface or aggregated Ethernet bundle.
SVLAN	Stacked VLAN ID, also known as the *outer tag*.
VLAN	VLAN ID, also know as the *inner tag*.
VPI	Virtual path identifier value for the PPPoE client.
VCI	Virtual circuit identifier value for the PPPoE client.

Table 23: show pppoe lockout Output Fields *(continued)*

Field Name	Field Description
Short-Cycle Protection	State of PPPoE short-cycle protection, also known as PPPoE subscriber session lockout, on the underlying interface: • **circuit-id**—Filters PPPoE client sessions by their agent circuit identifier (ACI) value when configured for short-cycle protection • **mac-address**—Filters PPPoE client sessions by their unique media access control (MAC) address when configured for short-cycle protection • **off**—Short-cycle protection not configured for PPPoE client sessions Enabling short-cycle protection temporarily prevents (locks out) a failed or short-lived (short-cycle) PPPoE subscriber session from reconnecting to the router for a default or configurable period of time.
Lockout Time (seconds)	Displays the PPPoE lockout time range, the number of PPPoE clients in lockout condition, and the number of PPPoE clients in a lockout grace period: • **Min**—Minimum lockout time, in seconds, configured on the PPPoE underlying interface. • **Max**—Maximum lockout time, in seconds, configured on the PPPoE underlying interface. • **Total clients in lockout**—Number of PPPoE clients currently undergoing lockout. • **Total clients in lockout grace period**—Number of PPPoE clients currently in a lockout grace period. A *lockout grace period* occurs when the time between lockout events is greater than either 15 minutes or the maximum lockout time.
Client Address	MAC source address or agent circuit idenfiier (ACI) value of the PPPoE client.
Current	Current lockout time, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.
Elapsed	Time elapsed into the lockout period, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout
Next	Lockout time, in seconds, that the router uses for the next lockout event; displays a nonzero value if the PPPoE client is currently in a lockout grace period.

Sample Output

show pppoe lockout (ACI-Based Short-Cycle Protection)

```
user@host> show pppoe lockout at-1.0.0.30
at-1/0/0.30 Index 10305
Device: at-1/0/0, VPI: 1, VCI: 30
Short Cycle Protection: circuit-id,
  Lockout Time (seconds): Min: 1, Max: 300
    Total clients in lockout: 1
    Total clients in lockout grace period: 1

  Client Address                        Current    Elapsed     Next
    Relay-identifier atm 3/0:100.33          64         22      128
      00:00:5e:00:53:ab
      00:00:5e:00:53:21
```

show pppoe lockout (MAC Address-Based Short-Cycle Protection)

```
user@host> show pppoe lockout demux0.100
```

```
demux0.100 Index 10305
Device: xe-1/0/0, SVLAN: 100, VLAN: 100,
  Short-Cycle Protection: mac-address,
  Lockout Time (seconds): Min: 1, Max: 300
    Total clients in lockout: 3
    Total clients in lockout grace period: 1

  Client Address                    Current   Elapsed    Next
    00:00:5e:00:53:15                    16        10      32
    00:00:5e:00:53:ab                   256       168     300
    00:00:5e:00:53:23                     0         0       8
```

show pppoe lockout (Short-Cycle Protection Not Configured)

```
user@host> show pppoe lockout xe-1/0/0.1
xe-1/0/0.0 Index 10305
Device: xe-1/0/0,
  Short-Cycle Protection: Off,
```


show pppoe lockout atm-identifier

Syntax show pppoe lockout atm-identifier device-name *device-name* vpi *vpi-identifier* vci *vci-identifier*

Release Information Command introduced in Junos OS Release 15.2 on MX Series routers.

Description Display information about the lockout condition or lockout grace period for all PPPoE subscriber sessions associated with the specified ATM encapsulation type identifiers. Because the lockout condition persists even in the absence of an underlying interface or after automatic removal of the VLAN or VLAN demux interface, using the **show pppoe lockout atm-identifier** command enables you to display the lockout condition for PPPoE clients by specifying ATM identifying characteristics instead of the ATM interface name.

The following characteristics comprise the ATM encapsulation type identifier:

- Device name (physical interface or aggregated Ethernet bundle)
- Virtual path identifier (VPI)
- Virtual circuit identifier (VCI)

You can configure PPPoE subscriber session lockout, also known as PPPoE short-cycle protection, for VLAN, VLAN demux, and PPPoE-over-ATM dynamic subscriber interfaces.

Options *device-name*—Name of the ATM physical interface or aggregated Ethernet bundle associated with the PPPoE client for which you want to display lockout information.

vci-identifier—ATM VCI value associated with the PPPoE client for which you want to display lockout information.

Range: 0 through 65535

vpi-identifier—ATM VPI value associated with the PPPoE client for which you want to display lockout information.

Range: 0 through 255

Required Privilege Level view

Related Documentation

- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

List of Sample Output **show pppoe lockout atm-identifier device-name vpi vci (PPPoE Client with Specified VPI and VCI on ATM Physical Interface) on page 725**

Output Fields Table 24 on page 724 lists the output fields for the **show pppoe lockout atm-identifier** command. Output fields are listed in the approximate order in which they appear.

Table 24: show pppoe lockout atm-identifier Output Fields

Field Name	Field Description
underlying-interface-name	Name of the PPPoE underlying logical interface. If no associated underlying interface exists, the underlying interface name is not displayed. Instead, the command output displays only the encapsulation type identifier.
Index	Index number of the logical interface, which reflects its initialization sequence. If no associated underlying interface exists, the index number is not displayed. Instead, the command output displays only the encapsulation type identifier.
Device	Name of the ATM physical interface or aggregated Ethernet bundle.
VPI	Virtual path identifier value for the PPPoE client.
VCI	Virtual circuit identifier value for the PPPoE client.
Short Cycle Protection	State of PPPoE short-cycle protection, also known as PPPoE subscriber session lockout, on the underlying interface: • **circuit-id**—Filters PPPoE client sessions by their agent circuit identifier (ACI) value when configured for short-cycle protection. • **mac-address**—Filters PPPoE client sessions by their unique media access control (MAC) address when configured for short cycle-protection . • **off**—Short-cycle protection not configured for PPPoE client sessions.
Lockout Time (seconds)	Displays the PPPoE lockout time range, the number of PPPoE clients in lockout condition, and the number of PPPoE clients in a lockout grace period: • **Min**—Minimum lockout time, in seconds, configured on the PPPoE underlying interface. • **Max**—Maximum lockout time, in seconds, configured on the PPPoE underlying interface. • **Total clients in lockout**—Number of PPPoE clients currently undergoing lockout. • **Total clients in lockout grace period**—Number of PPPoE clients currently in a lockout grace period. A *lockout grace period* occurs when the time between lockout events is greater than either 15 minutes or the maximum lockout time.
Client Address	MAC source address or agent circuit identifier (ACI) value of the PPPoE client.
Current	Current lockout time, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.
Elapsed	Time elapsed into the lockout period, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.
Next	Lockout time, in seconds, that the router uses for the next lockout event; displays a nonzero value if the PPPoE client is currently in a lockout grace period.

Sample Output

show pppoe lockout atm-identifier device-name vpi vci (PPPoE Client with Specified VPI and VCI on ATM Physical Interface)

```
user@host> show pppoe-lockout atm-identifier device-name at-1/0/0 vpi 1 vci 30
at-1/0/0.30 Index 10305
Device: at-1/0/0, VPI: 1, VCI: 30
Short Cycle Protection: circuit-id,
  Lockout Time (seconds): Min: 1, Max: 300
    Total clients in lockout: 1
    Total clients in lockout grace period: 1

  Client Address                      Current   Elapsed    Next
    Relay-identifier atm 3/0:100.33        64        22     128
      00:00:5e:00:53:ab
      00:00:5e:00:53:21
```


show pppoe lockout vlan-identifier

Syntax

show pppoe lockout vlan-identifier device-name *device-name*
<svlan-id *svlan-identifier*>
<vlan-id *vlan-identifier*>

Release Information

Command introduced in Junos OS Release 15.2 on MX Series routers.

Description

Display information about the lockout condition or lockout grace period for all PPPoE subscriber sessions associated with the specified VLAN encapsulation type identifiers. Because the lockout condition persists even in the absence of an underlying interface or after automatic removal of the VLAN or VLAN demux interface, using the **show pppoe lockout vlan-identifier** command enables you to display the lockout condition for PPPoE clients by specifying VLAN identifying characteristics instead of the underlying interface name.

The following characteristics comprise the VLAN encapsulation type identifier:

- Device name (physical interface or aggregated Ethernet bundle)
- Stacked VLAN (S-VLAN) ID (also known as the *outer tag*)
- VLAN ID (also known as the *inner tag*)

You can configure PPPoE subscriber session lockout, also known as PPPoE short-cycle protection, for VLAN, VLAN demux, and PPPoE-over-ATM dynamic subscriber interfaces.

Options

device-name—Name of the Ethernet physical interface or aggregated Ethernet bundle associated with the PPPoE client for which you want to display lockout information.

svlan-identifier—(Optional) A valid S-VLAN identifier associated with the PPPoE client for which you want to display lockout information.

Range: 1 through 4094

vlan-identifier—(Optional) A valid VLAN identifier associated with the PPPoE client for which you want to display lockout information.

Range: 1 through 4094

Required Privilege Level

view

Related Documentation

- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Configuring Lockout of PPPoE Subscriber Sessions on page 177

List of Sample Output

show pppoe lockout vlan-identifier device-name vlan-id (Single-Tagged VLAN on Aggregated Ethernet Bundle) on page 728
show pppoe lockout vlan-identifier device-name svlan-id vlan-id (Dual-Tagged VLAN on Gigabit Ethernet Interface) on page 728
show pppoe lockout vlan-identifier device-name (Untagged VLAN on Aggregated Ethernet Bundle) on page 728

Output Fields Table 25 on page 727 lists the output fields for the **show pppoe lockout vlan-identifier** command. Output fields are listed in the approximate order in which they appear.

Table 25: show pppoe lockout vlan-identifier Output Fields

Field Name	Field Description
underlying-interface-name	Name of the PPPoE underlying logical interface. If no associated underlying interface exists, the underlying interface name is not displayed. Instead, the command output displays only the encapsulation type identifier.
Index	Index number of the logical interface, which reflects its initialization sequence. If no associated underlying interface exists, the index number is not displayed. Instead, the command output displays only the encapsulation type identifier.
Device	Name of the Ethernet physical interface or aggregated Ethernet bundle.
SVLAN	Stacked VLAN ID, also known as the *outer tag*.
VLAN	VLAN ID, also know as the *inner tag*.
Short Cycle Protection	State of PPPoE short-cycle protection, also known as PPPoE subscriber session lockout, on the underlying interface: • **circuit-id**—Filters PPPoE client sessions by their agent circuit identifier (ACI) value when configured for short-cycle protection. • **mac-address**—Filters PPPoE client sessions by their unique media access control (MAC) address when configured for short-cycle protection . • **off**—Short-cycle protection not configured for PPPoE client sessions.
Lockout Time (seconds)	PPPoE lockout time range, the number of PPPoE clients in lockout condition, and the number of PPPoE clients in a lockout grace period: • **Min**—Minimum lockout time, in seconds, configured on the PPPoE underlying interface. • **Max**—Maximum lockout time, in seconds, configured on the PPPoE underlying interface. • **Total clients in lockout**—Number of PPPoE clients currently undergoing lockout. • **Total clients in lockout grace period**—Number of PPPoE clients currently in a lockout grace period. A *lockout grace period* occurs when the time between lockout events is greater than either 15 minutes or the maximum lockout time.
Client Address	MAC source address or agent circuit identifier (ACI) value of the PPPoE client.
Current	Current lockout time, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.
Elapsed	Time elapsed into the lockout period, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.
Next	Lockout time, in seconds, that the router uses for the next lockout event; displays a nonzero value if the PPPoE client is currently in a lockout grace period.

Sample Output

show pppoe lockout vlan-identifier device-name vlan-id (Single-Tagged VLAN on Aggregated Ethernet Bundle)

```
user@host> show pppoe lockout vlan-identifier device-name ae0 vlan-id 100
Device: ae0, VLAN: 100
  Short-Cycle Protection level: mac-address,
  Lockout Time (seconds): Min: 1, Max: 300
    Total clients in lockout: 3
    Total clients in lockout grace period: 1

  Client Address                      Current    Elapsed     Next
    00:00:5e:00:53:15                      16         10       32
    00:00:5e:00:53:ab                     256        168      300
    00:00:5e:00:53:23                       0          0        8
```

show pppoe lockout vlan-identifier device-name svlan-id vlan-id (Dual-Tagged VLAN on Gigabit Ethernet Interface)

```
user@host> show pppoe lockout vlan-identifier device-name ge-1/1/0 svlan-id 100 vlan-id 1
Device: ge-1/1/0, SVLAN: 100, VLAN: 1
  Short Cycle Protection: mac-address,
  Lockout Time (sec):  Min: 30, Max: 90
    Total clients in lockout: 0
    Total clients in lockout grace period: 1
  Client Address                     Current     Elapsed     Next
    00:00:5e:00:53:22                      0           0       60
```

show pppoe lockout vlan-identifier device-name (Untagged VLAN on Aggregated Ethernet Bundle)

```
user@host> show pppoe lockout vlan-identifier device-name ae2
Device: ae3
  Short Cycle Protection: mac-address,
  Lockout Time (sec):  Min: 30, Max: 90
    Total clients in lockout: 0
    Total clients in lockout grace period: 1
  Client Address                     Current     Elapsed     Next
    00:00:5e:00:53:22                      0           0       60
```

show pppoe service-name-tables

Syntax show pppoe service-name-tables
<*table-name*>

Release Information Command introduced in Junos OS Release 10.0.

Description Display configuration information about PPPoE service name tables.

Options **none**—Display the names of configured PPPoE service name tables.

table-name—(Optional) Name of a configured PPPoE service name table.

Required Privilege Level view

Related Documentation

- *Verifying a PPPoE Configuration*
- Verifying and Managing Dynamic PPPoE Configuration on page 217

List of Sample Output show pppoe service-name-tables on page 730
show pppoe service-name-tables (For the Specified Table Name) on page 730

Output Fields Table 26 on page 729 lists the output fields for the **show pppoe service-name-tables** command. Output fields are listed in the approximate order in which they appear.

Table 26: show pppoe service-name-tables Output Fields

Field Name	Field Description	Level of Output
Service Name Table	Name of the PPPoE service name table.	none
Service Name	Name of a configured service in the PPPoE service name table: • **<empty>**—Service of zero length that represents an unspecified service • **<any>**—Default service for non-empty service entries that do not match the configured empty or named service entries • ***service-name***—Named service entry	none
Action	Action taken when the PPPoE underlying interface interface receives a PPPoE Active Discovery Initiation (PADI) packet with the specified named service, **empty** service, **any** service, or ACI/ARI pair: • **Delay *seconds***—Number of seconds that the interface delays before responding with a PPPoE Active Discovery Offer (PADO) packet • **Drop**—Interface drops (ignores) the packet. • **Terminate**—Interface responds immediately with a PADO packet	none
Dynamic Profile	Name of the dynamic profile with which the router creates a dynamic PPPoE subscriber interface. A dynamic profile can be assigned to a named service, **empty** service, **any** service, or ACI/ARI pair.	none

Table 26: show pppoe service-name-tables Output Fields *(continued)*

Field Name	Field Description	Level of Output
Routing Instance	Name of the routing instance in which to instantiate the dynamic PPPoE subscriber interface. A routing instance can be assigned to a named service, **empty** service, **any** service, or ACI/ARI pair.	none
Max Sessions	Maximum number of active PPPoE sessions that the router can establish with the specified named service, **empty** service, or **any** service.	none
Active Sessions	Current count of active PPPoE sessions created using the specified named service, **empty** service, or **any** service. The Active Sessions value cannot exceed the Max Sessions value.	none
ACI	Agent circuit identifier (ACI) that corresponds to the DSLAM interface that initiated the client service request. An asterisk is interpreted as a wildcard character and can appear at the beginning, the end, or both the beginning and end of the string. An ACI can be configured as part of an ACI/ARI pair for a named service, **empty** service, or **any** service.	none
ARI	Agent remote identifier (ARI) that corresponds to the subscriber associated with the DSLAM interface that initiated the service request. An asterisk is interpreted as a wildcard character and can appear at the beginning, the end, or both at the beginning and end of the string. An ARI can be configured as part of an ACI/ARI pair for a named service, **empty** service, or **any** service.	none
Static Interface	Name of the static PPPoE interface reserved for exclusive use by the PPPoE client with matching ACI/ARI information. A static interface can be configured only for an ACI/ARI pair.	none

Sample Output

show pppoe service-name-tables

```
user@host> show pppoe service-name-tables
Service Name Table: test1
Service Name Table: test2
Service Name Table: test3
```

show pppoe service-name-tables (For the Specified Table Name)

```
user@host> show pppoe service-name-tables Table1
Service Name Table: Table1
  Service Name: <empty>
    Action: Terminate
    Dynamic Profile: BasicPppoeProfile
    Max Sessions: 100
    Active Sessions: 3
  Service Name: <any>
    Action: Drop
    ACI: velorum-ge-2/0/3
    ARI: westford
      Action: Terminate
      Static Interface: pp0.100
    ACI: volantis-ge-5/0/5
    ARI: sunnyvale
```



```
    Action: Terminate
    Static Interface: pp0.101
Service Name: Wholesale
  Action: Terminate
  Dynamic Profile: WholesalePppoeProfile
  Routing Instance: WholesaleRI
  Max Sessions: 16000
  Active Sessions: 4
```


show pppoe sessions

Syntax

show pppoe sessions
<aci *circuit-id-string*>
<ari *remote-id-string*>
<service *service-name*>

Release Information Command introduced in Junos OS Release 10.2.

Description Display information about all active PPPoE sessions on the router, or about the active PPPoE sessions established for a specified service name, agent circuit identifier (ACI), or agent remote identifier (ARI).

Options

none—Display information for all active PPPoE sessions on the router.

aci *circuit-id-string*—(Optional) Display information only for active PPPoE sessions established with the specified agent circuit identifier. The agent circuit identifier corresponds to the DSLAM interface that initiated the service request.

ari *remote-id-string*—(Optional) Display information only for active PPPoE sessions established with the specified agent remote identifier. The agent remote identifier corresponds to the subscriber associated with the DSLAM interface that initiated the service request.

service *service-name*—(Optional) Display information only for active PPPoE sessions established with the specified service, where *service-name* can be **empty**, **any**, or a named service.

Required Privilege Level view

Related Documentation

- *Verifying a PPPoE Configuration*
- Verifying and Managing Dynamic PPPoE Configuration on page 217

List of Sample Output

show pppoe sessions (For All Active Sessions) on page 733
show pppoe sessions (For All Active Sessions Matching the Agent Circuit Identifier) on page 733

Output Fields Table 27 on page 732 lists the output fields for the **show pppoe sessions** command. Output fields are listed in the approximate order in which they appear.

Table 27: show pppoe sessions Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the statically-created or dynamically-created PPPoE interface for the active PPPoE session.	none
Underlying interface	Interface on which PPPoE is running.	none

Table 27: show pppoe sessions Output Fields *(continued)*

Field Name	Field Description	Level of Output
State	State of the PPPoE session; displays **Session Up** for active PPPoE sessions.	none
Session ID	PPPoE session identifier.	none
Remote MAC	MAC address of the remote side of the connection, either the access concentrator or the PPPoE client.	none

Sample Output

show pppoe sessions (For All Active Sessions)

```
user@host> show pppoe sessions
Interface        Underlying            State        Session     Remote
                 interface                          ID          MAC
pp0.0            ge-2/0/3.2            Session Up   27          00:00:5e:00:53:c1
pp0.1            ge-2/0/3.2            Session Up   28          00:00:5e:00:53:c1
pp0.1073741824   ge-2/0/3.1            Session Up   29          00:00:5e:00:53:c1
pp0.1073741825   ge-2/0/3.1            Session Up   30          00:00:5e:00:53:c1
pp0.1073741826   ge-2/0/3.1            Session Up   31          00:00:5e:00:53:c1
```

show pppoe sessions (For All Active Sessions Matching the Agent Circuit Identifier)

```
user@host> show pppoe sessions aci "velorum-ge-2/0/3"
Interface        Underlying            State        Session     Remote
                 interface                          ID          MAC
pp0.0            ge-2/0/3.2            Session Up   27          00:00:5e:00:53:c1
pp0.1            ge-2/0/3.2            Session Up   28          00:00:5e:00:53:c1
```

show pppoe statistics

Syntax

show pppoe statistics
<*logical-interface-name*>

Release Information

Command introduced before Junos OS Release 7.4.
logical-interface-name option introduced in Junos OS Release 10.1.

Description

Display statistics information about PPPoE interfaces.

Options

none—Display PPPoE statistics for all interfaces.

logical-interface-name—(Optional) Name of a PPPoE underlying logical interface.

Required Privilege Level

view

Related Documentation

- *show ppp address-pool*
- show pppoe underlying-interfaces on page 736

List of Sample Output

show pppoe statistics on page 735
show pppoe statistics (For the Specified Underlying Interface Only) on page 735

Output Fields

Table 28 on page 734 lists the output fields for the **show pppoe statistics** command. Output fields are listed in the approximate order in which they appear.

Table 28: show pppoe statistics Output Fields

Field Name	Field Description
Active PPPoE sessions	Total number of active PPPoE sessions and the number of packets sent and received during the PPPoE session, categorized by packet type and packet errors: • **PADI**—PPPoE Active Discovery Initiation packets. • **PADO**—PPPoE Active Discovery Offer packets. • **PADR**—PPPoE Active Discovery Request packets. • **PADS**—PPPoE Active Discovery Session-Confirmation packets. • **PADT**—PPPoE Active Discovery Termination packets. • **Service name error**—Packets for which the Service-Name request could not be honored. • **AC system error**—Packets for which the access concentrator experienced an error in performing the host request. For example, the host had insufficient resources to create a virtual circuit. • **Generic error**—Packets that indicate an unrecoverable error occurred. • **Malformed packets**—Malformed or short packets that caused the packet handler to discard the frame as unreadable. • **Unknown packets**—Unrecognized packets.

Table 28: show pppoe statistics Output Fields *(continued)*

Field Name	Field Description
Timeouts	Information about timeouts that occurred during the PPPoE session (not displayed for M120, M320, and MX Series routers): • **PADI**—No PADR packet has been received within the timeout period. (This value is always zero and is not supported.) • **PADO**—No PPPoE Active Discovery Offer packet has been received within the timeout period. • **PADR**—No PADS packet has been received within the timeout period.

Sample Output

show pppoe statistics

```
user@host> show pppoe statistics
Active PPPoE sessions: 1
  PacketType          Sent      Received
  PADI                   0             0
  PADO                   0             0
  PADR                   0             0
  PADS                   0             0
  PADT                   0             0
  Service name error     0             0
  AC system error        0             0
  Generic error          0             0
  Malformed packets      0             0
  Unknown packets        0             0
  Timeouts
  PADI                   0
  PADO                   0
  PADR                   0
```

show pppoe statistics (For the Specified Underlying Interface Only)

```
user@host> show pppoe statistics ge-4/0/3.2
Active PPPoE sessions: 4
  PacketType                       Sent          Received
    PADI                              0                 5
    PADO                              5                 0
    PADR                              0                 5
    PADS                              4                 0
    PADT                              0                 1
    Service name error                0                 0
    AC system error                   0                 0
    Generic error                     0                 0
    Malformed packets                 0                 0
    Unknown packets                   0                 0
```

show pppoe underlying-interfaces

Syntax

show pppoe underlying-interfaces
<brief | detail | extensive>
<lockout>
<*logical-interface-name*>

Release Information

Command introduced in Junos OS Release 10.0.
lockout option added in Junos OS Release 11.4.

Description

Display information about PPPoE underlying interfaces.

Options

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

lockout—(Optional) Display summary information about the lockout condition and the lockout grace period for PPPoE clients on the PPPoE underlying interface.

logical-interface-name—(Optional) Name of a PPPoE underlying logical interface.

Required Privilege Level

view

Related Documentation

- Verifying and Managing Dynamic PPPoE Configuration on page 217
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 139
- Configuring the PPPoE Family for an Underlying Interface on page 140
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45

List of Sample Output

show pppoe underlying-interfaces brief on page 739
show pppoe underlying-interfaces detail on page 739
show pppoe underlying-interfaces extensive on page 739
show pppoe underlying-interfaces extensive (PPPoE client in lockout condition) on page 740
show pppoe underlying-interfaces lockout on page 740
show pppoe underlying-interfaces detail (Autosensing Configured for ACI-based Dynamic VLANs) on page 741

Output Fields

Table 29 on page 736 lists the output fields for the **show pppoe underlying-interfaces** command. Output fields are listed in the approximate order in which they appear.

Table 29: show pppoe underlying-interfaces Output Fields

Field Name	Field Description	Level of Output
Underlying Interface	Name of the PPPoE underlying logical interface.	All levels

Table 29: show pppoe underlying-interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Service Name Table	Name of the service name table.	All levels
Dynamic Profile	Name of the dynamic profile that was used to create this interface. If the interface was statically created, then the value is **none**.	All levels
Index	Index number of the logical interface, which reflects its initialization sequence.	**detail extensive**
State	Origin of the logical interface: **Static** or **Dynamic**. Indicates whether the interface was statically or dynamically created.	**detail extensive**
Operational States	Fields in this block are actual operational values rather than simply the configured values. The operational values can be the result of RADIUS-initiated changes.	**detail extensive**
Max Sessions	Maximum number of PPPoE logical interfaces that can be activated on the underlying interface. When this number of logical interfaces has been established, all subsequent PPPoE Active Discovery Initiation (PADI) packets are dropped and all subsequent PPPoE Active Discovery Request (PADR) packets trigger PPPoE Active Discovery Session (PADS) error responses.	**detail extensive**
Max Sessions VSA Ignore	Whether the router is configured to ignore (clear) the PPPoE maximum session value returned by RADIUS in the Max-Clients-Per-Interface Juniper Networks VSA [26-143] and restore the PPPoE maximum session value on the underlying interface to the value configure with the **max-sessions** statement: **Off** (default) or **On**.	**detail extensive** none
Active Sessions	Number of active PPPoE sessions on the underlying interface. If a dynamic profile is listed, then it is the number of active PPPoE sessions on the underlying interface that are using this profile. The Active Sessions value must not exceed the Max Sessions value.	**detail extensive**
Agent Circuit Identifier	Whether the underlying interface is configured to enable creation of (autosense) dynamic VLAN subscriber interfaces based on agent circuit identifier (ACI) information. **Autosensing** indicates that creation of ACI-based dynamic VLAN interfaces is enabled on the underlying interface. If creation of ACI-based dynamic VLANs is not configured on the underlying interface, this field does not appear.	**detail extensive** none
Duplicate Protection	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. The uniqueness of the PPPoE client is determined by the client's MAC address.	**detail extensive**
Short Cycle Protection	State of PPPoE short cycle protection: **mac-address**, **circuit-id**, or **Off**. Enabling short cycle protection, also known as PPPoE lockout, on the PPPoE underlying interface temporarily prevents (locks out) a failed or short-lived (short-cycle) PPPoE subscriber session from reconnecting to the router for a default or configurable period of time. PPPoE client sessions are identified by their unique media access control (MAC) source address or agent circuit identifier (ACI) value.	**detail extensive**

Table 29: show pppoe underlying-interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
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**
PacketType	Number of packets sent and received during the PPPoE session, categorized by packet type and packet errors: • **PADI**—PPPoE Active Discovery Initiation packets. • **PADO**—PPPoE Active Discovery Offer packets. • **PADR**—PPPoE Active Discovery Request packets. • **PADS**—PPPoE Active Discovery Session-Confirmation packets. • **PADT**—PPPoE Active Discovery Termination packets. • **Service name error**—Packets for which the Service-Name request could not be honored. • **AC system error**—Packets for which the access concentrator experienced an error in performing the host request. For example, the host had insufficient resources to create a virtual circuit. • **Generic error**—Packets that indicate an unrecoverable error occurred. • **Malformed packets**—Malformed or short packets that caused the packet handler to discard the frame as unreadable. • **Unknown packets**—Unrecognized packets.	**extensive**
Lockout Time (sec)	The PPPoE lockout time range, the number of PPPoE clients in lockout condition, and the number of PPPoE clients in a lockout grace period if **Short Cycle Protection** is enabled (**On**): • **Min**—Minimum lockout time, in seconds, configured on the PPPoE underlying interface. • **Max**—Maximum lockout time, in seconds, configured on the PPPoE underlying interface. • **Total clients in lockout**—Number of PPPoE clients currently undergoing lockout. • **Total clients in lockout grace period**—Number of PPPoE clients currently in a lockout grace period. A *lockout grace period* occurs when the time between lockout events is greater than either 15 minutes or the maximum lockout time.	**extensive**
Client Address	MAC source address of the PPPoE client.	**extensive**
Current	Current lockout time, in seconds; displays **0** (zero) if the PPPoE client is not undergoing lockout.	**extensive**
Elapsed	Time elapsed into the lockout period, in seconds; displays **0**zero) if the PPPoE client is not undergoing lockout	**extensive**
Next	Lockout time, in seconds, that the router uses for the next lockout event; displays a nonzero value if the PPPoE client is currently in a lockout grace period.	**extensive**

Sample Output

show pppoe underlying-interfaces brief

```
user@host> show pppoe underlying-interfaces brief
Underlying Interface     Service Name Table    Dynamic Profile
ge-4/0/3.1               Premium               None
ge-4/0/3.2               None                  PppoeProfile
```

show pppoe underlying-interfaces detail

```
user@host> show pppoe underlying-interfaces detail
ge-4/0/3.1 Index 73
  Operational States:
  State: Static, Dynamic Profile: None,
  Max Sessions: 4000, Max Sessions VSA Ignore: Off,
  Active Sessions: 0,
  Service Name Table: Premium,
  Direct Connect: Off,
  AC Name: velorum, Duplicate Protection: On,
  Short Cycle Protection: Off

ge-4/0/3.2 Index 78
  Operational States:
  State: Dynamic, Dynamic Profile: PppoeProfile,
  Max Sessions: 500, Max Sessions VSA Ignore: Off,
  Active Sessions: 3,
  Service Name Table: None,
  Direct Connect: Off,
  AC Name: velorum, Duplicate Protection: On,
  Short Cycle Protection: Off
```

show pppoe underlying-interfaces extensive

```
user@host> show pppoe underlying-interfaces extensive
ge-4/0/3.1 Index 73
  Operational States:
  State: Static, Dynamic Profile: None,
  Max Sessions: 4000, Max Sessions VSA Ignore Off,
  Active Sessions: 0,
  Service Name Table: None,
  Direct Connect: Off,
  AC Name: velorum, Duplicate Protection: Off,
  Short Cycle Protection: Off

  PacketType                         Sent         Received

    PADI                                0                0
    PADO                                0                0
    PADR                                0                0
    PADS                                0                0
    PADT                                0                0
    Service name error                  0                0
    AC system error                     0                0
    Generic error                       0                0
    Malformed packets                   0                0
    Unknown packets                     0                0

ge-4/0/3.2 Index 78
  Operational States:
```

```
  State: Dynamic, Dynamic Profile: PppoeProfile,
  Max Sessions: 4000, Max Sessions VSA Ignore: Off
  Active Sessions: 3,
  Service Name Table: None,
  Direct Connect: Off,
  AC Name: velorum, Duplicate Protection: Off,
  Short Cycle Protection: Off

  PacketType                        Sent          Received
    PADI                               0                 5
    PADO                               5                 0
    PADR                               0                 5
    PADS                               4                 0
    PADT                               0                 1
    Service name error                 0                 0
    AC system error                    0                 0
    Generic error                      0                 0
    Malformed packets                  0                 0
    Unknown packets                    0                 0
```

show pppoe underlying-interfaces extensive (PPPoE client in lockout condition)

```
user@host> show pppoe underlying-interfaces ge-1/0/0/.0 extensive
ge-1/0/0.0 Index 71
  State: Static, Dynamic Profile: None,
  Max Sessions: 32000, Max Sessions VSA Ignore: Off,
  Active Sessions: 0,
  Service Name Table: None,
  Direct Connect: Off,
  AC name: winona, Duplicate Protection: On,
  Short Cycle Protection: Off

  PacketType                        Sent          Received
    PADI                               0                 7
    PADO                               3                 0
    PADR                               0                 3
    PADS                               3                 0
    PADT                               2                 1
    Service name error                 0                 0
    AC system error                    0                 0
    Generic error                      0                 0
    Malformed packets                  0                 0
    Unknown packets                    0                 0

  Lockout Time (sec):  Min: 1, Max: 30
    Total clients in lockout: 1
    Total clients in lockout grace period: 0

  Client Address              Current     Elapsed     Next
    00:00:5e:00:53:11               4           3        8
```

show pppoe underlying-interfaces lockout

```
user@host> show pppoe underlying-interfaces ge-1/0/0.0 lockout
ge-1/0/0.0 Index 71
  Short Cycle Protection: Off,
  Lockout Time (sec):  Min: 10, Max: 60
    Total clients in lockout: 0
    Total clients in lockout grace period: 0
```


show pppoe underlying-interfaces detail (Autosensing Configured for ACI-based Dynamic VLANs)

```
user@host> show pppoe underlying-interfaces demux0.1073741826 detail
demux0.1073741826 Index 345
  State: Dynamic, Dynamic Profile: aci-vlan-pppoe-profile,
  Max Sessions: 32000, Max Sessions VSA Ignore: Off,
  Active Sessions: 1,
  Agent Circuit Identifier: Autosensing,
  Service Name Table: None,
  Duplicate Protection: On, Short Cycle Protection: Off,
  Direct Connect: Off,
  AC Name: nbc,
  Short Cycle Protection: circuit-id,
```

show services l2tp session

Syntax

show services l2tp session
<brief | detail | extensive>
<interface *interface-name*>
<local-gateway *gateway-address*>
<local-gateway-name *gateway-name*>
<local-session-id *session-id*>
<local-tunnel-id *tunnel-id*>
<peer-gateway *gateway-address*>
<peer-gateway-name *gateway-name*>
<statistics>
<tunnel-group *group-name*>
<user *username*>

Release Information

Command introduced before Junos OS Release 7.4.
Support for LAC on MX Series routers introduced in Junos OS Release 10.4.
Support for LNS on MX Series routers introduced in Junos OS Release 11.4.

Description

(M10i and M7i routers only) Display information about active L2TP sessions for LNS.

(MX Series routers only) Display information about active L2TP sessions for LAC and LNS.

Options

none—Display standard information about all active L2TP sessions.

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

interface *interface-name*—(Optional) Display L2TP session information for only the specified adaptive services or inline services interface. The interface type depends on the line card as follows:

- **si-*fpc/pic/port***— MPCs on MX Series routers only. This option is not available for L2TP on M Series routers.
- **sp-*fpc/pic/port***—AS or Multiservices PICs on M7i, M10i, and M120 routers only. This option is not available for L2TP on MX Series routers.

local-gateway *gateway-address*—(Optional) Display L2TP session information for only the specified local gateway address.

local-gateway-name *gateway-name*—(Optional) Display L2TP session information for only the specified local gateway name.

local-session-id *session-id*—(Optional) Display L2TP session information for only the specified local session identifier.

local-tunnel-id *tunnel-id*—(Optional) Display L2TP session information for only the specified local tunnel identifier.

peer-gateway *gateway-address*—(Optional) Display L2TP session information for only the specified peer gateway address.

peer-gateway-name ***gateway-name***—(Optional) Display L2TP session information for only the specified peer gateway name.

statistics—(Optional) Display the number of control packets and bytes transmitted and received for the session. You cannot include this option with any of the level options, **brief**, **detail**, or **extensive**.

tunnel-group ***group-name***—(Optional) Display L2TP session information for only the specified tunnel group. To display information about L2TP CPU and memory usage, you can include the tunnel group name in the **show services service-sets memory-usage** ***group-name*** and **show services service-sets cpu-usage** ***group-name*** commands. This option is not available for L2TP LAC on MX Series routers.

user ***username***—(M Series routers only) (Optional) Display L2TP session information for only the specified username.

Required Privilege Level view

Related Documentation

- *L2TP Services Configuration Overview*
- *L2TP Minimum Configuration*
- *clear services l2tp session*

List of Sample Output

show services l2tp session (LNS on M Series Routers) on page 746
show services l2tp session (LNS on MX Series Routers) on page 747
show services l2tp session (LAC) on page 747
show services l2tp session detail (LAC) on page 747
show services l2tp session extensive (LAC) on page 747
show services l2tp session extensive (LAC on MX Series Routers) on page 747
show services l2tp session extensive (LNS on M Series Routers) on page 748
show services l2tp session extensive (LNS on MX Series Routers) on page 748
show services l2tp session statistics (MX Series Routers) on page 749

Output Fields Table 30 on page 743 lists the output fields for the **show services l2tp session** command. Output fields are listed in the approximate order in which they appear.

Table 30: show services l2tp session Output Fields

Field Name	Field Description	Level of Output
Interface	(LNS only) Name of an adaptive services interface.	All levels
Tunnel group	(LNS only) Name of a tunnel group.	All levels
Tunnel local ID	Identifier of the local endpoint of the tunnel, as assigned by the L2TP network server (LNS).	All levels
Session local ID	Identifier of the local endpoint of the L2TP session, as assigned by the LNS.	All levels

Table 30: show services l2tp session Output Fields *(continued)*

Field Name	Field Description	Level of Output
Session remote ID	Identifier of the remote endpoint of the L2TP session, as assigned by the L2TP access concentrator (LAC).	All levels
State	State of the L2TP session: • **Established**—Session is operating. This is the only state supported for the LAC. • **closed**—Session is being closed. • **destroyed**—Session is being destroyed. • **clean-up**—Session is being cleaned up. • **lns-ic-accept-new**—New session is being accepted. • **lns-ic-idle**—Session has been created and is idle. • **lns-ic-reject-new**—New session is being rejected. • **lns-ic-wait-connect**—Session is waiting for the peer's incoming call connected (ICCN) message.	All levels
Bundle ID	(LNS only) Bundle identifier. Indicates the session is part of a multilink bundle. Sessions that have a blank **Bundle** field are not participating in the Multilink Protocol. Sessions in a multilink bundle might belong to different L2TP tunnels. For L2TP output organized by bundle ID, issue the **show services l2tp multilink extensive** command.	All levels
Mode	(LNS) Mode of the interface representing the session: **shared** or **exclusive**. (LAC) Mode of the interface representing the session: **shared** or **dedicated**. Only **dedicated** is currently supported for the LAC.	**extensive**
Local IP	IP address of local endpoint of the Point-to-Point Protocol (PPP) session.	**extensive**
Remote IP	IP address of remote endpoint of the PPP session.	**extensive**
Username	(LNS only) Name of the user logged in to the session.	All levels
Assigned IP address	(LNS only) IP address assigned to remote client.	**extensive**
Local name	For LNS, name of the LNS instance in which the session was created. For LAC, name of the LAC.	**extensive**
Remote name	For LNS, name of the LAC from which the session was created. For LAC, name of the LAC instance.	**extensive**
Local MRU	(LNS only) Maximum receive unit (MRU) setting of the local device, in bytes.	**extensive**
Remote MRU	(LNS only) MRU setting of the remote device, in bytes.	**extensive**

Table 30: show services l2tp session Output Fields *(continued)*

Field Name	Field Description	Level of Output
Tx speed	Transmit speed of the session conveyed from the LAC to the LNS, in bits per second (bps). Either the initial (**initial**) line speed or both the initial and current (**update**) line speeds can be displayed on MX Series routers: • When connection speed updates are not enabled, then only the initial line speed is displayed. • When connection speed updates are enabled, then both the initial and the current speeds are displayed. When the Tx connect speed method is set to none, the value of zero (0) is displayed.	**extensive**
Rx speed	Receive speed of the session conveyed from the LAC to the LNS, in bits per second (bps). Either the initial (**initial**) line speed or both the initial and current (**update**) line speeds can be displayed on MX Series routers: • When connection speed updates are not enabled, then only the initial line speed is displayed. • When connection speed updates are enabled, then both the initial and the current speeds are displayed. When the Tx connect speed method is set to none, the value of zero (0) is displayed.	**extensive**
Bearer type	Type of bearer enabled: • **0**—Might indicate that the call was not received over a physical link (for example, when the LAC and PPP are located in the same subsystem). • **1**—Digital access requested. • **2**—Analog access requested. • **4**—Asynchronous Transfer Mode (ATM) bearer support.	**extensive**
Framing type	Type of framing enabled: • **1**—Synchronous framing • **2**—Asynchronous framing	**extensive**
LCP renegotiation	(LNS only) Whether Link Control Protocol (LCP) renegotiation is configured: **On** or **Off**.	**extensive**
Authentication	Type of authentication algorithm used: Challenge Handshake Authentication Protocol (CHAP) or Password Authentication Protocol (PAP).	**extensive**
Interface ID	(LNS only) Identifier used to look up the logical interface for this session.	**extensive**
Interface unit	Logical interface for this session.	All levels
Call serial number	Unique serial number assigned to the call.	**extensive**

Table 30: show services l2tp session Output Fields *(continued)*

Field Name	Field Description	Level of Output
Policer bandwidth	Maximum policer bandwidth configured for this session.	**extensive**
Policer burst size	Maximum policer burst size configured for this session.	**extensive**
Firewall filter	Configured firewall filter name.	**extensive**
Session encapsulation overhead	Overhead allowance configured for this session, in bytes.	**extensive**
Session cell overhead	Cell overhead activation (**On** or **Off**).	**extensive**
Create time	Date and time when the call was created.	**extensive**
Up time	Length of time elapsed since the call became active, in hours, minutes, and seconds.	**extensive**
Idle time	Length of time elapsed since the call became idle, in hours, minutes, and seconds.	**extensive**
Statistics since	Date and time when collection of the following statistics began: • **Control Tx**—Amount of control information transmitted, in packets and bytes. • **Control Rx**—Amount of control information received, in packets and bytes. • **Data Tx**—Amount of data transmitted, in packets and bytes. • **Data Rx**—Amount of data received, in packets and bytes. • **Errors Tx**—Number of errors transmitted, in packets. • **Errors Rx**—Number of errors received, in packets. • **LCP echo req Tx**—Number of LCP echo requests transmitted, in packets. • **LCP echo req Rx**—Number of LCP echo requests received, in packets. • **LCP echo rep Tx**—Number of LCP echo responses transmitted, in packets. • **LCP echo rep Rx**—Number of LCP echo responses received, in packets. • **LCP echo Req timout**—Number of LCP echo requests that timed out. • **LCP echo Req error**—Number of errors received for LCP echo packets. • **LCP echo Rep error** —Number of errors transmitted for LCP echo packets.	**extensive**

Sample Output

show services l2tp session (LNS on M Series Routers)

```
user@host> show services l2tp session
Interface: sp-1/2/0, Tunnel group: group1, Tunnel local ID:  8802
  Local Remote Interface State               Bundle Username
  ID    ID     unit
  37966      5         2 Established
```


show services l2tp session (LNS on MX Series Routers)

```
user@host> show services l2tp session
Tunnel local ID: 40553
  Local  Remote   State                Interface        Interface
  ID     ID                            unit             Name
  17967  1        Established          1073749824       si-5/2/0
```

show services l2tp session (LAC)

```
user@host> show services l2tp session
Tunnel local ID: 31889
  Local  Remote   State                Interface        Interface
  ID     ID                            unit             Name
   31694      1   Established                311        pp0
```

show services l2tp session detail (LAC)

```
user@host> show services l2tp session detail
Tunnel local ID: 31889
  Session local ID: 31694, Session remote ID:     1, Interface unit: 311
    State: Established, Interface: pp0, Mode: Dedicated
    Local IP: 203.0.113.2:1701, Remote IP: 203.0.113.1:1701
    Local name: ce-lac, Remote name: ce-lns
```

show services l2tp session extensive (LAC)

```
user@host> show services l2tp session extensive
Tunnel local ID: 31889
  Session local ID: 31694, Session remote ID:     1
    Interface unit: 311
    State: Established, Mode: Dedicated
    Local IP: 203.0.113.2:1701, Remote IP: 203.0.113.1:1701
    Local name: ce-lac, Remote name: ce-lns
    Tx speed: 0, Rx speed: 0
    Bearer type: 1, Framing type: 1
    LCP renegotiation: N/A, Authentication: None, Interface ID: N/A
    Interface unit: 311, Call serial number: 0
    Policer bandwidth: 0, Policer burst size: 0
    Policer exclude bandwidth: 0, Firewall filter: 0
    Session encapsulation overhead: 0, Session cell overhead: 0
    Create time: Tue Aug 24 14:38:23 2010, Up time: 01:06:25
    Idle time: N/A
```

show services l2tp session extensive (LAC on MX Series Routers)

```
user@host> show services l2tp session extensive
Tunnel local ID: 31889
  Session local ID: 31694, Session remote ID:     1
    Interface unit: 311
    State: Established, Mode: Dedicated
    Local IP: 203.0.113.102:1701, Remote IP: 203.0.113.101:1701
    Local name: ce-lac, Remote name: ce-lns
    Tx speed: initial 64000, Update 256000
    Rx speed: initial 64000, Update 256000
    Bearer type: 1, Framing type: 1
    LCP renegotiation: N/A, Authentication: None, Interface ID: N/A
    Interface unit: 311, Call serial number: 0
    Policer bandwidth: 0, Policer burst size: 0
    Policer exclude bandwidth: 0, Firewall filter: 0
    Session encapsulation overhead: 0, Session cell overhead: 0
```

```
    Create time: Tue Aug 24 14:38:23 2010, Up time: 01:06:25
    Idle time: N/A
```

show services l2tp session extensive (LNS on M Series Routers)

```
user@host> show services l2tp session extensive
Interface: sp-1/2/0, Tunnel group: group1, Tunnel local ID: 62746
  Session local ID: 56793, Session remote ID: 53304
    State: Established, Bundle ID: 5, Mode: shared
    Local IP: 203.0.113.121:1701, Remote IP: 203.0.113.202:1701
    Username: user@example.com, Assigned IP address: 203.0.113.51/32
    Local MRU: 4000, Remote MRU: 1500, Tx speed: 64000, Rx speed: 64000
    Bearer type: 2, Framing type: 1
    LCP renegotiation: Off, Authentication: CHAP, Interface ID: unit_20
    Interface unit: 20, Call serial number: 4137941434
    Policer bandwidth: 64000, Policer burst size: 51200
    Firewall filter: f1
    Session encapsulation overhead: 16, Session cell overhead: On
    Create time: Tue Mar 23 14:13:15 2004, Up time: 01:16:41
    Idle time: 00:00:00
    Statistics since: Tue Mar 23 14:13:13 2004
                        Packets        Bytes
      Control Tx              4           88
      Control Rx              2           28
      Data Tx                 0            0
      Data Rx               461        29.0k
      Errors Tx               0
      Errors Rx               0

Interface: sp-1/2/0, Tunnel group: group_company_dns, Tunnel local ID: 37266
  Session local ID: 39962, Session remote ID: 53303
    State: Established, Bundle ID: 5, Mode: shared
    Local IP: 203.0.113.121:1701, Remote IP: 203.0.113.222:1701
    Username: usr1@company.example.com, Assigned IP address: 203.0.113.3/24
    Local name: router-1, Remote name: router-2
    Local MRU: 4470, Remote MRU: 4470, Tx speed: 155000000, Rx speed: 155000000
    Bearer type: 2, Framing type: 1
    LCP renegotiation: Off, Authentication: CHAP, Interface ID: unit_31
    Interface unit: 31, Call serial number: 4137941433
    Policer bandwidth: 64000, Policer burst size: 51200
    Firewall filter: f1
    Create time: Tue Mar 23 14:13:17 2004, Up time: 01:16:39
    Idle time: 01:16:36
    Statistics since: Tue Mar 23 14:13:15 2004
                        Packets        Bytes
      Control Tx              6          196
      Control Rx              4          150
      Data Tx                 0            0
      Data Rx                 1           80
      Errors Tx               0
      Errors Rx               0
```

show services l2tp session extensive (LNS on MX Series Routers)

```
user@host> show services l2tp session extensive
Tunnel local ID: 40553
  Session local ID: 17967, Session remote ID: 1
    Interface unit: 1073749824
    State: Established
    Interface: si-5/2/0
    Mode: Dedicated
```



```
Local IP: 192.0.2.2:1701, Remote IP: 192.0.2.3:1701
Local name: lns-mx960, Remote name: testlac
Tx speed: 56000, Rx speed: 0
Bearer type: 2, Framing type: 1
LCP renegotiation: Off, Authentication: None
Call serial number: 1
Create time: Mon Apr 25 20:27:50 2011, Up time: 00:01:48
Idle time: N/A
Statistics since: Mon Apr 25 20:27:50 2011
                    Packets        Bytes
  Control Tx              4          219
  Control Rx              4          221
  Data Tx                 0            0
  Data Rx                10          228
  Errors Tx               0
  Errors Rx               0
```

show services l2tp session statistics (MX Series Routers)

```
user@host>show services l2tp session statistics local session-id 1
Tunnel local ID: 17185
Session local ID: 1, Session remote ID: 14444, Interface unit: 1073788352
State: Established
Statistics since: Mon Aug 1 13:27:47 2011
    Packets   Bytes
Data Tx   4    51
Data Rx   3    36
```

show subscribers

Syntax

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

Release Information

Command introduced in Junos OS Release 9.3.
Command introduced in Junos OS Release 9.3 for EX Series switches.
client-type, **mac-address**, **subscriber-state**, and **extensive** options introduced in Junos OS Release 10.2.
count option usage with other options introduced in Junos OS Release 10.2.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Options **aci-interface-set-name** and **agent-circuit-identifier** introduced in Junos OS Release 12.2.
The **physical-interface** and **user-name** options introduced in Junos OS Release 12.3.
Options **vci** and **vpi** introduced in Junos OS Release 12.3R3 and supported in later 12.3R*x* releases.
Options **vci** and **vpi** supported in Junos OS Release 13.2 and later releases. (Not supported in Junos OS Release 13.1.)
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Command introduced in Junos OS Release 15.1R3 on MX Series routers for enhanced subscriber management.

Description

Display information for active subscribers.

Options

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

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

address—(Optional) Display subscribers whose IP address matches the specified address. You must specify the IPv4 or IPv6 address prefix without a netmask (for example, 192.0.2.0). If you specify the IP address as a prefix with a netmask (for example, 192.0.2.0/32), the router displays a message that the IP address is invalid, and rejects the command.

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

client-type—(Optional) Display subscribers whose client type matches one of the following client types:

- **dhcp**—DHCP clients only.
- **dotlx**—Dotlx clients only.
- **essm**—ESSM clients only.
- **fwauth**—FwAuth (authenticated across a firewall) clients only.
- **l2tp**—L2TP clients only.
- **mlppp**—MLPPP clients only.
- **ppp**—PPP clients only.
- **pppoe**—PPPoE clients only.
- **static**—Static clients only.
- **vlan**—VLAN clients only.
- **vlan-oob**—VLAN out-of-band (ANCP-triggered) clients only.
- **vpls-pw**—VPLS pseudowire clients only.
- **xauth**—Xauth clients only.

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

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

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

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

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

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

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

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

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

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

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

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

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

vlan-id—(Optional) Display subscribers whose VLAN ID matches the specified VLAN ID, regardless of whether the subscriber uses a single-tagged or double-tagged VLAN. For subscribers using a double-tagged VLAN, this option displays subscribers where the inner VLAN tag matches the specified VLAN ID. To display only subscribers where the specified value matches only double-tagged VLANs, use the **stacked-vlan-id *stacked-vlan-id*** option to match the outer VLAN tag.

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

Required Privilege Level

view

Related Documentation

- show subscribers summary on page 770
- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration on page 45
- *Verifying and Managing Junos OS Enhanced Subscriber Management*

List of Sample Output

Output Fields Table 31 on page 753 lists the output fields for the **show subscribers** command. Output fields are listed in the approximate order in which they appear.

Table 31: show subscribers Output Fields

Field Name	Field Description
Interface	Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface. The * character indicates a continuation of addresses for the same session.
IP Address/VLAN ID	Subscriber IP address or VLAN ID associated with the subscriber in the form *tpid.vlan-id* No IP address or VLAN ID is assigned to an L2TP tunnel-switched session. For these subscriber sessions the value is **Tunnel-switched**.
User Name	Name of subscriber.

Table 31: show subscribers Output Fields *(continued)*

Field Name	Field Description
LS:RI	Logical system and routing instance associated with the subscriber.
Type	Subscriber client type (DHCP, L2TP, PPP, PPPoE, STATIC-INTERFACE, VLAN).
IP Address	Subscriber IPv4 address.
IP Netmask	Subscriber IP netmask. (MX Series) This field displays 255.255.255.255 by default. For tunneled or terminated PPP subscribers only, this field displays the actual value of Framed-IP-Netmask when the SDB_FRAMED_PROTOCOL attribute in the session database is equal to AUTHD_FRAMED_PROTOCOL_PPP. This occurs in the use case where the LNS generates access-internal routes when it receives Framed-IP-Netmask from RADIUS during authorization. When it receives Framed-Pool from RADIUS, the pool mask is ignored and the default /32 mask is used.
Primary DNS Address	IP address of primary DNS server.
Secondary DNS Address	IP address of secondary DNS server.
Primary WINS Address	IP address of primary WINS server.
Secondary WINS Address	IP address of secondary WINS server.
IPv6 Address	Subscriber IPv6 address, or multiple addresses.
IPv6 Prefix	Subscriber IPv6 prefix. If you are using DHCPv6 prefix delegation, this is the delegated prefix.
IPv6 User Prefix	IPv6 prefix obtained through ND/RA.
IPv6 Address Pool	Subscriber IPv6 address pool. The IPv6 address pool is used to allocate IPv6 prefixes to the DHCPv6 clients.
IPv6 Network Prefix Length	Length of the network portion of the IPv6 address.
IPv6 Prefix Length	Length of the subscriber IPv6 prefix.
Logical System	Logical system associated with the subscriber.
Routing Instance	Routing instance associated with the subscriber.
Interface	(Enhanced subscriber management for MX Series routers) Name of the enhanced subscriber management logical interface, in the form **demux0.*nnnn*** (for example, **demux0.3221225472**), to which access-internal and framed subscriber routes are mapped.
Interface Type	Whether the subscriber interface is **Static** or **Dynamic**.
Interface Set	Internally generated name of the dynamic ACI interface set used by the subscriber session.

Table 31: show subscribers Output Fields *(continued)*

Field Name	Field Description
Interface Set Type	Interface type of the ACI interface set: **Dynamic**. This is the only ACI interface set type currently supported.
Interface Set Session ID	Identifier of the dynamic ACI interface set entry in the session database.
Underlying Interface	Name of the underlying interface for the subscriber session.
Dynamic Profile Name	Dynamic profile used for the subscriber.
Dynamic Profile Version	Version number of the dynamic profile used for the subscriber.
MAC Address	MAC address associated with the subscriber.
State	Current state of the subscriber session (**Init**, **Configured**, **Active**, **Terminating**, **Tunneled**).
L2TP State	Current state of the L2TP session, **Tunneled** or **Tunnel-switched**. When the value is **Tunnel-switched**, two entries are displayed for the subscriber; the first entry is at the LNS interface on the LTS and the second entry is at the LAC interface on the LTS.
Tunnel switch Profile Name	Name of the L2TP tunnel switch profile that initiates tunnel switching.
Local IP Address	IP address of the local gateway (LAC).
Remote IP Address	IP address of the remote peer (LNS).
VLAN Id	VLAN ID associated with the subscriber in the form *tpid.vlan-id*.
Stacked VLAN Id	Stacked VLAN ID associated with the subscriber in the form *tpid.vlan-id*.
RADIUS Accounting ID	RADIUS accounting ID associated with the subscriber.
Agent Circuit ID	For the **dhcp** client type, option 82 agent circuit ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format. For the **vlan-oob** client type, the agent circuit ID or access-loop circuit identifier that identifies the subscriber line based on the subscriber-facing DSLAM interface on which the subscriber request originates.
Agent Remote ID	For the **dhcp** client type, option 82 agent remote ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format. For the **vlan-oob** client type, the agent remote ID or access-loop remote identifier that identifies the subscriber line based on the NAS-facing DSLAM interface on which the subscriber request originates.
DHCP Relay IP Address	IP address used by the DHCP relay agent.

Table 31: show subscribers Output Fields *(continued)*

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

Table 31: show subscribers Output Fields *(continued)*

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

Sample Output

show subscribers (IPv4)

```
user@host> show subscribers
Interface               IP Address/VLAN ID   User Name         LS:RI
ge-1/3/0.1073741824     10                                    default:default
demux0.1073741824       203.0.113.10        WHOLESALER-CLIENT default:default
demux0.1073741825       203.0.113.3         RETAILER1-CLIENT  test1:retailer1
demux0.1073741826       203.0.113.3         RETAILER2-CLIENT  test1:retailer2
```

show subscribers (IPv6)

```
user@host> show subscribers
Interface          IP Address/VLAN ID   User Name            LS:RI
ge-1/0/0.0         2001:db8:c0:0:0:0/74    WHOLESALER-CLIENT   default:default
     *             2001:db8:1/128          subscriber-25       default:default
```

show subscribers (IPv4 and IPv6 Dual Stack)

```
user@host> show subscribers
Interface           IP Address/VLAN ID          User Name
LS:RI
demux0.1073741834   0x8100.1002 0x8100.1
default:default
demux0.1073741835   0x8100.1001 0x8100.1
default:default
pp0.1073741836      203.0.113.13              dualstackuser1@example1.com
```

```
default:ASP-1
*                   2001:db8:1::/48
*                   2001:db8:1:1::/64
pp0.1073741837      203.0.113.33             dualstackuser2@example1.com
default:ASP-1
*                   2001:db8:1:2:5::/64
```

show subscribers (LNS on MX Series Routers)

```
user@host> show subscribers
Interface          IP Address/VLAN ID   User Name         LS:RI
si-4/0/0.1         192.0.2.0          user@example.com   default:default
```

show subscribers (L2TP Switched Tunnels)

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

si-2/1/0.1073741843 Tunnel-switched      user@example.com       default:default
```

show subscribers client-type dhcp detail

```
user@host> show subscribers client-type dhcp detail
Type: DHCP
IP Address: 203.0.113.29
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux
MAC Address: 00:00:5e:00:53:98
State: Active
Radius Accounting ID: user :2304
Login Time: 2009-08-25 14:43:52 PDT

Type: DHCP
IP Address: 203.0.113.27
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744383
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:00:5e:00:53:f3
State: Active
Radius Accounting ID: 1234 :2560
Login Time: 2009-08-25 14:43:56 PDT
```

show subscribers client-type vlan-oob detail

```
user@host> show subscribers client-type vlan-oob detail
Type: VLAN-OOB
User Name: L2WS.line-aci-1.line-ari-1
Logical System: default
Routing Instance: ISP1
Interface: demux0.1073744127
Interface type: Dynamic
```



```
Underlying Interface: ge-1/0/0
Dynamic Profile Name: Prof_L2WS
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 1234
Session ID: 77
```
VLAN Id: 126
```
Core-Facing Interface: ge-2/1/1
VLAN Map Id: 6
Inner VLAN Map Id: 2001
```
Agent Circuit ID: line-aci-1
Agent Remote ID: line-ari-1
```
Login Time: 2013-10-29 14:43:52 EDT
```

show subscribers count

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

show subscribers address detail (IPv6)

```
user@host> show subscribers address 203.0.113.137 detail
Type: PPPoE
User Name: pppoeTerV6User1Svc
IP Address: 203.0.113.137
IP Netmask: 255.0.0.0
IPv6 User Prefix: 2001:db8:0:c88::/32
Logical System: default
Routing Instance: default
Interface: pp0.1073745151
Interface type: Dynamic
Underlying Interface: demux0.8201
Dynamic Profile Name: pppoe-client-profile
MAC Address: 00:00:5e:00:53:53
Session Timeout (seconds): 31622400
Idle Timeout (seconds): 86400
State: Active
Radius Accounting ID: example demux0.8201:6544
Session ID: 6544
Agent Circuit ID: ifl3720
Agent Remote ID: ifl3720
Login Time: 2012-05-21 13:37:27 PDT
Service Sessions: 1
```

show subscribers detail (IPv4)

```
user@host> show subscribers detail
Type: DHCP
IP Address: 203.0.113.29
IP Netmask: 255.255.0.0
Primary DNS Address: 192.0.2.0
Secondary DNS Address: 192.0.2.1
Primary WINS Address: 192.0.2.3
Secondary WINS Address: 192.0.2.4
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:00:5e:00:53:98
State: Active
```



```
Radius Accounting ID: example :2304
Idle Timeout (seconds): 600
Login Time: 2009-08-25 14:43:52 PDT
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 08 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 36 2f
33 2d 37 2d 30 37 05 01 06 0f 21 2c
Service Sessions: 2
```

show subscribers detail (IPv6)

```
user@host> show subscribers detail
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2001:db8:ffff:1::/32
Logical System: default
Routing Instance: default
Interface: ge-3/1/3.2
Interface type: Static
MAC Address: 00:00:5e:00:53:03
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
```

show subscribers detail (IPv6 Static Demux Interface)

```
user@host> show subscribers detail
Type: STATIC-INTERFACE
User Name: user@example.net
IPv6 Prefix: 2001:db8:3:4:5:6:7:aa/32
Logical System: default
Routing Instance: default
Interface: demux0.1
Interface type: Static
Dynamic Profile Name: junos-default-profile
State: Active
Radius Accounting ID: 185
Login Time: 2010-05-18 14:33:56 EDT
```

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

```
user@host> show subscribers detail
Type: L2TP
User Name: user@example.net
IP Address: 203.0.113.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST
```

show subscribers detail (L2TP Switched Tunnels)

```
user@host> show subscribers detail
Type: L2TP
User Name: user@example.com
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741842
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 203.0.113.51
Remote IP Address: 192.0.2.0
Radius Accounting ID: 21
Session ID: 21
Login Time: 2013-01-18 03:01:11 PST

Type: L2TP
User Name: user@example.com
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741843
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 203.0.113.31
Remote IP Address: 192.0.2.1
Session ID: 22
Login Time: 2013-01-18 03:01:14 PST
```

show subscribers detail (Tunneled Subscriber)

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

show subscribers detail (IPv4 and IPv6 Dual Stack)

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

Type: PPPoE
```

```
User Name: dualstackuser1@example1.com
IP Address: 203.0.113.13
IPv6 Prefix: 2001:db8:1::/32
IPv6 User Prefix: 2001:db8:1:1::/32
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST

Type: DHCP
IPv6 Prefix: 2001:db8:1::/32
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Static
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: test :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
```

show subscribers detail (ACI Interface Set Session)

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

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

```
user@host> show subscribers detail
Type: PPPoE
User Name: ppphint2
IP Address: 203.0.113.15
Logical System: default
Routing Instance: default
Interface: pp0.1073741825
Interface type: Dynamic
Interface Set: aci-1001-demux0.1073741824
```



```
Interface Set Type: Dynamic
Interface Set Session ID: 2
Underlying Interface: demux0.1073741824
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: 3
Session ID: 3
Agent Circuit ID: aci-ppp-dhcp-dvlan-50
Login Time: 2012-03-07 13:46:53 PST
```

show subscribers extensive

```
user@host> show subscribers extensive
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2001:db8:ffff:1::/32
Logical System: default
Routing Instance: default
Interface: ge-3/1/3.2
Interface type: Static
MAC Address: 00:00:5e:00:53:03
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
IPv6 Address Pool: pd_pool
IPv6 Network Prefix Length: 48
```

show subscribers extensive (RPF Check Fail Filter)

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

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

```
user@host> show subscribers extensive
Type: L2TP
User Name: user@example.net
IP Address: 203.0.113.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
```

```
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST
IPv4 Input Filter Name: classify-si-5/2/0.1073749824-in
IPv4 Output Filter Name: classify-si-5/2/0.1073749824-out
```

show subscribers extensive (IPv4 and IPv6 Dual Stack)

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

Type: PPPoE
User Name: dualstackuser1@example1.com
IP Address: 203.0.113.13
IPv6 Prefix: 2001:db8:1::/32
IPv6 User Prefix: 2001:db8:1:1::/32
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST
IPv6 Delegated Network Prefix Length: 48
IPv6 Interface Address: 2001:db8:2016:1:1::1/64
IPv6 Framed Interface Id: 1:1:2:2
IPv4 Input Filter Name: FILTER-IN-pp0.1073741825-in
IPv4 Output Filter Name: FILTER-OUT-pp0.1073741825-out
IPv6 Input Filter Name: FILTER-IN6-pp0.1073741825-in
IPv6 Output Filter Name: FILTER-OUT6-pp0.1073741825-out

Type: DHCP
IPv6 Prefix: 2001:db8:1::/32
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Static
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: test :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
```



```
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
IPv6 Delegated Network Prefix Length: 48
```

show subscribers extensive (ADF Rules)

```
user@host> show subscribers extensive
...
   Service Session ID: 12
   Service Session Name: SERVICE-PROFILE
   State: Active
   Family: inet
     ADF IPv4 Input Filter Name: __junos_adf_12-demux0.3221225474-inet-in
                       Rule 0: 010101000b0101020b020200201811
                               from {
                                   source-address 203.0.113.232;
                                   destination-address 198.51.100.0/24;
                                   protocol 17;
                               }
                               then {
                                   accept;
                               }
```

show subscribers extensive (Effective Shaping-Rate)

```
user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741837
Interface type: Dynamic
Interface Set: ifset-1
Underlying Interface: ae1
Dynamic Profile Name: svlan-dhcp-test
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.201
VLAN Id: 0x8100.201
Login Time: 2011-11-30 00:18:04 PST
Effective shaping-rate: 31000000k
...
```

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

```
user@host> show subscribers aci-interface-set-name aci-1003-ge-1/0/0.4001 detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-set-profile
Dynamic Profile Version: 1
State: Active
Session ID: 13
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE
User Name: ppphint2
IP Address: 203.0.113.17
```

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

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

```
user@host> show subscribers agent-circuit-identifier aci-ppp-vlan detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-set-profile
Dynamic Profile Version: 1
State: Active
Session ID: 13
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE
User Name: ppphint2
IP Address: 203.0.113.17
Logical System: default
Routing Instance: default
Interface: pp0.1073741834
Interface type: Dynamic
Interface Set: aci-1003-ge-1/0/0.4001
Interface Set Type: Dynamic
Interface Set Session ID: 13
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:5e:00:53:52
State: Active
Radius Accounting ID: 14
Session ID: 14
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:57 PDT
```

show subscribers interface extensive

```
user@host> show subscribers interface demux0.1073741826 extensive
Type: VLAN
User Name: user@test.example.com
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Dynamic
```



```
Dynamic Profile Name: profile-vdemux-relay-23qos
MAC Address: 00:00:5e:00:53:04
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: user@test.example.com
IP Address: 192.0.2.0
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Static
MAC Address: 00:00:5e:00:53:04
State: Active
Radius Accounting ID: 21
Session ID: 21
Login Time: 2011-10-20 16:24:33 EST
Service Sessions: 2

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

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

show subscribers logical-system terse

```
user@host> show subscribers logical-system test1 terse
Interface           IP Address/VLAN ID   User Name         LS:RI
demux0.1073741825     203.0.113.3         RETAILER1-CLIENT  test1:retailer1
demux0.1073741826     203.0.113.4         RETAILER2-CLIENT  test1:retailer2
```

show subscribers physical-interface count

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

show subscribers routing-instance inst1 count

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

show subscribers stacked-vlan-id detail

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

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

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

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

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

show subscribers user-name detail

```
user@host> show subscribers user-name larry1 detail
Type: DHCP
User Name: larry1
IP Address: 203.0.113.37
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.1
Interface type: Static
Dynamic Profile Name: foo
MAC Address: 00:00:5e:00:53:01
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-11-07 08:25:59 PST
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 01 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 32 2f
37 2d 30 2d 30 37 05 01 06 0f 21 2c
```

show subscribers vlan-id

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

show subscribers vlan-id detail

```
user@host> show subscribers vlan-id 100 detail
Type: VLAN
Interface: ge-1/0/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-prof-tpid
State: Active
```



```
VLAN Id: 100
Login Time: 2009-03-11 06:48:54 PDT

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

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

```
user@host> show subscribers vpi 40 vci 50 extensive
Type: PPPoE
User Name: testuser
IP Address: 203.0.113.2
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: pp0.0
Interface type: Static
MAC Address: 00:00:5e:00:53:02
State: Active
Radius Accounting ID: 2
Session ID: 2
ATM VPI: 40
ATM VCI: 50
Login Time: 2012-12-03 07:49:26 PST
IP Address Pool: pool_1
IPv6 Framed Interface Id: 200:65ff:fe23:102
```

show subscribers address detail (Enhanced Subscriber Management)

```
user@host> show subscribers address 203.0.113.111 detail
Type: DHCP
User Name: simple_filters_service
IP Address: 203.0.113.111
IP Netmask: 255.0.0.0
Logical System: default
Routing Instance: default
Interface: demux0.3221225482
Interface type: Dynamic
Underlying Interface: demux0.3221225472
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:00:5e:00:53:0f
State: Active
Radius Accounting ID: 11
Session ID: 11
PFE Flow ID: 15
Stacked VLAN Id: 210
VLAN Id: 209
Login Time: 2014-03-24 12:53:48 PDT
Service Sessions: 1
DHCP Options: len 3
35 01 01
```


show subscribers summary

Syntax

show subscribers summary
<all>
<detail | extensive | terse>
<count>
<physical-interface *physical-interface-name*>
<logical-system *logical-system* pic | port | routing-instance *routing-instance* | slot>

Release Information

Command introduced in Junos OS Release 10.2.

Description

Display summary information for subscribers.

Options

none—Display summary information by state and client type for all subscribers.

all—(Optional) Display summary information by state, client type, and LS:RI.

detail | extensive | terse—(Not supported on MX Series routers) (Optional) Display the specified level of output.

count—(Not supported on MX Series routers) (Optional) Display the count of total subscribers and active subscribers for any specified option.

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

physical-interface *physical-interface-name*—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers whose physical interface matches the specified physical interface, by subscriber state, client type, and LS:RI.

pic—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by PIC number and the total number of subscribers.

port—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by port number and the total number of subscribers.

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

slot—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by FPC slot number and the total number of subscribers.

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

Required Privilege Level

view

Related Documentation

- show subscribers on page 750

List of Sample Output

show subscribers summary on page 772
show subscribers summary all on page 772
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Output Fields

Table 32 on page 771 lists the output fields for the **show subscribers summary** command. Output fields are listed in the approximate order in which they appear.

Table 32: show subscribers summary Output Fields

Field Name	Field Description	Level of Output
Subscribers by State	Number of subscribers summarized by state. The summary information includes the following: • Init—Number of subscriber currently in the initialization state. • Configured—Number of configured subscribers. • Active—Number of active subscribers. • Terminating—Number of subscribers currently terminating. • Terminated—Number of terminated subscribers. • Total—Total number of subscribers for all states.	**detail** none
Subscribers by Client Type	Number of subscribers summarized by client type. Client types can include DHCP, L2TP, PPP, PPPOE, STATIC-INTERFACE, VLAN, and VLAN-OOB. Also displays the total number of subscribers for all client types (Total).	**detail extensive** none
Subscribers by LS:RI	Number of subscribers summarized by logical system:routing instance (LS:RI) combination. Also displays the total number of subscribers for all LS:RI combinations (Total).	**detail** none
Subscribers by Connection Type	Number of subscribers summarized by connection type, **Cross-connected** or **Terminated**.	**extensive**
Interface	Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface. The * character indicates a continuation of addresses for the same session. For aggregated Ethernet interfaces, the output of the **summary (pic | port | slot)** options prefixes the interface name with ae0:.	All levels

Table 32: show subscribers summary Output Fields *(continued)*

Field Name	Field Description	Level of Output
Count	Count of subscribers displayed for each PIC, port, or slot when those options are specified with the **summary** option. For an aggregated Ethernet configuration, the total subscriber count does not equal the sum of the individual PIC, port, or slot counts, because each subscriber can be in more than one aggregated Ethernet link.	**detail extensive** none
Total Subscribers	Total number of subscribers for all physical interfaces, all PICS, all ports, or all LS:RI slots.	**detail extensive** none
IP Address/VLAN ID	Subscriber IP address or VLAN ID associated with the subscriber in the form *tpid.vlan-id*	**terse**
User Name	Name of subscriber.	**terse**
LS:RI	Logical system and routing instance associated with the subscriber.	**terse**

Sample Output

show subscribers summary

```
user@host> show subscribers summary

Subscribers by State
 Init      3
 Configured    2
 Active   183
 Terminating    2
 Terminated    1

 TOTAL        191

Subscribers by Client Type
 DHCP      107
 PPP        76
 VLAN          8
 VLAN-OOB        2
 TOTAL        193
```

show subscribers summary all

```
user@host> show subscribers summary all
Subscribers by State
 Init         3
 Configured       2
 Active      183
 Terminating       2
 Terminated       1

 TOTAL          191

Subscribers by Client Type
 DHCP      107
 PPP         76
 VLAN          8
```



```
 TOTAL         191

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

 TOTAL     191
```

show subscribers summary physical-interface

```
user@host> show subscribers summary physical-interface ge-1/0/0
Subscribers by State
   Active: 3998
   Total: 3998

Subscribers by Client Type
   DHCP: 3998
   Total: 3998

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

show subscribers summary physical-interface pic

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

Subscribers by Client Type
   DHCP: 4825
   Total: 4825

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

show subscribers summary physical-interface port

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

Subscribers by Client Type
   DHCP: 4825
   Total: 4825

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

show subscribers summary physical-interface slot

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

Subscribers by Client Type
   DHCP: 4825
   Total: 4825

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

show subscribers summary pic

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

Total Subscribers: 2000
```

show subscribers summary pic (Aggregated Ethernet Interfaces)

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

Total Subscribers: 801
```

show subscribers summary port

```
user@host> show subscribers summary port
Interface           Count
ge-5/0/1              201
ge-5/0/2              301

Total Subscribers: 502
```

show subscribers summary port extensive

```
user@host>show subscribers summary port extensive
Interface: ge-5/0/1
Count: 201
Detail:
Subscribers by Client Type
   DHCP: 100
   PPPoE: 100
   VLAN-OOB: 1
Subscribers by Connection Type
   Terminated: 200
   Cross-connected: 1

Interface: ge-5/0/2
Count: 301
Detail:
Subscribers by Client Type
   DHCP: 200
```



```
   PPPoE: 100
   VLAN-OOB: 1
Subscribers by Connection Type
   Terminated: 300
   Cross-connected: 1

Total Subscribers: 502
```

show subscribers summary slot

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

Total Subscribers: 2000
```

show subscribers summary terse

```
user@host> show subscribers summary terse
Interface           IP Address/VLAN ID   User Name         LS:RI
ge-1/3/0.1073741824   100                                    default:default
demux0.1073741824     203.0.113.10         WHOLESALER-CLIENT default:default
demux0.1073741825     203.0.113.13         RETAILER1-CLIENT  test1:retailer1
demux0.1073741826     203.0.113.213        RETAILER2-CLIENT  test1:retailer2
```

PART 8

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