

Junos® OS

Broadband Subscriber Management Getting Started Guide

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Junos® OS Broadband Subscriber Management Getting Started Guide
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About This Guide

Use this guide to get a high-level overview of subscriber management, including AAA support, class of service (CoS) to manage appropriate service levels; resource monitoring to enhance system stability by avoiding overuse of memory and CPU resources; and dynamic profiles to configure and provision subscribers and services.

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Introduction to Subscriber Management

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Subscriber Management Overview

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The Juniper Networks Junos OS subscriber management feature provides subscriber access, authentication, and service creation, activation, and deactivation. You can also collect accounting information and statistics for subscriber service sessions.

The subscriber access feature supports both CLI and AAA-based configuration (such as RADIUS) for subscribers. Access and services start when the router receives a message from a client (such as a DHCP discover message). For RADIUS clients, RADIUS Access-Accept messages and Change-of-Authorization-Request (CoA-Request) messages can create, modify, and delete subscriber sessions as well as activate and deactivate service sessions. You can use CLI commands to create a dynamic profile, which acts as a template of user attributes.

A subscriber service is based on the combination of a defined dynamic profile and attributes configured through authentication. Dynamic profiles can include dynamic firewall filters, class-of-service (CoS) settings, and protocol (IGMP) settings that define access limits for subscribers and the scope of a service granted to the subscriber after access is obtained.

The subscriber access feature provides the following convenience and flexibility to service providers and subscribers:

- Service providers can separate services and access technology and eliminate unprofitable flat-rate billing. They gain the ability to efficiently design, manage, and deliver services that subscribers want, and then bill subscribers based on connect time, bandwidth, and the actual service used.
- Subscribers benefit by gaining access to multiple simultaneous services. Depending on the service provider configuration, subscribers can dynamically connect to and disconnect from various services when they want and for however long they want. Subscribers can be billed based on the service level and usage, rather than being charged a set rate regardless of usage.

To understand more about Subscriber Management Licensing, see [Subscriber Access Licensing Overview](#) and [Configuring the Router to Strictly Enforce the Subscriber Scaling License](#). Please refer to the [Juniper Licensing Guide](#) for general information about License Management. Please refer to the product [Data Sheets](#) for details, or contact your Juniper Account Team or Juniper Partner.

Subscriber Access Terms and Acronyms

[Table 1 on page 3](#) defines terms and acronyms that are used in this discussion of subscriber access.

Table 1: Subscriber Access Terms and Acronyms

Term	Definition
AAA method for subscriber authentication	The AAA method that uses authentication (for example, including RADIUS VSAs in the Access-Accept packet) to verify a subscriber and activate a service when the subscriber logs in.
Dynamic profile	A template that defines a set of characteristics that are combined with authorization attributes and are dynamically assigned to static interfaces to provide dynamic subscriber access and services for broadband applications.
RADIUS CoA method	The method that uses RADIUS CoA-Request messages and VSAs to activate a service for a subscriber that is already logged in.
Subscriber access technology	The technology used by a subscriber to access services (for example, DHCP).

AAA Service Framework and Subscriber Management Overview

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

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

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

Class of Service and Subscriber Management Overview

Class of service (CoS) enables you to divide traffic into classes and offer various levels of throughput and acceptable packet loss when congestion occurs. CoS also provides the option of using differentiated services when best-effort traffic delivery is insufficient. You can also configure the services router to provide hierarchical scheduling for subscribers by dynamically adding or deleting queues when subscribers require services.

By using a dynamic profile, you can provide all subscribers in your network with default CoS parameters when they log in. For example, you can configure an access dynamic profile to specify that all subscribers receive a basic data service. If you use RADIUS variables in the dynamic profile, you can enable the service to be activated for those subscribers at login. You can also use variables to configure a service profile that enables subscribers to activate a service or upgrade to different services through RADIUS change-of-authorization (CoA) messages following initial login.

Configuring Subscriber Access

This topic provides a broad overview of some of the common configuration tasks for subscriber access and management. You can find detailed information in the following Junos OS User Guides:

- [Broadband Subscriber Sessions User Guide](#)
- [Broadband Subscriber Access Protocols User Guide](#)

- [Broadband Subscriber Services User Guide](#)
- [Broadband Subscriber VLANs and Interfaces User Guide](#)
- [Broadband Subscriber Management Wholesale User Guide](#)

To configure subscriber access:

1. Configure the client access protocol.

- Configure DHCP local server.

See *Understanding Differences Between Legacy DHCP and Extended DHCP*.

- Configure DHCP relay.

See *Extended DHCP Relay Agent Overview*.

- Configure PPP.

See [Configuring Logical Interface Properties](#) and [Configuring PPPoE](#)

2. Configure subscriber authentication, accounting, and addressing.

a. Configure RADIUS:

- i. Specify the RADIUS servers.

See *Specifying RADIUS Authentication and Accounting Servers for Subscriber Access*.

- ii. Specify any optional server attributes.

See *Configuring Authentication and Accounting Parameters for Subscriber Access*.

- iii. (Optional) Configure the CoA feature for the RADIUS dynamic-request server to change or deactivate the service after login.

See *Configuring RADIUS-Initiated Dynamic Request Support*.

- iv. Configure subscriber accounting (RADIUS accounting).

See *Configuring Per-Subscriber Session Accounting*.

b. Configure addressing:

- See *Address-Assignment Pool Configuration Overview*.

3. Create and manage dynamic profiles for access and service.

a. Configure a basic dynamic profile.

See ["Configuring a Basic Dynamic Profile" on page 51](#).

See *Example: Minimum PPPoE Dynamic Profile*

- b. Configure a dynamic profile for access.

See *Configuring Dynamic DHCP Client Access to a Multicast Network*.

- c. Configure a dynamic profile for services.

See *Defining Various Levels of Services for DHCP Subscribers*.

- d. Configure a default subscriber service.

See *Configuring a Default Subscriber Service*.

- e. Configure the static subscriber interfaces to be referenced in the dynamic profile.

- f. Specify the interface-name and unit variables that the router uses to dynamically associate to a subscriber's incoming interface.

- g. Add, modify, or delete dynamic profile values to manage subscriber access and services.

The router dynamically activates or modifies the subscriber service using the RADIUS configuration.

- When the subscriber logs in, the router dynamically activates the service.

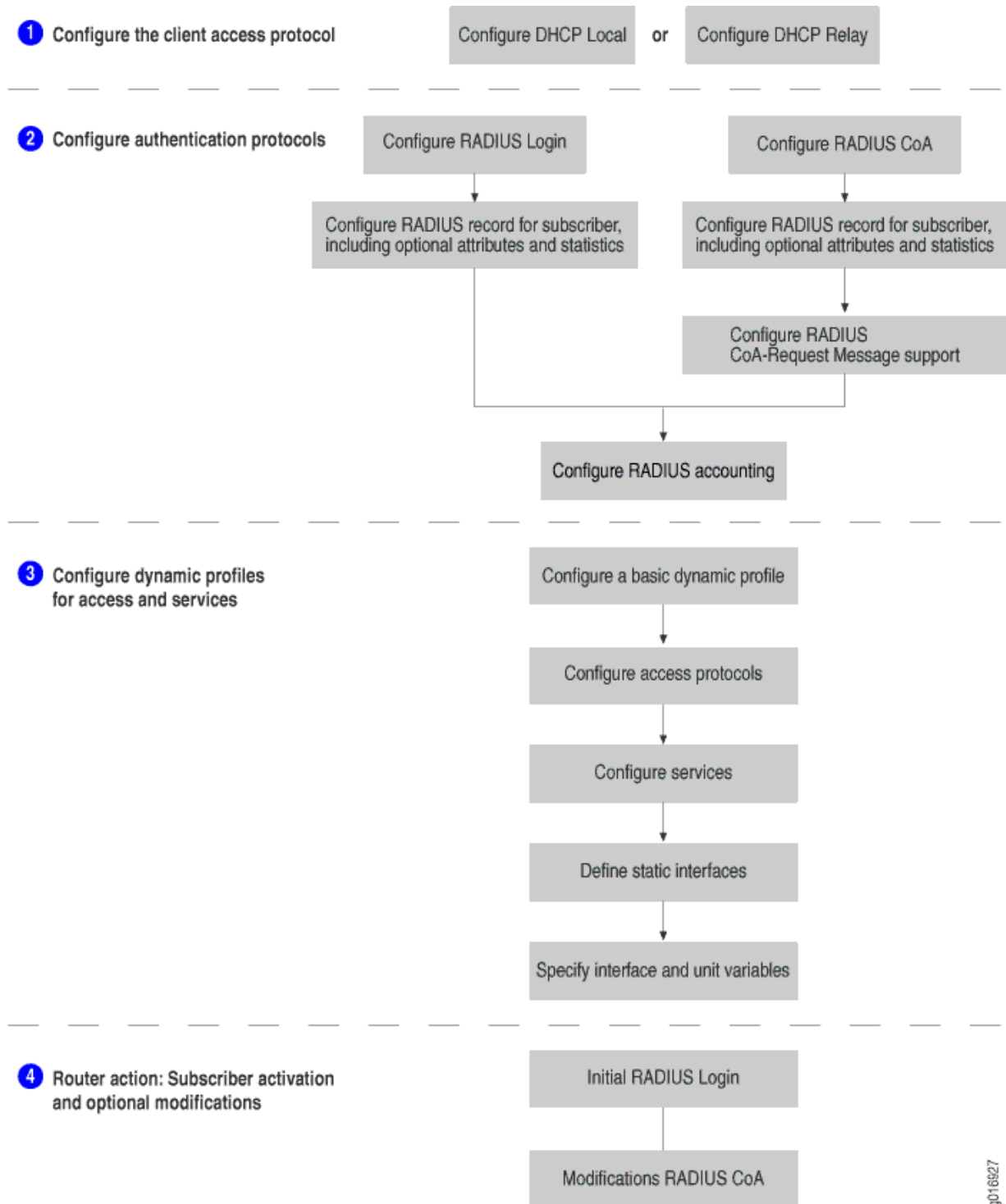
See *Dynamic Service Management with RADIUS*.

- If RADIUS CoA has been configured, the router can dynamically modify the service for a subscriber.

See *RADIUS-Initiated Change of Authorization (CoA) Overview*.

[Figure 1 on page 7](#) shows the configuration sequence you perform for DHCP-based subscriber access. It also shows the dynamic configuration performed by the router.

Figure 1: Subscriber Access Configuration Workflow



Subscriber Activation and Service Management in an Access Network

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- [Router Predefined Variables Used by Dynamic Profiles | 9](#)

The subscriber access feature uses dynamic profiles to activate subscribers and manage services.

A dynamic profile is a set of characteristics, defined in a template, that the router uses to provide dynamic subscriber access and services.

By using dynamic profiles you can:

- Define access for your network
- Define different service levels for subscribers
- Preprovision services that you can activate later

Using AAA-based login (RADIUS-based login or RADIUS CoA) you can:

- Provide subscribers with dynamic activation and deactivation based on service selection
- Provide greater flexibility and efficient management for a large number of subscribers and services

Components of a Dynamic Profile

You can use dynamic profiles to define various router components for subscriber access.

These components include the following:

- **Dynamic firewall filters**—Includes input and output filters to enforce rules that define whether to permit or deny packets that are transmitting an interface on the router. To apply dynamic firewall filters to the subscriber interface, you configure static input and output firewall filters and reference those filters in dynamic profiles.
- **Dynamic *Class of Service* (CoS)**—Includes CoS values that define a service for a subscriber. For example, you can configure the shaping rate for traffic in a video service by referencing CoS statements in a dynamic profile.
- **Dynamic signaling protocol**—Includes dynamic IGMP configuration for host to router signaling for IPv4 to support IP multicasting.

Router Predefined Variables Used by Dynamic Profiles

The router contains many predefined variables. These variables enable dynamic association of certain interface-specific values to incoming subscriber requests. You must specify these predefined variables in certain statements within a dynamic profile. When a client accesses the router, the dynamic profile configuration replaces the predefined variable with the actual data from an incoming client data packet and configuration (local and RADIUS).

RELATED DOCUMENTATION

Subscriber Access Network Overview

Subscriber Access Operation Flow Using DHCP Relay

AAA Service Framework Overview

RADIUS-Initiated Change of Authorization (CoA) Overview

RADIUS-Initiated Disconnect Overview

CoS for Subscriber Access Overview

Default Services for DHCP Subscribers

Service Activation and Deactivation Using the CLI Instead of RADIUS

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DHCP Subscriber Interface Overview

Junos OS Enhanced Subscriber Management

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Junos OS enhanced subscriber management is a next-generation broadband edge software architecture for wireline subscriber management. Enhanced subscriber management enables you to take advantage of increased scaling and performance for configuring and managing dynamic interfaces and services for subscriber management.

Enhanced subscriber management delivers optimized scaling and performance for the existing dynamic subscriber management feature set. Enhanced subscriber management provides feature parity with the legacy Junos OS subscriber management feature set, with certain exceptions. For a list of these feature exceptions, see the latest *Junos OS Release Notes for MX Series 5G Universal Routing Platforms* for your Junos OS software.

In order to use dynamic profiles to create and manage dynamic subscriber interfaces and services, you *must* explicitly configure and enable enhanced subscriber management. When enhanced subscriber management is enabled, it handles all subscriber-management control protocol traffic (DHCP, PPP, PPPoE, L2TP, and dynamic VLAN creation) to direct the creation of subscriber sessions and their associated dynamic interfaces.

If you are using only static network configurations and static services in a business edge environment, you do not need to enable enhanced subscriber management to configure these static topologies. When enhanced subscriber management is *not* enabled, the following client applications do not support the use of dynamic profiles, the creation of dynamic interfaces, or dynamic authentication services:

- Dynamic VLANs
- PPPoE
- PPP
- L2TP
- DHCP

From an operational perspective, enhanced subscriber management introduces only minimal changes to existing subscriber management configuration and verification procedures. For example, enhanced subscriber management consolidates several subscriber management components previously distributed across multiple processes into a single process. As a result, enhanced subscriber management can display consolidated information for subscriber management in a single `show` command.

Routing Services and Enhanced Subscriber Management

When client connections require additional routing protocols on dynamic interfaces, with the exception of IGMP and MLD, you must include routing services in the dynamic profile interface configuration. If you do not do so, then the pseudo logical interface is not created and routing services cannot be associated with the dynamic interface. The additional routing protocols cannot run on the dynamic subscriber interface.

You do not have to include routing services in the dynamic profile interface configuration when clients use only the standard access-internal routes, access routes, and framed routes. In other words, the routing service configuration is not required for simple client reachability purposes.

Routing service configuration is not required for IGMP or MLD, because these protocols are natively supported on enhanced subscriber management interfaces.

NOTE: Distributed IGMP is not supported on subscriber management interfaces where routing-services are enabled.

When a dynamic profile containing the `routing-services` statement is instantiated, the router creates an enhanced subscriber management logical interface, also referred to as a pseudo logical interface, in the form `demux0.nnnnnnnnnn` (for example, `demux0.3221225472`). Any associated subscriber routes or routes learned from a routing protocol running on the enhanced subscriber management interface use this pseudo interface as the next-hop interface.

Starting in Junos OS Release 18.4R1, the `routing-services` statement is deprecated and is replaced by the `routing-service` statement. Besides enabling or disabling routing services for all subscribers on the dynamic interface, the `routing-service` statement enables you to use RADIUS to selectively enable or disable routing services for a specific subscriber during authentication if RADIUS returns the Routing-Services VSA (26-212) in the Access-Accept message.

This RADIUS capability requires you to specify the `$junos-routing-services` predefined variable in the dynamic profile. A VSA value of one enables routing services for the subscriber; a value of zero disables routing services for the subscriber. Any value other than zero or one is rejected. If you configure the variable and RADIUS does not return the VSA, then routing services are disabled for the subscriber.

You can specify the variable in the dynamic profiles for PPPoE subscribers, the underlying VLAN, or both. When you include the variable in the VLAN dynamic profile, then you must also configure the

VLAN to be authenticated; otherwise, routing services remain disabled for the underlying interface and therefore also disabled for the PPPoE subscriber.

You can optionally create dedicated dynamic VLAN profiles to enable routing services for subscribers that require routing services. You can then create dedicated profiles for subscribers that do not need routing services by omitting the `routing-service` statement from the profile. In the following code sample, `vlan-profile1` enables routing services; `vlan-profile2` does not.

```
dynamic-profiles vlan-profile1 {
    interfaces $junos-interface-ifd-name {
        unit $junos-interface-unit {
            routing-service {
                enable;
            }
        }
    }
}
dynamic-profiles vlan-profile2 {
    interfaces $junos-interface-ifd-name {
        unit $junos-interface-unit {
        }
    }
}
```

The VLAN profile is chosen based on the VLAN range associated with the profile by the `ranges` statement at the `[edit interfaces]` hierarchy level. In the following code sample, `vlan-profile1` uses VLAN IDs in the range 100 through 500; `vlan-profile2` uses IDs in the range from 501 through 1000:

```
interfaces ge-0/0/1 {
    auto-configure;
    vlan-ranges {
        dynamic-profile vlan-profile1 {
            ranges 100-500;
        }
        dynamic-profile vlan-profile2 {
            ranges 501-1000;
        }
    }
}
```


Enabling BGP over Dynamic PPPoE Subscriber Interfaces

Starting in Junos OS Release 18.4R1, BGP is supported over dynamic PPPoE interfaces for the IPv4 address family. You must enable routing services with the `routing-service` statement in both the PPPoE subscriber dynamic profile and the dynamic profile for the underlying VLAN interface. If routing services are not enabled for the dynamic underlying interface, then the PPPoE subscriber is rejected during the first family profile activation. If the underlying VLAN is static rather than dynamic, then routing services are not required (or possible) on the underlying VLAN.

In this configuration, the PPPoE subscriber clients correspond to BGP neighbors. This means that when you configure the BGP neighbors with the `[edit protocols bgp group name neighbor]` stanza, you must use the PPPoE client IP addresses as the BGP neighbor addresses. The BGP peer addresses cannot be dynamically provisioned.

Support for BGP over dynamic PPPoE subscriber interfaces includes the following:

- Route advertisement over the BGP-established PPPoE neighbor.
- End-to-end bidirectional traffic from the core to the IP prefix advertised in the BGP route.
- Dedicated next hops are created by the routing daemon for subscriber routes, rather than reusing shared next hops and pseudo logical interfaces.

The BGP over dynamic PPPoE interfaces feature does not support the following:

- Multihop BGP
- IBGP, because it might involve multihops
- BFD for the PPPoE subscribers
- Interface sets for the PPPoE subscribers
- Aggregated Ethernet targeting
- IPv6 address family
- More than one routing protocol besides BGP over the same subscriber
- MPLS termination on the PPPoE subscriber next hop
- Subscribers over pseudowire interfaces over redundant logical tunnel stacking
- Subscribers over pseudowire interfaces over demux0 stacking

The following interface stacking configurations are supported for routing-service-enabled PPPoE:

- PPPoE over dynamic VLANs

- PPPoE over static VLANs
- PPPoE over stacked VLANs (with inner and outer VLAN IDs)

The underlying VLAN for which routing services is enabled supports:

- Stacking of routing-service-enabled and routing-service-disabled PPPoE subscribers.
- Stacking of other access models such as DHCP.
- The parent physical interface can be a leg in an aggregated Ethernet bundle.

Address Resolution and Enhanced Subscriber Management

Starting in Junos OS Release 18.4R1, several enhancements are available for address resolution with enhanced subscriber management. These enhancements affect only framed routes on dynamic VLANs. Framed routes associated with DHCP subscribers function the same as before this feature support.

- Dynamic layer 2 MAC address resolution is supported for non-host routes. Users deploying statically addressed IP clients or a mix of statically addressed IP clients and DHCP clients can use network (/29) framed routes or host (/32) framed routes to establish reachability. The /29 routes are coupled with the dynamic Layer 2 address associated with a host framed route. This supports business users who use routers with multiple public addresses behind CPE routers. This feature is enabled by default and requires no special configuration.

In earlier releases, dynamic address resolution is supported only for host framed routes; network framed routes that resolve to an indirect next hop (such as a local gateway) are not supported.

- By default, an IPv4 framed host route is permanently associated with the source MAC address from the trigger packet that created the dynamic VLAN. You can override this behavior by enabling dynamic ARP to resolve the MAC address for the framed host routes with the `ipoe-dynamic-arp-enable` statement. ARP protocol exchange resolves the Layer 2 address for the framed route.
- The router can compare the source MAC address received in a gratuitous ARP request or reply packet with the value in the ARP cache. The router updates the cache with the received MAC address if it determines this address is different from the cache entry. Include the `receive-gratuitous-arp` statement to enable this feature.

This capability is useful when an IP address moves to a different device or NIC and consequently is associated with a different MAC address than before the move. The new device broadcasts a gratuitous ARP reply that the router compares to the MAC address in the cache.

When the statement is not included, the dynamic ARP times out. Before it is deleted from the cache, the router sends an ARP request for the target IP address. The client responds with the new MAC address, but a window may exist for the client where the MAC address does not match the NIC.

Control Plane Resiliency

Starting in Junos OS Release 19.1, several enhancements are available to improve control plane resiliency and the reliability of session database replication and state synchronization between primary and standby Routing Engines.

- The primary and standby Routing Engines exchange detailed information about session database replication. This exchange enables the Routing Engines to better determine whether the replication is correct.
- You can configure the router to detect shared memory corruption and to automatically recover by rebooting the primary or standby Routing Engines, or both. In earlier releases, a manual reboot is required to clear the corrupted shared memory; otherwise, it remains corrupted, causing processes that share the memory to generate core errors.
- You can monitor Routing Engine resiliency with the `show system subscriber-management resiliency` command. The `summary` version indicates whether the system is functioning normally or an unexpected condition exists. The `detail` and `extensive` versions provide detailed statistics about the session database in shared memory per Routing Engine.

Benefits of Enhanced Subscriber Management

- Optimizes scaling and performance for dynamic subscriber management features.
- Required for the creation and management of dynamic profiles, dynamic interfaces, and dynamic subscribers.

Configuring Junos OS Enhanced Subscriber Management

Junos OS enhanced subscriber management is a next-generation broadband edge software architecture for wireline subscriber management. With enhanced subscriber management, you can take advantage of optimized scaling and performance for configuration and management of dynamic interfaces and services for subscriber management. It must be enabled to use dynamic profiles for creating and managing dynamic subscriber interfaces and services.

Enhanced subscriber management is supported on all MX Series 5G Universal Routing Platforms with Modular Port Concentrators (MPCs) installed. It is not supported for MS-DPCs. If the router has both MPC and MS-DPCs, a conflict between the MS-DPC and Enhanced Subscriber Management services can occur during ISSU that can result in an unscheduled shutdown of the device. To prevent this, do not run ISSU if the system has MS-DPCs installed, or only enable Enhanced Subscriber Management on device where no MS-DPCs are present.

Before you begin:

- Download and install Junos OS Release 15.1R4 or later.

See *Migration, Upgrade, and Downgrade Instructions* in the *Junos OS Release 15.1R4 Release Notes*. You must reboot the router after the upgrade is validated and installed.



CAUTION: Because unified in-service software upgrade (unified ISSU) is not supported for subscriber management when you upgrade from a release that does not support enhanced subscriber management (Junos OS Release 14.2 or earlier) to a release that does support enhanced subscriber management (15.1R4 and later), all subscriber sessions and subscriber state are lost after the upgrade.

NOTE: Starting in Junos OS Release 17.4R1, when enhanced IP network services and enhanced subscriber management are enabled, the amount of DRAM on the Routing Engine determines whether the subscriber management daemons on that Routing Engine all run in 32-bit mode or all run in 64-bit mode.

- Less than 32 GB of RAM—32-bit mode
- 32 GB or more of RAM—64-bit mode

In releases earlier than Junos OS Release 17.4R1, only the subscriber management daemon, bbe-smgd, operates in either 32-bit or 64-bit mode depending on the DRAM.

NOTE: All Routing Engines in the system must have the same amount of memory. This is universally true for subscriber management in all releases.

To configure Junos OS enhanced subscriber management for the first time:

1. Configure enhanced IP network services on the router.
 - a. Specify that you want to configure chassis properties for the router.

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


- b. Configure enhanced IP network services.

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

2. Enable enhanced subscriber management.
 - a. Specify that you want to configure global services for the router.

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

- b. Enable enhanced subscriber management.

```
[edit system services]
user@host# set subscriber-management enable
```

3. Increase the amount of system shared memory available for enhanced subscriber management by limiting the maximum size of the configuration database.

JUNOS OS processes map shared memory into their process space. For example, on MX240 through MX10003 routers, processes can map up to 1GB of shared memory. Enhanced subscriber management processes contend for shared memory with the JUNOS OS configuration database. By default, the configuration database tries to reserve 80 percent of the shared memory map, leaving insufficient space for subscriber management to function. The majority of configurations require much less than 300MB of mapped space. An appropriate database size enables subscriber management to operate and scale optimally. In some circumstances, you must configure a maximum size to increase the amount of shared memory available to subscriber management. In other circumstances, we recommend that you allow the router to determine the appropriate size and that you do not configure a maximum.

NOTE: Starting in Junos OS Release 20.1R1, a single memory map is used for both the Junos OS configuration database and the schema database, together. In lower releases, two separate maps are used.

- For MX5, MX10, MX40, MX80, and MX104 routers, you must always configure the maximum size to be no more than 100MB, regardless of the which Junos OS release is running and regardless of Routing Engine RAM.

```
user@host# set system configuration-database max-db-size 100M
```

- For MX240, MX480, MX960, MX2008, MX2010, MX2020, and MX10003 routers, the decision whether to explicitly configure a maximum size and what that size is, depends on the Junos OS release and the amount of RAM in the Routing Engines. [Table 2 on page 18](#) lists conditions and the corresponding recommendations.

Table 2: Configuration Database Size for MX240, MX480, MX960, MX2008, MX2010, MX2020, and MX10003 Routers

Junos OS Release	Routing Engine RAM	Recommendation
Release 17.4R1 and earlier releases Release 18.1R1	Any	Configure maximum size to no more than 300MB.
Release 17.4R2 and higher 17.4x releases Release 18.1R2 and higher releases	Routing Engines have at least 32GB each	Allow the router to determine the appropriate size. Do not configure a maximum size.
Release 17.4R2 and higher 17.4x releases Release 18.1R2 and higher releases	Routing Engines have less than 32GB each	Configure maximum size to no more than 300MB.

- (Optional) Enable dynamic ARP to resolve the MAC address for IPv4 framed host routes. Otherwise, an IPv4 framed host route is permanently associated with the source MAC address from the trigger packet that created the dynamic VLAN.

```
[edit system services subscriber-management overrides interfaces family inet]
user@host# set ipoe-dynamic-arp-enable
```


5. (Optional) Enable router to compare the source MAC address received in a gratuitous ARP request or reply packet with the value in the ARP cache and update the cache when this address is different from the cache entry.

```
[edit system services subscriber-management overrides interfaces family inet
user@host# set receive-gratuitous-arp
```

6. (Optional) Configure the router to automatically reboot the primary or standby Routing Engine, or both, when it detects that the shared memory has been corrupted, which is considered a catastrophic failure.

```
[edit system services subscriber-management overrides
user@host# set event catastrophic-failure reboot master
user@host# set event catastrophic-failure reboot standby
```

7. (Optional) Enable traffic-accounting and rate-monitoring for the given interface:

```
[edit dynamic-profiles profile-name interfaces unit "$junos-interface-unit"
user@host# set actual-transit-statistics
```

8. (Optional) Enable routing services for dynamic interfaces if you want to run routing protocols on those interfaces. This is not required for IGMP or MLD over dynamic interfaces.

```
[edit dynamic-profiles profile-name interfaces interface-name unit "$junos-interface-unit"
user@host# set routing-services
```

Starting in Junos OS Release 18.4R1, the `routing-services` statement is deprecated and is replaced by the `routing-service` statement.

```
[edit dynamic-profiles profile-name interfaces interface-name unit "$junos-interface-unit"
user@host# set routing-service
```

NOTE: When the underlying VLAN interface for PPPoE subscribers is created with a dynamic profile, you must enable routing services in both the PPPoE dynamic profile and the dynamic profile for the underlying VLAN. Otherwise the subscriber is not allowed to log in.

9. (Optional) Enable graceful Routing Engine switchover (GRES) and nonstop active routing (NSR).

NOTE: For MX Series routers using enhanced subscriber management, the new backup Routing Engine (the former primary Routing Engine) will reboot when a graceful Routing Engine switchover is performed. This cold restart resynchronizes the backup Routing Engine state with that of the new primary Routing Engine, preventing discrepancies in state that might have occurred during the switchover.

NOTE: When graceful Routing Engine switchover is enabled for subscriber management, all Routing Engines in the router must have the same amount of DRAM for stable operation.

a. Enable GRES.

```
[edit chassis redundancy]
user@host# set graceful-switchover
```

NOTE: When GRES is enabled, you can either configure NSR or graceful restart. If you configure both, then committing the configuration fails.

b. Enable NSR (recommended if you enable GRES).

```
[edit routing-options]
user@host# set nonstop-routing
```

NOTE: To enable graceful restart:

```
[edit routing-options]
user@host# set graceful-restart
```

c. Configure commit operations to automatically synchronize the configuration between the primary Routing Engine and the standby Routing Engine.

```
[edit system]
user@host# set commit synchronize
```


10. Commit the configuration.

After you commit the configuration, the software prompts you to initiate a system reboot.

11. Reboot the router software to enable enhanced subscriber management.

a. Access operational mode.

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

b. Reboot the software.

```
user@host> request system reboot
```

Example

The following example shows a typical configuration to enable enhanced subscriber management.

```
[edit]
chassis {
  network-services {
    enhanced-ip;
  }
  redundancy {
    graceful-switchover;
  }
}
routing-options {
  nonstop-routing;
}
system {
  commit synchronize;
  configuration-database {
    max-db-size 300M;
  }
  services {
    subscriber-management {
      enable;
    }
  }
}
```


NOTE: If you have configured `graceful-restart`, then the following statement will be displayed in the example instead of `nonstop-routing`:

```
routing-options {
    graceful-restart;
}
```

Verifying and Managing Junos OS Enhanced Subscriber Management

IN THIS SECTION

- Purpose | 22
- Action | 22

Purpose

View information about class of service (CoS), routing tables, active subscribers, and the subscriber database for Junos OS enhanced subscriber management.

Action

- To display dynamic subscriber interface associations for CoS classifiers, rewrite rules, and scheduler maps:

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

- To display CoS associations for a dynamic interface set:

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


- To display the mapping of CoS schedulers to forwarding classes:

```
user@host> show class-of-service scheduler-map
```

- To display CoS traffic shaping and scheduling profiles:

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

- To display the active entries in the routing table:

```
user@host> show route
```

- To display detailed information about active subscribers whose IP address matches the specified address:

```
user@host> show subscribers address address detail
```

- To display information about how routes are mapped to specific enhanced subscriber management interfaces:

```
user@host> show system subscriber-management route
```

- To display summary information for the subscriber management database:

```
user@host> show system subscriber-management summary
```

- To verify whether subscriber management daemons are running in 32-bit mode or 64-bit mode:

```
user@host> show system processes | grep libexec[36]
```

Starting in Junos OS Release 17.4 R1, when enhanced IP network services and enhanced subscriber management are enabled and a Routing Engine in the system has at least 32 GB of RAM, subscriber management daemons on that Routing Engine run in 64-bit mode. For consistent operation, all Routing Engines in the system must have the same amount of memory.

- 64-bit mode:

```
user@host> show system processes | grep libexec[36]
  PID TT  STAT    TIME  COMMAND
 21149 -   S    0:01.37 /usr/libexec64/pfed -N
 21195 -   S    0:00.46 /usr/libexec64/smid -N
 21214 -   S    0:05.04 /usr/libexec64/bbe-smgd -b -N
 21270 -   S    0:04.26 /usr/libexec64/authd -N
 21498 -   S    0:02.37 /usr/libexec64/rpd -N
 21504 -   S    0:00.84 /usr/libexec64/cosd
 21539 -   S    0:00.37 /usr/libexec64/dfwd -N
 21740 -   S    0:00.95 /usr/libexec64/jpppd -N
```

- 32-bit mode:

```
user@host> show system processes | grep libexec[36]
  PID TT  STAT    TIME  COMMAND
 21149 -   S    0:01.37 /usr/libexec32/pfed -N
 21195 -   S    0:00.46 /usr/libexec32/smid -N
 21214 -   S    0:05.04 /usr/libexec32/bbe-smgd -b -N
 21270 -   S    0:04.26 /usr/libexec32/authd -N
 21498 -   S    0:02.37 /usr/libexec32/rpd -N
 21504 -   S    0:00.84 /usr/libexec32/cosd
 21539 -   S    0:00.37 /usr/libexec32/dfwd -N
 21740 -   S    0:00.95 /usr/libexec32/jpppd -N
```

Release History Table

Release	Description
19.1R1	Starting in Junos OS Release 19.1, several enhancements are available to improve control plane resiliency and the reliability of session database replication and state synchronization between primary and standby Routing Engines.
18.4R1	Starting in Junos OS Release 18.4R1, the routing-services statement is deprecated and is replaced by the routing-service statement.
18.4R1	Starting in Junos OS Release 18.4R1, BGP is supported over dynamic PPPoE interfaces for the IPv4 address family.

18.4R1	Starting in Junos OS Release 18.4R1, several enhancements are available for address resolution with enhanced subscriber management. These enhancements affect only framed routes on dynamic VLANs. Framed routes associated with DHCP subscribers function the same as before this feature support.
18.4R1	Starting in Junos OS Release 18.4R1, the routing-services statement is deprecated and is replaced by the routing-service statement.
17.4R1	Starting in Junos OS Release 17.4R1, when enhanced IP network services and enhanced subscriber management are enabled, the amount of DRAM on the Routing Engine determines whether the subscriber management daemons on that Routing Engine all run in 32-bit mode or all run in 64-bit mode.
17.4R1	Starting in Junos OS Release 17.4 R1, when enhanced IP network services and enhanced subscriber management are enabled and a Routing Engine in the system has at least 32 GB of RAM, subscriber management daemons on that Routing Engine run in 64-bit mode.

Tracing Subscriber Management Database Events for Troubleshooting

IN THIS SECTION

- [Configuring the Subscriber Management Database Trace Log Filename | 26](#)
- [Configuring the Number and Size of Subscriber Management Database Log Files | 26](#)
- [Configuring Access to the Subscriber Management Database Log File | 27](#)
- [Configuring a Regular Expression for Subscriber Management Database Messages to Be Logged | 28](#)
- [Configuring the Subscriber Management Database Tracing Flags | 28](#)

The Junos OS trace feature tracks subscriber management database operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems. The operations and events are those associated with the smid process, which manages the subscriber management infrastructure.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file located in the `/var/log` directory. By default, the router uses the filename `smid`. You can specify a different filename, but you cannot change the directory in which trace files are located.
2. When the trace log file *filename* reaches 128 kilobytes (KB), it is compressed and renamed *filename.0.gz*. Subsequent events are logged in a new file called *filename*, until it reaches capacity again. At this point, *filename.0.gz* is renamed *filename.1.gz* and *filename* is compressed and renamed *filename.0.gz*. This process repeats until the number of archived files reaches the maximum file number. Then the oldest trace file—the one with the highest number—is overwritten.

You can optionally specify the number of trace files to be from 2 through 1000. You can also configure the maximum file size to be from 10 KB through 1 gigabyte (GB). (For more information about how log files are created, see the [System Log Explorer](#).)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for all users.

The following topics describe how to configure all aspects of tracing subscriber management database operations:

Configuring the Subscriber Management Database Trace Log Filename

By default, the name of the file that records trace output for the subscriber management database is `smid`. You can specify a different name with the `file` option.

To configure the filename for subscriber management database tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system services subscriber-management traceoptions]
user@host# set file smi_logfile_1
```

Configuring the Number and Size of Subscriber Management Database Log Files

You can optionally specify the number of compressed, archived trace log files to be from 2 through 1000. You can also configure the maximum file size to be from 10 KB through 1 gigabyte (GB); the default size is 128 kilobytes (KB).

The archived files are differentiated by a suffix in the format *.number.gz*. The newest archived file is *.0.gz* and the oldest archived file is *.(maximum number)-1.gz*. When the current trace log file reaches the maximum size, it is compressed and renamed, and any existing archived files are renamed. This process repeats until the maximum number of archived files is reached, at which point the oldest file is overwritten.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation, *filename*, reaches 2 MB, *filename* is compressed and renamed *filename.0.gz*, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename.0.gz* is renamed *filename.1.gz* and *filename* is compressed and renamed *filename.0.gz*. This process repeats until there are 20 trace files. Then the oldest file, *filename.19.gz*, is simply overwritten when the next oldest file, *filename.18.gz* is compressed and renamed to *filename.19.gz*.

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output.

```
[edit system services subscriber-management traceoptions]
user@host# set file smi_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the Subscriber Management Database Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit system services subscriber-management traceoptions]
user@host# set file smi_1 _logfile_1 world-readable
```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

```
[edit system services subscriber-management traceoptions]
user@host# set file smi_1 _logfile_1 no-world-readable
```


Configuring a Regular Expression for Subscriber Management Database Messages to Be Logged

By default, the trace operation output includes all messages relevant to the logged events.

You can refine the output by including regular expressions to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

```
[edit system services subscriber-management traceoptions]  
user@host# set file smi_1 _logfile_1 match regex
```

Configuring the Subscriber Management Database Tracing Flags

By default, only important events are logged. You can specify which events and operations are logged by specifying one or more tracing flags.

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit system services subscriber-management traceoptions]  
user@host# set flag flag
```

Tracing Subscriber Management Session Database Replication Events for Troubleshooting

IN THIS SECTION

- [Configuring the Subscriber Management Session Database Replication Trace Log Filename](#) | 30

- [Configuring the Number and Size of Subscriber Management Session Database Replication Log Files | 30](#)
- [Configuring Access to the Subscriber Management Session Database Replication Log File | 31](#)
- [Configuring a Regular Expression for Subscriber Management Session Database Replication Messages to Be Logged | 31](#)
- [Configuring the Subscriber Management Session Database Replication Tracing Flags | 32](#)

The Junos OS trace feature tracks subscriber management session database replication operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems. The operations and events are those associated with the bdbrepd process, which syncs the subscriber management database between the primary and backup Routing Engines.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file located in the `/var/log` directory. By default, the router uses the filename `bdbrepd`. You can specify a different filename, but you cannot change the directory in which trace files are located.
2. When the trace log file *filename* reaches 128 kilobytes (KB), it is compressed and renamed *filename.0.gz*. Subsequent events are logged in a new file called *filename*, until it reaches capacity again. At this point, *filename.0.gz* is renamed *filename.1.gz* and *filename* is compressed and renamed *filename.0.gz*. This process repeats until the number of archived files reaches the maximum file number. Then the oldest trace file—the one with the highest number—is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the [System Log Explorer](#).)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for all users.

The following topics describe how to configure all aspects of tracing subscriber management session database operations:

Configuring the Subscriber Management Session Database Replication Trace Log Filename

By default, the name of the file that records trace output for the subscriber management session database is `bdbrepd`. You can specify a different name with the `file` option.

To configure the filename for subscriber management database tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system services database-replication traceoptions]
user@host# set file bdbrep_logfile_1
```

Configuring the Number and Size of Subscriber Management Session Database Replication Log Files

You can optionally specify the number of compressed, archived trace log files to be from 2 through 1000. You can also configure the maximum file size to be from 10 KB through 1 gigabyte (GB); the default size is 128 kilobytes (KB).

The archived files are differentiated by a suffix in the format `.number.gz`. The newest archived file is `.0.gz` and the oldest archived file is `.(maximum number)-1.gz`. When the current trace log file reaches the maximum size, it is compressed and renamed, and any existing archived files are renamed. This process repeats until the maximum number of archived files is reached, at which point the oldest file is overwritten.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation, *filename*, reaches 2 MB, *filename* is compressed and renamed *filename.0.gz*, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename.0.gz* is renamed *filename.1.gz* and *filename* is compressed and renamed *filename.0.gz*. This process repeats until there are 20 trace files. Then the oldest file, *filename.19.gz*, is simply overwritten when the next oldest file, *filename.18.gz* is compressed and renamed to *filename.19.gz*.

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output.

```
[edit system services database-replication traceoptions]
user@host# set file bdbrep_1_logfile_1 files 20 size 2097152
```


Configuring Access to the Subscriber Management Session Database Replication Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit system services database-replication traceoptions]  
user@host# set file bdbrep_1 _logfile_1 world-readable
```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

```
[edit system services database-replication traceoptions]  
user@host# set file bdbrep_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for Subscriber Management Session Database Replication Messages to Be Logged

By default, the trace operation output includes all messages relevant to the logged events.

You can refine the output by including regular expressions to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

```
[edit system services database-replication traceoptions]  
user@host# set file bdbrep_1 _logfile_1 match regex
```


Configuring the Subscriber Management Session Database Replication Tracing Flags

By default, only important events are logged. You can specify which events and operations are logged by specifying one or more tracing flags.

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit system services database-replication traceoptions]  
user@host# set flag flag
```


2

CHAPTER

Resource Monitoring for Subscriber Management and Services

Resource Monitoring for Subscriber Management and Services | 34

Resource Monitoring for Subscriber Management and Services

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Resource Monitoring for Subscriber Management and Services Overview

IN THIS SECTION

- [Using Watermarks for Line-Card Resource Monitoring | 35](#)
- [Throttling Subscriber Load Based on CoS Resource Capacity | 37](#)
- [Examining the Utilization of Memory Resource Regions Using show Commands | 37](#)
- [Load Throttling to Reduce Processing Delays | 38](#)
- [Limiting Subscribers with Resource Monitor | 41](#)

Junos OS supports a resource monitoring capability using both the CLI and SNMP MIB queries. You can employ this utility to provision sufficient headroom (memory space limits for the application or virtual router) to ensure system stability, especially the health and operating efficiency of I-chip-based line cards and Trio-based FPCs on MX Series routers.

When memory utilization, either the ukernel memory or ASIC memory, reaches a certain threshold, the system operations compromise on the health and traffic-handling stability of the line card. Such a trade-off on system performance can be detrimental for supporting live traffic and protocols.

Besides the ability to configure a threshold to raise error logs when a specific threshold value of resources is exceeded, you can also monitor the threshold values and resource utilization using SNMP MIB queries.

The following sections describe the types of resource monitoring available with Junos OS:

Using Watermarks for Line-Card Resource Monitoring

You can configure watermark or checkpoint values for the line-card resources, such as ukern memory (heap), next-hop (NH) memory, and firewall or filter memory, to be uniform for both Trio-based and I-chip-based line cards. The NH memory watermark is applicable only for encapsulation memory (output WAN static RAM memory). Encapsulation memory is specific to I-chips and not applicable for Trio-based chips. When the configured watermark is exceeded, error logs are triggered. If the resource has been used above a certain threshold, warning system log messages are generated to notify about the threshold value having exceeded. Based on your network needs, you can then determine whether you want to terminate any existing subscribers and services to prevent the system from being overloaded and resulting in a breakdown.

This feature gathers input from each of the line cards and transfers this statistical detail to the Routing Engine process using a well-known internal port. This information is scanned by the daemon on the Routing Engine and using the shared memory space built into the session database, warning messages are generated for exceeded threshold conditions.

The capability to configure resource monitoring is supported on the MX80, MX104 routers and on the following line cards on MX240, MX480, MX960, MX2010, and MX2020 routers:

- MX-MPC1-3D
- MX-MPC1-3D-Q
- MX-MPC2-3D
- MX-MPC2-3D-Q
- MX-MPC2-3D-EQ
- MPC-3D-16XGE-SFPP
- MPC3E
- MPC3E-3D-NG
- MPC4E-3D-2CGE-8XGE
- MPC4E-3D-32XGE
- MPC5EQ-40G10G
- MPC5EQ-100G10G
- MPC5E-100G10G
- MPC5E-40G10G

- MPC10E-10C-MRATE
- MPC10E-15C-MRATE
- MX2K-MPC6E
- MX2K-MPC11E
- DPCE
- MS-DPC
- MX Series Flexible PIC Concentrators (MX-FPCs)
- NG-MPC3E

You can configure the following parameters at the [edit system services] hierarchy level to specify the high threshold value that is common for all the memory spaces or regions and the watermark values for the different memory blocks on DPCs and MPCs:

- High threshold value, exceeding which warnings or error logs are generated, for all the regions of memory, such as heap or ukernel, next hop and encapsulation, and firewall filter memory, by using the `resource-monitor high-threshold value` statement.
- Percentage of free memory space used for next hops to be monitored with a watermark value by using the `resource-monitor free-nh-memory-watermark percentage` statement.
- Percentage of free memory space used for ukernel or heap memory to be monitored with a watermark value by using the `resource-monitor free-heap-memory-watermark percentage` statement.
- Percentage of free memory space used for firewall and filter memory to be monitored with a watermark value by using the `resource-monitor free-fw-memory-watermark percentage` statement. This feature is enabled by default and you cannot disable it manually. The default value and the configured value of the watermark value for the percentage of free next-hop memory also applies to encapsulation memory.

The default watermark values for the percentage of free ukernel or heap memory, next-hop memory, and firewall filter memory are as follows:

- `free-heap-memory-watermark—20`
- `free-nh-memory-watermark—20`
- `free-fw-memory-watermark—20`

Throttling Subscriber Load Based on CoS Resource Capacity

Starting in Junos OS Release 17.4R1, class of service (CoS) criteria are incorporated into the throttling decision for subscriber access. Information about the availability of CoS resources, namely queue capacity, is collected from the line cards. At subscriber login, assuming that the subscriber requires CoS resources, the line cards report the CoS queue utilization as a percent of resources that are bound to a scheduling hierarchy and are not free to be bound to a new scheduling hierarchy. The `high-cos-queue-threshold` statement at the `[edit system services]` hierarchy level can be set in the range of from 0 percent to 90 percent, separately for each FPC slot. When CoS queue utilization on a given FPC reaches that FPC's configured threshold level, further subscriber logins on that FPC are not allowed. This resource monitoring mechanism provides adjustable safety margins to proactively avoid completely exhausting each FPC's available CoS queue resources. See [high-cos-queue-threshold](#).

NOTE: This feature is only available when you enable subscriber management. For more information on enabling subscriber management, see ["Configuring Junos OS Enhanced Subscriber Management" on page 15](#).

NOTE: Starting in Junos OS Release 19.4R1, you can specify a value of 0 to prevent any subscriber from being throttled by queue-based throttling.

This CoS resource monitoring feature bases admission decisions only on queues. Other CoS resources are not part of this criteria. This feature does not support throttling for subscribers arriving on pseudo-wire, logical tunnel, or redundant logical tunnel devices. The feature is supported on the following hardware:

- MX240, MX480, and MX960 routers
- MPC2E legacy, MPC2E-NG, MPC3E-NG, MPC5E, and MPC7E line cards

Examining the Utilization of Memory Resource Regions Using show Commands

You can use the `show system resource-monitor fpc` command to monitor the utilization of memory resources on the Packet Forwarding Engines of an FPC. The filter memory denotes the filter counter memory used for firewall filter counters. The asterisk (*) displayed next to each of the memory regions denotes the ones for which the configured threshold is being currently exceeded. Resource monitoring commands display the configured values of watermark for memories for different line-card applications to be monitored. The displayed statistical metrics are based on the computation performed of the current memory utilization of the individual line cards. The ukern memory is generic across the different types of line cards and signifies the heap memory buffers. Because a line card or an FPC in a particular slot can contain multiple Packet Forwarding Engine complexes, the memory utilized on the application-specific

integrated circuits (ASICs) are specific to a particular PFE complex. Owing to different architecture models for different variants of line cards supported, the ASIC-specific memory (next-hop and firewall or filter memory) utilization percentage can be interpreted differently.

Load Throttling to Reduce Processing Delays

Starting in Junos OS Release 17.3R1, the Routing Engine can use resource monitoring to assess and reduce the processing load on a line card's Packet Forwarding Engine. It is possible for the Routing Engine to send work at a higher rate than the Packet Forwarding Engine can process. This is sometimes called overdriving the line card or Packet Forwarding Engine. When the work load on the Packet Forwarding Engine is too high, it can cause noticeable delays in packet processing.

Resource monitoring enables the Routing Engine assess the load by evaluating the round-trip delay for packets that it sends to the Packet Forwarding Engine. A longer round-trip time indicates a higher load and therefore a greater chance of processing delays on the Packet Forwarding Engine. When appropriate, the Routing Engine reduces the percentage of subscriber sessions (client and service) that are allowed to complete.

This capability is called load throttling or round-trip time load throttling. Throttling prevents the Routing Engine from over-driving line cards to the point that processing delays become visible to operators and back-office systems. It works like this:

1. To monitor delays, the Routing Engine sends an echo request message every second to the Packet Forwarding Engine on the line card. The echo request includes both a timestamp for when it is sent and a running sequence number. The message priority is best effort, to simulate the worst-case processing delay on the line card.
2. The Packet Forwarding Engine processes the echo request and responds with an echo reply. The message priority is high to minimize jitter when the Routing Engine processes the returned packet.
3. When the Routing Engine receives the echo reply, it calculates the round trip time as the time difference between the echo request timestamp and the time it receives the echo reply for that particular sequence number.
4. The Routing Engine compares the round-trip delay time to a default round-trip threshold value of 1 second. If the measured delay is longer than the threshold for three consecutive trips, the Routing Engine denies logins for a percentage of new subscribers, reducing the number of new client and service sessions that are established. This reduction is called throttling.

An internal algorithm derives the throttling percentage based on the threshold and the round-trip time. This percentage varies based on the round-trip delay at that point in time.

The Routing Engine increases the throttle—denies more subscriber logins—for each successive set of three delay measurements that all exceed the threshold.

5. When the measured delay is less than the threshold for three consecutive trips, the Routing Engine removes the throttle. This allows subscribers to log in freely.

NOTE: RTT load throttling applies on a per-line-card basis for Ethernet interfaces (ge, xe) and pseudowire interfaces (ps) as follows:

- For aggregated Ethernet interfaces, it applies to the set of line cards associated with the aggregated Ethernet bundle.
- For pseudowire interfaces with redundant logical tunnel (RLT), it applies to the set of line cards that are associated with the anchor point.

In both cases, the Routing Engine considers the delay value that determines throttling to be the longest round-trip delay of all the line cards in the set.

Table 3 on page 39 shows how subscriber sessions are throttled on a line card over a period of 12 seconds when the round-trip delay is greater than the internal threshold. This example has the following assumptions:

- The internal delay threshold is 1 second.
- Delay measurements occur every second.
- The session creation rate is reduced by 10 percent after 3 consecutive round-trip delay measurements that are above the round-trip delay threshold. For as long as the threshold is exceeded, the throttling is increased every 3 measurements.
- If the measured delay drops and remains below the threshold for 3 consecutive round-trip delay measurements, the session rate returns to 100 percent.

NOTE: This example is simplified. Remember that the exact throttling percentage is determined dynamically and can vary second to second.

Table 3: Example Load Throttling Due to Round-trip Delay Time

Time	Round-trip Delay (ms)	Threshold Exceeded	Percentage of Sessions Allowed
1	850	No	100
2	900	No	100

Table 3: Example Load Throttling Due to Round-trip Delay Time *(Continued)*

Time	Round-trip Delay (ms)	Threshold Exceeded	Percentage of Sessions Allowed
3	995	No	100
4	1021	Yes Threshold exceeded count #1	100
5	1130	Yes Threshold exceeded count #2	100
6	1158	Yes Threshold exceeded count #3	90 Session rate reduced by 10 %
7	1127	Yes Threshold exceeded count #1	90 Session rate reduced by 10 %
8	1135	Yes Threshold exceeded count #2	90
9	1126	Yes Threshold exceeded count #3	80 Session rate reduced by 10 %
10	1000	No Threshold not exceeded count #1	80
11	991	No Threshold not exceeded count #2	80
12	998	No Threshold not exceeded count #3	100 Throttling removed

Resource load monitoring and round-trip time throttling is enabled by default. You can use either of the following statements to disable this feature:

- no-load-throttle at the [edit system services resource-monitor] hierarchy level
- no-throttle at the [edit system services resource-monitor] hierarchy level

If you disable the feature and the Packet Forwarding Engine becomes too busy, new subscribers can log in and go active, but no traffic flows for a period of time. This delay in traffic processing might become noticeable.

You can use the following command to confirm whether the load throttling feature is enabled and see various aspects of the feature in action. The bolded fields are particularly useful.

```
user@host> show system resource-monitor summary
Resource Usage Summary
Throttle                               : Enabled
Load Throttle                        : Enabled /*RTT load throttling is enabled*/
Heap Mem Threshold                     : 70 %
IFL Counter Threshold                  : 95 %
Round Trip Delay Threshold(ms) : 1000 /*RTT throttle value*/
Filter Counter Threshold                : 100 %
Expansion Threshold                    : 95 %
CoS Queue Threshold                   : 100 %
MFS threshold                          : 70 %      Used : 0

Slot # 0
  Client allowed                       : Yes
  Service allowed                      : Yes
  Heap memory used                     : 339204848      In % : 18
  Average Round-trip Delay(ms) : 103 (30 ) Round-trip Delay(ms) : 103 /*RTT delay
and average delay, the 30 in parentheses means that the average is for last 30 secs*/
  MAX session rate allowed(%)          : 100
  Client denied                    : 1524 /*The number of new subscribers have been denied*/
  Service Denied                       : 0
  Performance Denial Client             : 1524 <--
  Performance Denial Service            : 0
  IFL Denied                           : 0
```

Limiting Subscribers with Resource Monitor

Starting in Junos OS Release 17.3R1, you can also use resource monitoring to directly limit the number of subscribers supported per hardware element. You can specify the maximum number of subscribers

that can be logged in per chassis, line card (MPC), MIC, or port. You can set the limit to subscribers of only one client type (DHCP, L2TP, or PPPoE) or to subscribers of any client type.

This feature ensures that the number of subscribers logged in per hardware element does not exceed the number that your network can serve with stability at the desired service bandwidth. When the limit is reached for a hardware element, new subscriber logins are denied on that element until the number of subscribers drops below the configured limit. New subscribers over the limit can connect to another hardware element in the same broadcast domain. When you configure the limit on one or more legs of an aggregated Ethernet interface, login is denied if the subscriber count exceeds the value on any of the legs.

Limiting subscribers this way distributes the load among hardware elements, but it does not provide any sort of load balancing. This feature can also help you map capacity in your network and determine what hardware resources you need to expand that capacity. For example, if you provide a service that needs a particular amount of memory and know how many subscribers you can service with a given set of hardware, you can determine how much memory you need. Or if you want to add a service with more memory per subscriber, you can calculate the additional amount that you need, compare it to your available memory, and determine whether you need to provision new ports, MICs, MPCs, or routers to handle the new service.

Limiting Subscribers by Client Type and Hardware Element with Resource Monitor

In addition to using resource monitoring to monitor and manage system memory usage, you can use it to directly limit the number of subscribers supported per hardware element: chassis, line card (MPC), MIC, and port. You can specify the maximum number of subscribers that can be logged in to each of those elements. You apply the limit to subscribers of only one client type (DHCP, L2TP, or PPPoE) or to subscribers of any of these client types. In the latter case, the limit applies to the sum of sessions for all three client types.

Subscriber limiting can ensure that the number of subscribers logged in per hardware element does not exceed the number that your network can serve with stability at the desired service bandwidth. When the limit is reached for a hardware element, new subscriber logins are denied on that element until the number of subscribers drops below the configured limit. New subscribers over the limit connect to another hardware element in the same broadcast domain. When you configure the limit on one or more legs of an aggregated Ethernet interface, login is denied if the subscriber count exceeds the value on any of the legs.

Limiting subscribers this way distributes the load among hardware elements, but it does not provide any sort of load balancing. This feature can also help you map capacity in your network and determine what hardware resources you need to expand that capacity. For example, if you provide a service at a particular bandwidth and know how many subscribers you can service with a given set of hardware, you

can determine how much bandwidth you need. Or if you want to add a service with more bandwidth per subscriber, you can calculate the additional bandwidth that you need, compare it to your available bandwidth, and determine whether you need to provision new ports, MICs, MPCs, or routers to handle the new service.

NOTE: The CLI uses the terms `fpc` and `pic`. For this feature, `fpc` corresponds to MPC and `pic` corresponds to MIC.

To place a limit on the maximum number of subscribers allowed for a hardware element:

1. Configure the client type for the subscribers.

```
[edit system services resource-monitor subscribers-limit]
user@host# edit client-type type
```

2. (Optional) Configure a subscriber limit on the chassis.

```
[edit system services resource-monitor subscribers-limit client-type type]
user@host# set chassis limit limit
```

3. (Optional) Configure a subscriber limit on an MPC.

```
[edit system services resource-monitor subscribers-limit client-type type]
user@host# edit fpc slot-number
[edit system services resource-monitor subscribers-limit client-type type fpc slot-number]
user@host# set limit limit
```

4. (Optional) Configure a subscriber limit on a MIC.

```
[edit system services resource-monitor subscribers-limit client-type type fpc slot-number]
user@host# edit pic number
[edit system services resource-monitor subscribers-limit client-type type fpc slot-number pic
number]
user@host# set limit limit
```


5. (Optional) Configure a subscriber limit on a port.

```
[edit system services resource-monitor subscribers-limit client-type type fpc slot-number pic
number]
user@host# set port number limit limit
```

For example, the following configuration sets chassis and MPC limits for PPPoE subscribers:

```
[edit system services resource-monitor subscribers-limit]
user@host# edit client-type pppoe
[edit system services resource-monitor subscribers-limit client-type pppoe]
user@host# set chassis limit 112000
user@host# set fpc 0 limit 28000
user@host# set fpc 1 limit 28000
user@host# set fpc 2 limit 28000
user@host# set fpc 3 limit 28000
```

Release History Table

Release	Description
17.4R1	Starting in Junos OS Release 17.4R1, class of service (CoS) criteria are incorporated into the throttling decision for subscriber access.
17.3R1	Starting in Junos OS Release 17.3R1, you can also use resource monitoring to directly limit the number of subscribers supported per hardware element.

RELATED DOCUMENTATION

- Diagnosing and Debugging System Performance by Configuring Memory Resource Usage Monitoring on MX Series Routers
- Resource Monitoring Usage Computation Overview

3

CHAPTER

Dynamic Profiles for Subscriber Management

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[Per-Subscriber Support of Maximum Transmission Unit for Dynamic Profiles | 53](#)

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Dynamic Profiles for Subscriber Management

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Dynamic Profiles Overview

IN THIS SECTION

- [Dynamic Client Profiles and Dynamic Service Profiles | 47](#)
- [Dynamically Applying Services to Subscriber Sessions | 48](#)
- [Dynamic Profile Overrides | 49](#)
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- [Dynamic Profile Semantic Checking | 50](#)

A dynamic profile is a set of characteristics that acts as a kind of template that enables you to create, update, or remove a configuration that you can use to provide dynamic subscriber access and services for broadband applications. Using these profiles enables you to consolidate all of the common attributes of a client or a group of clients and apply the attributes or dynamically created objects simultaneously. After profiles are created, they reside on the router in a profile library.

You can manage subscribers dynamically with two kinds of dynamic profiles: *client profiles* and *service profiles*. Both profile types are configured at the [edit dynamic-profiles] hierarchy level and are independent of each other. Whether you use dynamic service profiles in addition to your dynamic client profiles depends on how you support differentiation among subscribers and how you package your subscriber services.

NOTE: Dynamic profile terminology is potentially confusing.

- A dynamic client profile can also correctly be referred to as a dynamic subscriber profile.
- Although dynamic client profiles are sometimes referred to as client access profiles, that term causes confusion with the access profiles configured at the [edit access profile *profile-name*] hierarchy level. Access profiles are used to configure authentication, accounting, and authorization parameters for subscriber access, some session attributes, and client-specific properties for L2TP and PPP sessions. Access profiles are applied at various configuration levels with the access-profile statement.

Dynamic Client Profiles and Dynamic Service Profiles

The major differences between dynamic client and dynamic service profiles are the following:

- A dynamic client profile is provisioned and applied to the client application configuration; for example, DHCP, DHCPv6, L2TP LNS, PPPoE, static subscribers, and VLANs. The contents of the profile are applied to the logical interface for the subscriber session. Most often, dynamic client profiles enable the dynamic instantiation of logical interfaces to which the profile is applied, but client profiles can also be applied to static subscriber logical interfaces.

A dynamic client profile can include any of the stanzas under [edit dynamic-profiles *profile-name*], except for variables *variable-name*.

- Dynamic service profiles include only service-related configurations, which are a subset of the configurations available in dynamic client profiles. They do not include other configuration attributes for a subscriber session. You cannot use a service profile to create or modify a logical interface. A dynamic service profile functions as a supplement to dynamic client profiles that is used after the creation of logical interfaces.

A dynamic service profile can include the following stanzas under [edit dynamic-profiles *profile-name*]: class-of-service, firewall, protocols, services, and variables.

Dynamic client profiles and dynamic service profiles also differ in the types of variables they can use:

- Dynamic client profiles can include predefined-variable-defaults, which define default values for Juniper Networks predefined variables that are included in the profile. The default values in the profile are used when RADIUS does not return a value for the variable. See ["Dynamic Variables Overview" on page 57](#) and ["Configuring Default Values for Predefined Variables in a Dynamic Profile" on page 109](#) for information about predefined variables.
- Dynamic service profiles can include user-defined variables that act like parameters in a function call. The variable values can be provided by the RADIUS server to support more specialized customization per subscriber. You can also set default values for these variables to be used when RADIUS does not

provide the value. See ["User-Defined Variables in Dynamic Profiles" on page 112](#) for information about user-defined variables.

- Dynamic client profiles do not include user-defined variables. Dynamic service profiles do not include predefined-variable-defaults.

[Table 4 on page 48](#) lists the types of variables supported by access profiles and service profiles.

Table 4: Types of Variables Supported in Dynamic Profiles

Type of Dynamic Profile	Junos OS Predefined Variable (Local)	Junos OS Predefined Variable (RADIUS)	User-Defined Variable
Access Profile	Yes	Yes	Yes
Service Profile	Yes	No	Yes

[Table 5 on page 48](#) lists the default values, expressions, and unique identifiers supported by access profiles and service profiles.

Table 5: Default Values and Expressions Supported in Dynamic Profiles

Type of Dynamic Profile	Default Values	Expressions	Unique Identifiers
Access Profile	Yes (RADIUS predefined variables only)	No	Yes (Schedulers and Scheduler maps only)
Service Profile	Yes (User-defined variables only)	Yes (Service activation only)	Yes (Firewall filters only)

Dynamically Applying Services to Subscriber Sessions

You can configure services to be applied to subscriber sessions in several ways:

- Include service configurations for the subscriber session in a dynamic client profile. For example, you can configure Layer 2 services such as Class of Service (CoS) and Layer 3 services such as dynamic firewall filters. Layer 3 services are applied for the negotiated address family for DHCP, DHCPv6, and PPPoE subscribers. See *Changing CoS Services Overview*.

NOTE: A dynamic client profile cannot reference a dynamic service profile. It can only directly include service configurations.

- Apply a dynamic service profile using your RADIUS configuration. The Juniper Networks Activate-Service VSA (26-65), returned in the RADIUS Access-Accept message when the subscriber authenticates, can reference a dynamic service profile and optionally pass additional parameters for the service. For DHCP and PPPoE sessions, this service profile is applied when the session's address family is activated. See *Dynamic Service Management with RADIUS*.

You can use another Juniper Networks VSA, Deactivate-Service (26-66), to deactivate services in the Access Accept message.

- Apply a service profile with a Juniper Networks VSA in a RADIUS Change of Authorization (CoA) message. You can use a CoA message to activate (VSA 26-65) or deactivate (VSA 26-66) services. For example, a subscriber may opt in or out of a service after the session is established. See *RADIUS-Initiated Change of Authorization (CoA) Overview*.
- Apply a dynamic service profile by including the service-profile statement to reference the profile in the configurations for DHCP local server, DHCP relay agent, L2TP, or static subscribers. For example, see *Specifying the Static Subscriber Group Service Profile*, *Configuring an L2TP Tunnel Group for LNS Sessions with Inline Services Interfaces*, and *Configuring an L2TP Access Profile on the LNS*.

Dynamic Profile Overrides

Starting in Junos OS Release 14.1, you can specify a different dynamic profile in the RADIUS Client-Profile-Name VSA [26-174] to have RADIUS override a configured client dynamic profile. RADIUS returns this VSA to AAA with other client session attributes in the Access-Accept message. AAA subsequently overrides the corresponding profile name attribute in the session database entry for the client, and this new profile is instantiated instead of the originally configured profile.

Dynamic Profile Version Creation

You can create new versions of dynamic profiles that are currently in use by subscribers. Dynamic profile version creation is enabled at the [edit system] hierarchy level. When enabled, you can create multiple versions of any dynamic profiles on the router. Any subscriber that logs in following a dynamic profile modification uses the latest version of the dynamic profile. Subscribers that are already active continue to use the older version of the dynamic profile until they log out or their session terminates.

When creating versions of dynamic profiles, keep the following in mind:

- You must enable or disable dynamic profile version creation before creating or using any dynamic profiles on the router. Enabling or disabling dynamic profile version creation after dynamic profiles are configured is not supported.

NOTE: Before you can enable or disable dynamic profile version creation for a router on which any dynamic profiles are configured, you must first remove all dynamic profiles from the router configuration.

- Each version of a dynamic profile is stored in the profile database as a new profile.
- The name of the new profile version is derived by appending a string to the original base dynamic profile name. This string contains two dollar sign (\$) characters to identify the version field of the profile name. These two characters are followed by numerical characters that represent the “version number” of the dynamic profile (for example, 01).
- The version number of the dynamic profile is automatically generated by the system.
- The dynamic profile that you modify is always stored as the latest version. You cannot create a modified dynamic profile and save it as an earlier version. For example, if you modify version three of a dynamic profile while it is in use, the dynamic profile is saved as version four.
- You can only modify the latest version of a dynamic profile.
- The maximum value for the version number is 99999. However, for each profile, only 10 active versions are supported at a time.
- If the dynamic profile version that you modify is not in use by any subscriber, the profile is overwritten with committed changes without creating a new version.
- After reaching the 99999th modified version of a dynamic profile, any further modifications to the dynamic profile result in overwriting that final version. If the final version is in use, any modification attempts fail upon commit.
- You can delete a dynamic profile only when none of its versions are in use.
- The dynamic profile version feature supports graceful restart and unified ISSU.

Dynamic Profile Semantic Checking

Variables are applied to dynamic profiles dynamically and cannot be checked with existing CLI commands. Semantic checking validates some variables in dynamic profiles to help identify potential configuration errors.

Semantic checks are performed during commit and during profile instantiation. Commit time checks ensure that variables appear in the correct location within the dynamic profile. Checks performed before profile instantiation ensure that the values that replace the variables are correct. The checks performed on the values include the following:

- Range validation
- Variable type validation
- Existence of variables where they are mandatory
- Variable matching to regular expressions

A commit time check failure results in an error message being displayed and logged in the `/var/log/messages` file and the commit failing. An instantiation failure results in an error being logged in the `/var/log/messages` file and the profile instantiation failing.

Configuring a Basic Dynamic Profile

This topic describes how to create a basic dynamic profile. A basic profile must contain a profile name and have both an interface variable name (such as `$junos-interface-ifd-name`) included at the `[edit dynamic-profiles profile-name interfaces hierarchy level` and logical interface variable name (such as `$junos-underlying-interface-unit` or `$junos-interface-unit`) at the `[edit dynamic-profiles profile-name interfaces variable-interface-name unit]` hierarchy level.

Before you configure dynamic profiles for initial client access:

1. Configure the necessary router interfaces that you want DHCP clients to use when accessing the network.

See *DHCP Subscriber Interface Overview* for information about the types of interfaces you can use with dynamic profiles and how to configure them.

2. Configure all RADIUS values that you want the profiles to use when validating DHCP clients for access to the multicast network.

See *RADIUS Servers and Parameters for Subscriber Access*

To configure a basic dynamic profile:

1. Name the profile.

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

2. Define the interface-name statement with the internal \$junos-interface-ifd-name variable used by the router to match the interface name of the receiving interface.

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

3. Define the unit statement with the internal variable:

- When referencing an existing interface, specify the \$junos-underlying-interface-unit variable used by the router to match the unit value of the receiving interface.
- When creating dynamic interfaces, specify the \$junos-interface-unit variable used by the router to generate a unit value for the interface.

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

or

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

Release History Table

Release	Description
14.1	Starting in Junos OS Release 14.1, you can specify a different dynamic profile in the RADIUS Client-Profile-Name VSA [26-174] to have RADIUS override a configured client dynamic profile.

RELATED DOCUMENTATION

[Dynamic Variables Overview | 57](#)

[Predefined Variables in Dynamic Profiles | 59](#)

[User-Defined Variables in Dynamic Profiles | 112](#)

Per-Subscriber Support of Maximum Transmission Unit for Dynamic Profiles

IN THIS SECTION

- [Understanding Per-subscriber Support of Maximum Transmission Unit for Dynamic Profiles | 53](#)
- [Configuring Per-subscriber Maximum Transmission Unit for Dynamic Profiles | 55](#)

You can create per subscriber support of maximum transmission unit (MTU) for dynamic profiles. For more information, see the following topics:

Understanding Per-subscriber Support of Maximum Transmission Unit for Dynamic Profiles

IN THIS SECTION

- [MTU Per-Subscriber for Dynamic Profiles | 54](#)
- [Benefits of Per Subscriber Support of MTU for Dynamic Profiles | 54](#)
- [Limitations | 54](#)

Maximum transmission unit (MTU) is used to determine the maximum size of each packet in any TCP or IP transmission. MTU cannot be greater than the payload size that is the encapsulations at the assigned layer and any lower layers are excluded. You can specify the MTU for statically configured logical interfaces. Starting in Junos OS Release 18.2R1, you can configure an MTU value for a subscriber logical interface in a dynamic profile. This feature is required in customer applications requiring per-subscriber

MTU for logical interfaces on the same underlying physical interface (from which the MTU is inherited by default). The use case is primarily dynamic VLANs for DHCP or DHCPv6 or IPoE or IPv6oE. The dynamic logical interface MTU must be no greater than the physical interface MTU minus the VLAN header size. The per-subscriber MTU feature is provided by extending dynamic-profiles to allow MTU to be configured, either with a static value or the predefined variable, `$junos-interface-mtu`, whose value is provided by RADIUS.

MTU Per-Subscriber for Dynamic Profiles

A dynamic profile is a set of characteristics, defined in a type of template, that you can use to provide dynamic subscriber access and services for broadband applications. These services are assigned dynamically to interfaces. 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 need to create variables for demux interfaces that are dynamically created when the subscribers log in. Junos OS allows you to create MTU for each subscriber for dynamic profiles. The value can be static or can be represented through a new variable, `$junos-interface-mtu`. By default, the variable value is the MTU of the payload, that is, the MTU of the physical interface minus the VLAN header size. A specific value can be returned through the RADIUS authentication in the Framed-MTU attribute (12). The attribute includes a single value which is applied to both the inet and inet6 protocol families if both are configured with `$junos-interface-mtu` variable. While applying the MTU on the subscriber logical interface during dynamic profile instantiation, a check is made to ensure that the MTU of the logical interface does not exceed what is supported on its physical interface along with the family protocol overhead. The value of the static MTU should be within the acceptable MTU range. If RADIUS does not return a Framed MTU value for `$junos-interface-mtu` variable, the default value for `interface-mtu` is used. You configure this value at the `[edit dynamic-profiles dynamic-profiles predefined-variable-defaults]` hierarchy level. If neither is provided, then the profile request is NACKed.

Benefits of Per Subscriber Support of MTU for Dynamic Profiles

- Provides network scalability if each subscriber uses different dynamic profile or different subscriber name.
- Allows each subscriber to send traffic with different traffic rate.

Limitations

The following are the limitations:

- MTU for a dynamic logical interface is applied using the same rules as static logical interfaces.
- Framed-MTU returned by RADIUS is applicable only to the authenticated session. In other words, an authenticated dynamic VLAN (DVLAN) profile affects only the MTU for the vlan logical interface, and an authenticated DHCP profile affects only the MTU for the DHCP subscriber logical interface.

- If the RADIUS does not return a value in the Framed-MTU attribute (12), the profile request is NACKed.
- A commit check ensures that the mtu is specified for inet and inet6 address family, they must both be configured as explicit values if not the same value, or both must be configured with the \$junos-interface-mtu predefined variable (in which case they are set to the same value). Otherwise, the configuration is forbidden.

Configuring Per-subscriber Maximum Transmission Unit for Dynamic Profiles

The maximum transmission unit (MTU) can be configured per subscriber for dynamic profiles. The value of MTU can be static or represented through the \$junos-interface-mtu predefined variable. By default, the variable value is the MTU of the payload, which must be less than or equal to the MTU of the physical interface minus the VLAN header size. A specific value can be returned through RADIUS authentication through the Framed-MTU attribute (12). If the RADIUS server fails to return a value in the Framed MTU attribute, then the default value configured with interface-mtu statement at the [edit dynamic-profiles *profile-name* predefined-variable-defaults] hierarchy level is used. You can configure the MTU value with the mtu statement at the [edit dynamic-profiles *name* interfaces *name* unit *name* family inet] hierarchy level or at the [edit dynamic-profiles *name* interfaces *name* unit *name* family inet6] hierarchy level.

Before you begin, configure the device interfaces.

To configure per-subscriber MTU for dynamic profiles:

1. Configure per-subscriber MTU for dynamic profiles by hardcoding the mtu value for inet or inet 6 family.

```
[edit dynamic-profiles dynamic-profiles-name interfaces "$junos-interface-ifd-name" unit unit-name family inet]
user@host# set mtu mtu-value
```

```
[edit dynamic-profiles dynamic-profiles-name interfaces "$junos-interface-ifd-name" unit unit-name family inet6]
user@host# set mtu mtu-value
```


Configure pre-subscriber MTU for dynamic profiles by hardcoding an mtu value of 1450 for family inet of dynamic profile vlan-profile.

```
[edit dynamic-profiles vlan-profile interfaces "$junos-interface-ifd-name" unit 100 family
inet]
user@host# set mtu 1450
```

- 2. Configure the value for default for junos-interface-mtu.

```
[edit dynamic-profiles dynamic-profiles-name predefined-variable-defaults]
user@hots# interface-mtu value
```

Configure interface mtu value of 1450 for predefined variable defaults of dynamic profile vlan-profile.

```
[edit dynamic-profiles vlan-profile predefined-variable-defaults]
user@hots# interface-mtu 1450
```

Release History Table

Release	Description
18.2R1	Starting in Junos OS Release 18.2R1, you can configure an MTU value for a subscriber logical interface in a dynamic profile.

RELATED DOCUMENTATION

Dynamic Profiles for Subscriber Management		46
Dynamic Variables Overview		57
Predefined Variables in Dynamic Profiles		59

Dynamic Variables Overview

IN THIS SECTION

- [How Dynamic Variables Work | 57](#)
- [Default Values for Predefined Variables | 58](#)
- [Unique Identifier \(UID\) for Parameterized Filters | 58](#)

Variables constitute the dynamic component of a dynamic profile. You use variables in dynamic profiles as placeholders for dynamically obtained or dynamically generated values that the dynamic profiles use to configure subscriber interfaces and provision subscribers.

How Dynamic Variables Work

Dynamic variables are data placeholders that you define and place in dynamic profiles. When a particular event occurs on an interface (for example, a DHCP client accesses the interface), the dynamic profiles obtain data to fill these placeholders from one of three sources—the interface receiving an incoming client data packet, an externally configured server (for example, RADIUS), or a value associated with each user-configurable variable.

For your convenience, Junos OS provides predefined variables that you can use within a dynamic profile. Most of these variables relate to interface-specific data obtained directly from the interface that receives an incoming client data packets (for example, interface name, interface unit value, and so on). When a client accesses the interface, the router software extracts the necessary interface data, propagates this data to the dynamic profile, and then uses the dynamic profile to configure the interface for the accessing client.

You can define user-defined variables for individual dynamic profiles at the `[dynamic-profiles profile-name variables]` hierarchy level. At this hierarchy level, you create an association between a variable value (for example, `$junos-igmp-version`) that appears in the body of the dynamic profile and data associated with that call value that is managed in an externally configured server (for example, a RADIUS VSA managed on a RADIUS server) or defined as a value in the `variables` stanza. When an event occurs on an interface to trigger the instantiation of a dynamic profile for the interface, Junos OS obtains values for each variable from an external server (for example, from RADIUS authentication and authorization VSAs) during the subscriber authentication process. At run time, the variables are replaced by these actual values and are used to configure the subscriber interface.

Default Values for Predefined Variables

You can optionally configure default values for many predefined variables. The Junos OS uses the default value in the following cases:

- When the external RADIUS server is not available
- When the VSA returned by the RADIUS server does not contain a value for the predefined variable

Unique Identifier (UID) for Parameterized Filters

Parameterized filters use unique identifiers (UIDs) in dynamic profiles created for services. The generated UIDs enable you to identify and configure separate parameter values for filters with the same variable name. In addition, assigning a UID improves performance of the router.

For service profiles, you can request the generation of a UID for a user-defined variable by including the `uid` statement at the `[dynamic-profiles profile-name variables variable-name]` hierarchy level. You then reference the variable name in the filter.

To enable selection of a particular filter in a dynamic profile that contains multiple variables of the same parameter and criteria type, you must indicate that the variable refers to a UID. To configure, include the `uid-reference` statement at the `[dynamic-profiles profile-name variables variable-name]` hierarchy level. For example, if the variable `$in-filter` receives the value of "filter1" from RADIUS, the filter definition named `$filter` is used.

RELATED DOCUMENTATION

[Predefined Variables in Dynamic Profiles | 59](#)

[User-Defined Variables in Dynamic Profiles | 112](#)

Parameterized Filters Overview

RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework

Predefined Variables in Dynamic Profiles

IN THIS SECTION

- [Junos OS Predefined Variables | 59](#)
- [Junos OS Predefined Variables That Correspond to RADIUS Attributes and VSAs | 94](#)
- [Predefined Variable Defaults for Dynamic Client Profiles | 107](#)
- [Configuring Predefined Dynamic Variables in Dynamic Profiles | 108](#)
- [Configuring Default Values for Predefined Variables in a Dynamic Profile | 109](#)

Junos OS Predefined Variables

Junos OS contains many predefined variables. The dynamic profile obtains and replaces values for these variables from an incoming client data packet and configuration (local and RADIUS). These variables are predefined—you use them in the body of a dynamic profile without first having to define the variables at the [dynamic-profiles *profile-name* variables] hierarchy level. [Table 6 on page 59](#) provides a list of predefined variables, their descriptions, and where in the Junos OS hierarchy you can configure them.

Table 6: Junos OS Predefined Variables and Definitions

Variable	Definition
Access and Access-Internal Routes	
\$junos-framed-route-cost	Cost metric of an IPv4 access route. You specify this variable with the metric statement at the [edit dynamic-profiles <i>profile-name</i> routing-options access route <i>address</i>] hierarchy level.
\$junos-framed-route-distance	Distance of an IPv4 access route. You specify this variable with the preference statement at the [edit dynamic-profiles <i>profile-name</i> routing-options access route <i>address</i>] hierarchy level.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
<code>\$junos-framed-route-ip-address-prefix</code>	Route prefix of an IPv4 access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access] hierarchy level for the route statement.
<code>\$junos-framed-route-ipv6-address-prefix</code>	Route prefix of an IPv6 access route. You specify this variable with the route statement at either of the following hierarchy levels: <ul style="list-style-type: none"> [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options rib \$junos-ipv6-rib access] [edit dynamic-profiles <i>profile-name</i> routing-options rib \$junos-ipv6-rib access]
<code>\$junos-framed-route-ipv6-cost</code>	Cost metric of an IPv6 access route. You specify this variable with the metric statement at either of the following hierarchy levels: <ul style="list-style-type: none"> [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix] [edit dynamic-profiles <i>profile-name</i> routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix]

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-framed-route-ipv6-distance	<p>Distance of an IPv6 access route. You specify this variable with the preference statement at either of the following hierarchy levels:</p> <ul style="list-style-type: none"> • [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix] • [edit dynamic-profiles <i>profile-name</i> routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix]
\$junos-framed-route-ipv6-nexthop	<p>IPv6 next-hop address of an access route. You specify this variable with the next-hop statement at either of the following hierarchy levels:</p> <ul style="list-style-type: none"> • [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix] • [edit dynamic-profiles <i>profile-name</i> routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix]
\$junos-framed-route-ipv6-tag	<p>Tag value of an IPv6 access route. You specify this variable with the tag statement at either of the following hierarchy levels:</p> <ul style="list-style-type: none"> • [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix] • [edit dynamic-profiles <i>profile-name</i> routing-options rib \$junos-ipv6-rib access route \$junos-framed-route-ipv6-address-prefix]

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-framed-route-nexthop	IPv4 next-hop address of an access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route <i>address</i>] hierarchy level for the next-hop statement.
\$junos-framed-route-tag	Tag value of an IPv4 access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route <i>address</i>] hierarchy level for the tag statement.
\$junos-framed-route-tag2	Tag2 value for static routes. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route \$junos-framed-route-ip-address-prefix] hierarchy level for the tag2 statement.
\$junos-interface-name	<p>Logical interface of an access-internal route. DHCP or PPP supplies this information when the subscriber logs in. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal route <i>address</i>] hierarchy level for the qualified-next-hop statement.</p> <p>This variable is also used for creating dynamic IP demux interfaces.</p>
\$junos-ipv6-rib	<p>Routing table for an IPv6 access route. You specify this variable with the rib statement at the [edit dynamic-profiles <i>profile-name</i> routing-instances \$junos-routing-instance routing-options] hierarchy level.</p> <p>You can use this variable to specify a nondefault routing instance for the route.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-subscriber-ip-address	<p>IP address of a subscriber identified in an access-internal route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal] hierarchy level for the route statement.</p> <p>This variable is also used for creating dynamic IP demux interfaces.</p>
\$junos-subscriber-mac-address	<p>MAC address for a subscriber identified in an access-internal route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal route <i>address</i> qualified-next hop <i>underlying-interface</i>] hierarchy level for the mac-address statement.</p>
Dynamic Protocols	
\$junos-igmp-access-group-name	Specifies the access list to use for the source (S) filter.
\$junos-igmp-access-source-group-name	Specifies the access list to use for the source-group (S,G) filter.
\$junos-igmp-enable	Ensures that IGMP is not disabled on the interface by an AAA-based authentication and management method (for example, RADIUS). You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.
\$junos-igmp-immediate-leave	Enables IGMP immediate leave on the interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-igmp-version	IGMP version configured in a client access profile. Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The version is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.
\$junos-interface-name	<p>Name of the dynamic interface to which the subscriber access client connects. Its use is in dynamically enabling IGMP on the subscriber interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.</p> <p>The interface name is derived from concatenating the \$junos-interface-ifd-name and the \$junos-underlying-interface-unit variables obtained when a subscriber is created dynamically at the [dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-ipv6-ndra-prefix	Prefix value for the router advertisement interface. Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The prefix value is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols router-advertisement interface <i>\$junos-interface-name</i>] hierarchy level.
\$junos-mld-access-group-name	Specifies the access list to use for the group (G) filter.
\$junos-mld-access-source-group-name	Specifies the access list to use for the source-group (S,G) filter.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-mld-enable	Ensures that MLD is not disabled on the interface by an AAA-based authentication and management method (for example, RADIUS). You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols mld] hierarchy level for the interface statement.
\$junos-mld-immediate-leave	Enables MLD immediate leave on the interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols mld] hierarchy level for the interface statement.
\$junos-mld-version	MLD version configured in a client access profile. Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The version is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols mld] hierarchy level for the interface statement.
Dynamic CoS — Traffic-Control Profile Parameters	
\$junos-cos-adjust-minimum	<p>Minimum adjusted shaping rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the adjust-minimum statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-byte-adjust	<p>Byte adjustment value configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the bytes option with the overhead-accounting statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-byte-adjust-cell	<p>Overhead bytes when downstream ATM traffic is in cell-mode.</p> <p>NOTE: Do not configure the \$junos-cos-byte-adjust-cell variable when the \$junos-cos-byte-adjust variable is configured.</p>
\$junos-cos-byte-adjust-frame	<p>Overhead bytes when downstream ATM traffic is in frame-mode.</p> <p>NOTE: Do not configure the \$junos-cos-byte-adjust-frame variable when the \$junos-cos-byte-adjust variable is configured.</p>
\$junos-cos-delay-buffer-rate	<p>Delay-buffer rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the delay-buffer-rate statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-excess-rate	<p>Excess rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the excess-rate statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-excess-rate-high	<p>Rate configured for excess high-priority traffic in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the excess-rate-high statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-excess-rate-low	<p>Rate configured for excesslow-priority traffic in a traffic-control profile in a dynamic profile for subscriber access. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the excess-rate-low statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-guaranteed-rate	<p>Guaranteed rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>guaranteed-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p>
\$junos-cos-guaranteed-rate-burst	<p>Burst size for the guaranteed rate that is configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable with the <code>burst-size</code> option in the <code>guaranteed-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p>
\$junos-cos-scheduler-map	<p>Scheduler-map name configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>scheduler-map</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p> <p>NOTE: The scheduler map can be defined dynamically (at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service scheduler-maps]</code> hierarchy level) or statically (at the <code>[edit class-of-service scheduler-maps]</code> hierarchy level).</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-shaping-mode	<p>Shaping mode configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the overhead-accounting statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-shaping-rate	<p>Shaping rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the shaping-rate statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-shaping-rate-burst	<p>Burst size for the shaping rate configured in a traffic-control profile in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable with the burst-size option in the shaping-rate statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p>
\$junos-cos-shaping-rate-excess-high	<p>Shaping rate configured for excess high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.</p>

Table 6: Junos OS Predefined Variables and Definitions *(Continued)*

Variable	Definition
\$junos-cos-shaping-rate-excess-high-burst	Shaping rate burst size configured for excess high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-low	Shaping rate configured for excess low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-low-burst	Shaping rate burst size configured for excess low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-high	Shaping rate configured for high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-high-burst	Shaping rate burst size configured for high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-low	Shaping rate configured for low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-shaping-rate-priority-low-burst	Shaping rate burst size configured for low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-medium	Shaping rate configured for medium-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-medium-burst	Shaping rate burst size configured for medium-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-traffic-control-profile	<p>Traffic-control profile configured in a dynamic profile for subscriber access. The Junos OS obtains the profile information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the traffic-control-profiles statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service] hierarchy level.</p>

Dynamic CoS — Scheduler Parameters

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-scheduler	<p>Name of a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers] hierarchy level.</p>
\$junos-cos-scheduler-bs	<p>Buffer size as a percentage of total buffer, specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the buffer-size statement with the percent option at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>] hierarchy level.</p>
\$junos-cos-scheduler-pri	<p>Packet-scheduling priority value specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the priority statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-scheduler-dropfile-any	<p>Name of the drop profile for random early detection (RED) for loss-priority level any specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority any protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-dropfile-high	<p>Name of the drop profile for random early detection (RED) for loss-priority level high specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority high protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-scheduler-dropfile-low	<p>Name of the drop profile for random early detection (RED) for loss-priority level low specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority low protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level) for loss-priority low.</p>
\$junos-cos-scheduler-dropfile-medium-high	<p>Name of the drop profile for random early detection (RED) for loss-priority level medium-high specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority medium-high protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-scheduler-dropfile-medium-low	<p>Name of the drop profile for random early detection (RED) for loss-priority level medium-low specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority medium-low protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-excess-priority	<p>Priority value of the excess rate specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the excess-priority statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>] hierarchy level.</p>
\$junos-cos-scheduler-excess-rate	<p>Value of the excess rate specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the excess-rate statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-cos-scheduler-shaping-rate	<p>Value of the shaping rate specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>shaping-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]</code> hierarchy level.</p>
\$junos-cos-scheduler-tx	<p>Transmit rate specified for a scheduler configured in a dynamic profile. Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>transmit-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]</code> hierarchy level.</p>

Dynamic CoS — Dynamic Interface Sets

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-aggregation-interface-set-name	<p>Name of a hierarchical CoS L2 interface set that represents a logical intermediate node (DPU-C or PON tree) in the access network. This is also known as the dynamic aggregation interface set. The variable take one of the following values:</p> <ul style="list-style-type: none"> • When the hierarchical-access-network-detection option is configured for the access lines and the value of the Access-Aggregation-Circuit-ID-ASCII attribute (TLV 0x03) received either in the ANCP Port Up message or PPPoE PADR IA tags begins with a # character, then the variable takes the value of the remainder of the string after the # character. The # character identifies the string as a backhaul identifier. • When the hierarchical-access-network-detection option is not configured, or if the string does not begin with the # character, then the variable takes the value specified with the predefined-variable-defaults statement. <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-interface-set-name	<p>Name of the interface set obtained from the RADIUS server Access-Accept message when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-phy-ifd-interface-set-name	<p>Locally generated name of an interface set that is associated with the underlying physical interface in a dynamic profile. This predefined variable enables you to group all the subscribers on a specific physical interface so that you can apply services to the entire group of subscribers.</p> <p>This interface set is a default level 2 interface set for four-level hierarchies and a default level 3 interface set for five-level hierarchies.</p> <p>You can use this predefined variable to conserve CoS resources in a mixed business and residential topology by collecting the residential subscribers into an interface set associated with the physical interface. This causes a level 2 node to be used for the interface set rather than one for each residential interface.</p> <p>Otherwise, because the business and residential subscribers share the same interface and business subscribers require three levels of CoS, then three levels are configured for each residential subscriber. That results in an unnecessary level 2 node being consumed for each residential connection, wasting CoS resources.</p> <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-phy-ifd-underlying-intf-set-name	<p>Name of a default, topology-based interface set that is based on the physical interface name with a suffix of “-underlying” to conserve hierarchical CoS L2 nodes.</p> <p>This interface is used as a default level 2 interface set.</p> <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-svlan-interface-set-name	<p>Locally generated name of an interface set for use by dual-tagged VLAN (S-VLAN) interfaces. The name is based on the outer tag of the dual-tagged VLAN. The format of the generated variable is <i>physical_interface_name-outer_vlan_tag</i>.</p> <p>For example, an Ethernet interface of ge-1/1/0, with a dual-tagged VLAN interface that has an outer tag of 111, results in a value of ge-1/1/0-111 for \$junos-svlan-interface-set-name.</p> <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-tagged-vlan-interface-set-name	<p>Locally generated name of an interface set that groups logical interfaces stacked over logical stacked VLAN demux interfaces. You can use this variable for either a 1:1 (dual-tagged; individual client) VLAN or N:1 (single tagged; service) VLAN. The format of the generated variable differs with VLAN type as follows:</p> <ul style="list-style-type: none"> • Dual-tagged (client) VLAN—The format is <i>physical_interface_name-outer_vlan_tag-inner_vlan_tag</i>. For example, an Ethernet interface of ge-1/1/0, with a dual-tagged VLAN interface that has an outer tag of 111 and an inner tag of 200, results in a value of ge-1/1/0-111-200 for \$junos-tagged-vlan-interface-set-name. • Single tagged (service) VLAN—The format is <i>physical_interface_name-vlan_tag</i>. For example, an Ethernet interface of ge-1/1/0, with an N:1 VLAN that has a single tag of 200, results in a value of ge-1/1/0-200 for \$junos-tagged-vlan-interface-set-name. <p>You reference this variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
Dynamic Connectivity Fault Management Parameters	
\$junos-action-profile	Name of the action profile configured in a dynamic profile.
\$junos-ccm-interval	Continuity check interval time configured in a dynamic profile.
\$junos-loss-threshold	The number of continuity check messages lost before marking the remote MEP as down, configured in a dynamic profile.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-ma-name-format	Name of the maintenance association name format configured in a dynamic profile.
\$junos-md-name-format	Name of the maintenance domain format configured in a dynamic profile.
\$junos-ma-name	Name of the maintenance association configured in a dynamic profile.
\$junos-md-level	Value of 'Level', configured in a dynamic profile.
\$junos-md-name	Name of the maintenance domain configured in a dynamic profile.
\$junos-mep-id	The 'MEP' value configured in the dynamic profile.
\$junos-remote-mep-id	The 'Remote MEP' value configured in the dynamic profile.
Filters — RADIUS-obtained Policies	
\$junos-input-filter	Name of an input filter to be attached; filter name is derived from RADIUS VSA 26-10 (Ingress-Policy-Name) or RADIUS attribute 11 (Filter-ID) to the interface.
\$junos-input-interface-filter	<p>Name of an input filter to be attached to a family any interface; filter name is derived from RADIUS VSA 26-191 (Input-Interface-Filter) to the interface.</p> <p>You can also specify the filter name with the \$junos-input-interface-filter statement at the [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-interface-number</i> filter input] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-input-ipv6-filter	Name of an IPv6 input filter to be attached; filter name is derived from RADIUS VSA 26-106 (IPv6-Ingress-Policy-Name) to the interface.
\$junos-output-filter	Name of an output filter to be attached; filter name is derived from RADIUS VSA 26-11 (Egress-Policy-Name) to the interface.
\$junos-output-interface-filter	<p>Name of an output filter to be attached to a family any interface; filter name is derived from RADIUS VSA 26-191 (Output-Interface-Filter) to the interface.</p> <p>You can also specify the filter name with the \$junos-output-interface-filter statement at the [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-interface-number</i> filter output] hierarchy level.</p>
\$junos-output-ipv6-filter	Name of an IPv6 output filter to be attached; filter name is derived from RADIUS VSA 26-107 (IPv6-Egress-Policy-Name) to the interface.
Services	
\$junos-input-ipv6-service-filter	<p>Starting in Junos OS Release 17.2R1, name of an IPv6 input service filter to be attached. The filter name is derived from RADIUS-VSA 26-202 (IPv6 input service filter) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 service input service-set <i>service-set-name</i> service-filter] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-input-ipv6-service-set	<p>Starting in Junos OS Release 17.2R1, name of an IPv6 service set to be attached. The service set name is derived from RADIUS-VSA 26-200 (IPv6 input service set) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 service input service-set] hierarchy level.</p>
\$junos-input-service-filter	<p>Starting in Junos OS Release 17.2R1, name of an IPv4 input service filter to be attached. The filter name is derived from RADIUS-VSA 26-198 (IPv4 input service filter) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service input service-set <i>service-set-name</i> service-filter] hierarchy level.</p>
\$junos-input-service-set	<p>Starting in Junos OS Release 17.2R1, name of an IPv4 input service set to be attached. The service set name is derived from RADIUS-VSA 26-196 (IPv4 input service set) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service input service-set] hierarchy level.</p>
\$junos-output-ipv6-service-filter	<p>Starting in Junos OS Release 17.2R1, name of an IPv6 service filter to be attached. The filter name is derived from RADIUS-VSA 26-203 (IPv6 output service filter) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 service output service-set <i>service-set-name</i> service-filter] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-output-ipv6-service-set	<p>Starting in Junos OS Release 17.2R1, name of an IPv6 service set to be attached. The service set name is derived from RADIUS-VSA 26-201 (IPv6 output service set) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 service output service-set] hierarchy level.</p>
\$junos-output-service-filter	<p>Starting in Junos OS Release 17.2R1, name of an IPv4 service filter to be attached. The filter name is derived from RADIUS-VSA 26-199 (IPv4 output service filter) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service output service-set <i>service-set-name</i> service-filter] hierarchy level.</p>
\$junos-output-service-set	<p>Starting in Junos OS Release 17.2R1, name of an IPv4 output service set to be attached. The service set name is derived from RADIUS-VSA 26-197 (IPv4 output service set) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service output service-set] hierarchy level.</p>
\$junos-pcef-profile	<p>Starting in Junos OS Release 17.2R1, name of a PCEF profile to be attached. The profile name is derived from RADIUS-VSA 26-204 (PCEF profile) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> service] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-pcef-rule	<p>Starting in Junos OS Release 17.2R1, name of a PCC rule to activate. The rule name is derived from RADIUS-VSA 26-205 (PCEF rule) to the interface.</p> <p>You specify this variable at the [edit dynamic-profile <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> service pcef <i>pcef-profile-name</i> activate] hierarchy level.</p>
Subscriber Interfaces — Dynamic Demux Interfaces	
\$junos-interface-ifd-name	<p>Name of the device to which the subscriber access client connects. All interfaces are created on this device. Its primary use is in creating single or multiple subscribers on a statically created interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p> <p>When creating a logical underlying interface for a dynamic VLAN demux interface, you must also specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>demux0</i> unit <i>\$junos-interface-unit</i> demux-options underlying-interface] hierarchy level.</p>
\$junos-interface-target-weight	<p>Weight for an interface to associate it with an interface set and thus with the set's aggregated Ethernet member link for targeted distribution. When an interface set does not have a weight, then the interface weight value for the first authorized subscriber interface is used for the set. The value is derived from RADIUS VSA 26-214 Interface-Target-Weight. Also associated with Diameter AVP 214.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-interface-unit	Creates a unit number assigned to the logical interface. The router supplies this information when the subscriber accesses the network. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i>] hierarchy level for the unit statement.
\$junos-ipv6-address	Selects the IPv6 address of the interface the subscriber uses. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i>], [edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit" family <i>family</i>], and [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>] hierarchy level for the address statement.
\$junos-loopback-interface	Selects the loopback interface the subscriber uses. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" family inet] hierarchy level for the unnumbered-address statement.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-preferred-source-address	<p>Selects the preferred IPv4 source address (family inet) associated with the loopback address used for the subscriber. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" family inet unnumbered-address "\$junos-loopback-interface"] hierarchy level for the preferred-source-address statement.</p> <p>NOTE: Starting in Junos OS Release 16.1, 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 an IPv4 preferred source address. This constraint applies whether you use the \$junos-preferred-source-address predefined variable or the preferred-source-address statement. Configuring the preferred source address in this circumstance causes a commit failure.</p>
\$junos-preferred-source-ipv6-address	<p>Selects the preferred IPv6 source address (family inet6) associated with the loopback address used for the subscriber. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" family inet6 unnumbered-address "\$junos-loopback-interface"] hierarchy level for the preferred-source-address statement.</p> <p>NOTE: Starting in Junos OS Release 16.1, 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 an IPv6 preferred source address. This constraint applies whether you use 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.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-subscriber-demux-ip-address	<p>IP address of the subscriber. Use this variable instead of \$junos-subscriber-ip-address when the IP demux subscribers require a framed route returned from the RADIUS server.</p> <p>You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>demux0</i> unit family <i>inet</i> demux-source] hierarchy level.</p>
\$junos-subscriber-ip-address	<p>IP address of the subscriber. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>demux0</i> unit family <i>inet</i> demux-source] hierarchy level.</p> <p>This variable is also used for creating access-internal routes.</p>
\$junos-subscriber-ipv6-address	<p>IPv6 address for subscriber. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 demux-source] hierarchy level.</p>
\$junos-subscriber-ipv6-multi-address	<p>Expands the demux-source into multiple addresses; for example, the IPv6 prefix and /128 address for the subscriber.</p> <p>You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet6 demux-source] hierarchy level.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-underlying-interface	<p>Creates a logical underlying interface for a dynamic IP demux interface. The client logs in on this interface. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" demux-options] hierarchy level for the underlying-interface statement.</p> <p>When configured, the underlying interface is used to determine the \$junos-underlying-interface, \$junos-underlying-interface-unit, and \$junos-ifd-name variables. For example, if the receiving logical interface is ge-0/0/0.1, the \$junos-underlying-interface variable is set to ge-0/0/0 and the \$junos-underlying-interface-unit variable is set to 1.</p> <p>This variable is also used for creating access-internal routes.</p>

Subscriber Interfaces — Static VLAN Interfaces

\$junos-interface-ifd-name	<p>Name of the device to which the subscriber access client connects. All interfaces are created on this device. Its primary use is in creating single or multiple subscribers on a statically created interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-underlying-interface-unit	<p>Obtains the unit number for the underlying interface. It specifies the use of the underlying interface for the subscriber. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>\$junos-interface-ifd-name</i>] hierarchy level for the unit statement.</p>

Subscriber Interfaces — Dynamic PPPoE Interfaces

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-interface-unit	Specifies the logical unit number when the router dynamically creates a PPPoE logical interface. The \$junos-interface-unit predefined variable is dynamically replaced with the unit number supplied by the network when the PPPoE subscriber logs in. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> interfaces pp0] hierarchy level for the unit statement.
\$junos-underlying-interface	Specifies the name of the underlying Ethernet interface on which the router dynamically creates the PPPoE logical interface. The \$junos-underlying-interface predefined variable is dynamically replaced with the name of the underlying interface supplied by the network when the PPPoE subscriber logs in. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> interfaces pp0 unit "\$junos-interface-unit" pppoe-options] hierarchy level for the underlying-interface statement.
Subscriber Interfaces — Dynamic Interface Sets	
\$junos-interface-set-name	Name of an interface set configured in a dynamic profile. To represent the name of a dynamically created agent circuit identifier (ACI) interface set, use the \$junos-interface-set-name predefined variable in the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.
\$junos-interface-set-target-weight	Weight for an interface set to associate it and its member links with an aggregated Ethernet member link for targeted distribution. The value is derived from RADIUS VSA 26-213 Interface-Set-Target-Weight. Also associated with Diameter AVP 213.

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-phy-ifd-interface-set-name	<p>Name of an interface set associated with the underlying physical interface in a dynamic profile.</p> <p>In a heterogeneous topology where residential and business subscribers share the same physical interface, although only two levels of CoS are required for residential access, business access requires three levels. Because they share the same physical interface, three levels are configured for both, causing an unnecessary level 2 node to be consumed for each residential connection.</p> <p>Starting in Junos OS Release 16.1, you can reduce the CoS resources wasted on residential access by collecting the residential subscribers into an interface set associated with the physical interface. In this way, a level 2 node is used for the interface set rather than for each residential interface. To do so, specify the \$junos-phy-ifd-interface-set-name predefined variable with the interface-set statement at the [edit dynamic-profiles <i>profile-name</i> interfaces] hierarchy level to create the interface set based on the underlying physical interface.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-pon-id-interface-set-name	<p>Locally generated interface set name used to associate individual customer circuits in a passive optical network (PON) to deliver CoS and other services to the set of interfaces.</p> <p>The name is extracted from the DHCPv4 (Option 82, suboption 2) or DHCPv6 (Option 37) agent remote ID string inserted by an optical line terminal (OLT) in a PON. The OLT must format the agent remote ID string with a pipe symbol () as the delimiter between substrings. The substring extracted for the interface set name consists of the characters following the last delimiter in the agent remote ID string.</p> <p>The extracted substring identifies individual customer circuits. You determine the format and contents of the substring, and configure your OLT to insert the information. Typically, the substring might include the name and port of the OLT accessed by the CPE optical network terminal (ONT).</p>
\$junos-svlan-interface-set-name	<p>Locally generated interface set name for use by dual-tagged VLAN interfaces based on the outer tag of the dual-tagged VLAN. The format of the generated variable is <i>physical_interface_name - outer_VLAN_tag</i>.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-interface-name	<p>Name of the dynamic interface to which the subscriber access client connects. Its use is in identifying the subscriber interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> routing-instance <i>\$junos-routing-instance</i>] hierarchy level for the interface statement.</p> <p>The interface name is derived from concatenating the \$junos-interface-ifd-name and the \$junos-underlying-interface-unit variables obtained when a subscriber is created dynamically at the [dynamic-profiles <i>profile-name</i> routing-instance <i>\$junos-routing-instance</i> interface] hierarchy level.</p>
\$junos-routing-instance	<p>Name of the routing instance to which the subscriber is assigned. This variable triggers a return value from the RADIUS server for Virtual-Router (VSA 26-1).</p> <p>You reference this variable in the statement at the [dynamic-profiles <i>profile-name</i>] hierarchy level for the routing-instance statement.</p> <p>NOTE: Starting in Junos OS Release 16.1, 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. This constraint applies whether you use 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.</p>

Table 6: Junos OS Predefined Variables and Definitions (*Continued*)

Variable	Definition
\$junos-inner-vlan-map-id	<p>Starting in Junos OS Release 16.1R4, identifier for the inner VLAN tag for Layer 2 wholesale, ANCP-triggered, autosensed dynamic VLANs. The VLAN tag is allocated from the inner VLAN ID swap ranges that are provisioned on the core-facing physical interface. The inner VLAN tag is swapped with (replaces) the outer VLAN tag when the subscriber traffic is tunneled to the NSP.</p> <p>You specify this variable with the <code>inner-vlan-id</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> interfaces \$junos-interface-ifd-name unit \$junos-interface-unit input-vlan-map]</code> hierarchy level.</p>
\$junos-vlan-map-id	<p>Identifier for a VLAN that is rewritten at the input or output interface as specified by a VLAN map.</p> <p>You specify this variable with the <code>vlan-id</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> interfaces \$junos-interface-ifd-name unit \$junos-interface-unit input-vlan-map]</code> or <code>[edit dynamic-profiles <i>profile-name</i> interfaces \$junos-interface-ifd-name unit \$junos-interface-unit input-vlan-map]</code> hierarchy levels.</p>

Junos OS Predefined Variables That Correspond to RADIUS Attributes and VSAs

Table 7 on page 95 lists the RADIUS attributes and Juniper Networks VSAs and their corresponding Junos OS predefined variables that are used in dynamic profiles. When the router instantiates a dynamic profile following subscriber access, the Junos OS uses the predefined variable to specify the RADIUS attribute or VSA for the information obtained from the RADIUS server.

Some predefined variables support the configuration of default values. The configured default value is used in the event that RADIUS fails to return a value for the variable. You configure default values with the `predefined-variable-defaults predefined-variable default-value` statement at the `[edit dynamic-profiles]`

hierarchy level. When you specify the *predefined-variable*, you use the name of the Junos OS predefined variable, but you omit the leading \$junos- prefix.

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
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RADIUS Standard Attributes

8 Framed-IP-Address	\$junos-framed-route-ip-address	Address for the client	No
11 Filter-ID	\$junos-input-filter NOTE: Variable is also used for VSA 26-10.	Input filter to apply to client IPv4 interface	Yes
12 Framed-MTU	\$junos-interface-mtu	Maximum size of the packet; maximum transmission unit	Yes
22 Framed-Route	\$junos-framed-route-ip-address-prefix	(Subattribute 1): Route prefix for access route	No
	\$junos-framed-route-nexthop	(Subattribute 2): Next hop address for access route	No
	\$junos-framed-route-cost	(Subattribute 3): Metric for access route	No
	\$junos-framed-route-distance	(Subattribute 5): Preference for access route	No

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables *(Continued)*

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-framed-route-tag	(Subattribute 6): Tag for access route	No
97 Framed-IPv6-Prefix	\$junos-ipv6-ndra-prefix	Prefix value in IPv6 Neighbor Discovery route advertisements	No
99 Framed-IPv6-Route	\$junos-framed-route-ipv6-address-prefix	(Subattribute 1): Framed IPv6 route prefix configured for the client	No
	\$junos-framed-route-ipv6-cost	(Subattribute 3): Metric for access route	No
	\$junos-framed-route-ipv6-distance	(Subattribute 5): Preference for access route	No
	\$junos-framed-route-ipv6-nexthop	(Subattribute 2): IPv6 routing information configured for the client	No
	\$junos-framed-route-ipv6-tag	(Subattribute 6): Tag for access route	No

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (Continued)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
26-1 Virtual-Router	\$junos-routing-instance	Routing instance to which subscriber is assigned	Yes
26-10 Ingress-Policy-Name	\$junos-input-filter NOTE: Variable is also used for RADIUS attribute 11.	Input filter to apply to client IPv4 interface	Yes
26-11 Egress-Policy-Name	\$junos-output-filter	Output filter to apply to client IPv4 interface	Yes
26-23 IGMP-Enable	\$junos-igmp-enable	Enable or disable IGMP on client interface	Yes
26-71 IGMP-Access-Name	\$junos-igmp-access-group-name	Access list to use for the group (G) filter	Yes
26-72 IGMP-Access-Src-Name	\$junos-igmp-access-source-group-name	Access List to use for the source group (S,G) filter	Yes
26-74 MLD-Access-Name	\$junos-mld-access-group-name	Access list to use for the group (G) filter	Yes
26-75 MLD-Access-Src-Name	\$junos-mld-access-source-group-name	Access List to use for the source group (S,G) filter	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (Continued)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
26-77 MLD-Version	\$junos-mld-version	MLD protocol version	Yes
26-78 IGMP-Version	\$junos-igmp-version	IGMP protocol version	Yes
26-97 IGMP-Immediate-Leave	\$junos-igmp-immediate-leave	IGMP immediate leave	Yes
26-100 MLD-Immediate-Leave	\$junos-mld-immediate-leave	MLD immediate leave	Yes
26-106 IPv6-Ingress-Policy-Name	\$junos-input-ipv6-filter	Input filter to apply to client IPv6 interface	Yes
26-107 IPv6-Egress-Policy-Name	\$junos-output-ipv6-filter	Output filter to apply to client IPv6 interface	Yes
26-108 CoS-Parameter-Type	\$junos-cos-scheduler-map	(T01: Scheduler-map name) Name of scheduler map configured in traffic-control profile	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables *(Continued)*

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-shaping-rate	(T02: Shaping rate) Shaping rate configured in traffic-control profile	Yes
	\$junos-cos-guaranteed-rate	(T03: Guaranteed rate) Guaranteed rate configured in traffic-control profile	Yes
	\$junos-cos-delay-buffer-rate	(T04: Delay-buffer rate) Delay-buffer rate configured in traffic-control profile	Yes
	\$junos-cos-excess-rate	(T05; Excess rate) Excess rate configured in traffic-control profile	Yes
	\$junos-cos-traffic-control-profile	(T06: Traffic-control profile) Name of the traffic-control profile configured in a dynamic profile	Yes
	\$junos-cos-shaping-mode	(T07; Shaping mode) CoS shaping mode configured in a dynamic profile	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (*Continued*)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-byte-adjust	(T08; Byte adjust) Byte adjustments configured for the shaping mode in a dynamic profile	Yes
	\$junos-cos-adjust-minimum	(T09; Adjust minimum) Minimum adjusted value allowed for the shaping rate in a dynamic profile	Yes
	\$junos-cos-excess-rate-high	(T10; Excess rate high) Excess rate configured for high-priority traffic in a dynamic profile	Yes
	\$junos-cos-excess-rate-low	(T11; Excess rate low) Excess rate configured for low-priority traffic in a dynamic profile	Yes
	\$junos-cos-shaping-rate-burst	(T12; Shaping rate burst) Burst size configured for the shaping rate in a dynamic profile	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables *(Continued)*

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-guaranteed-rate-burst	(T13; Guaranteed rate burst) Burst size configured for the guaranteed rate in a dynamic profile	Yes
26-130 Qos-Set-Name	\$junos-interface-set-name	Name of an interface set configured in a dynamic profile	Yes
26-146 CoS-Scheduler-Pmt-Type	\$junos-cos-scheduler	(Null: Scheduler name) Name of scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-tx	(T01: CoS scheduler transmit rate) Transmit rate for scheduler configured in a dynamic profile	Yes Available for multiple parameters: <ul style="list-style-type: none"> • Percent • Rate
	\$junos-cos-scheduler-bs	(T02: CoS scheduler buffer size) Buffer size for scheduler configured in a dynamic profile	Yes Available for multiple parameters: <ul style="list-style-type: none"> • Percent • Temporal

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (*Continued*)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-scheduler-pri	(T03: CoS scheduler priority) Packet-scheduling priority for scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-dropfile-low	(T04: CoS scheduler drop-profile low) Name of drop profile for RED loss-priority level low for scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-dropfile-medium-low	(T05: CoS scheduler drop-profile medium-low) Name of drop profile for RED loss-priority level medium-low for scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-dropfile-medium-high	(T06: CoS scheduler drop-profile medium-high) Name of drop profile for RED loss-priority level medium-high for scheduler configured in a dynamic profile	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (*Continued*)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-scheduler-dropfile-high	(T07: CoS scheduler drop-profile high) Name of drop profile for RED loss-priority level high for scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-dropfile-any	(T08: CoS scheduler drop-profile any) Name of drop profile for RED loss-priority level any for scheduler configured in a dynamic profile	Yes
	\$junos-cos-scheduler-excess-rate	(T09: CoS scheduler excess rate) Excess rate configured for a scheduler in a dynamic profile	Yes Available for multiple parameters: <ul style="list-style-type: none"> • Percent • Proportion
	\$junos-cos-scheduler-shaping-rate	(T10: CoS scheduler shaping rate) Shaping rate configured for a scheduler in a dynamic profile	Yes Available for multiple parameters: <ul style="list-style-type: none"> • Percent • Rate

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables *(Continued)*

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
	\$junos-cos-scheduler-excess-priority	(T11: CoS scheduler excess priority) Excess priority configured for a scheduler in a dynamic profile	Yes
26-191 Input-Interface-Filter	\$junos-input-interface-filter	Name of an input filter to be attached to a family any interface.	No
26-192 Output-Interface-Filter	\$junos-output-interface-filter	Name of an output filter to be attached to a family any interface.	No
26-196 IPv4-Input-Service-Set	\$junos-input-service-set	Name of an IPv4 input service set to be attached.	No
26-197 IPv4-Output-Service-Set	\$junos-output-service-set	Name of an IPv4 output service set to be attached.	No
26-198 IPv4-Input-Service-Filter	\$junos-input-service-filter	Name of an IPv4 input service filter to be attached.	No

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables *(Continued)*

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
26-199 IPv4-Output-Service-Filter	\$junos-output-service-filter	Name of an IPv4 output service filter to be attached.	No
26-200 IPv6-Input-Service-Set	\$junos-input-ipv6-service-set	Name of an IPv6 input service set to be attached.	No
26-201 IPv6-Output-Service-Set	\$junos-output-ipv6-service-set	Name of an IPv6 output service set to be attached.	No
26-202 IPv6-Input-Service-Filter	\$junos-input-ipv6-service-filter	Name of an IPv6 input service filter to be attached.	No
26-203 IPv6-Output-Service-Filter	\$junos-output-ipv6-service-filter	Name of an IPv6 output service filter to be attached.	No
26-204 Adv-Pcef-Profile-Name	\$junos-pcef-profile	Name of a PCEF profile to be attached.	No
26-205 Adv-Pcef-Rule-Name	\$junos-pcef-rule	Name of a PCC rule to activate.	No

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (*Continued*)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
26-211	\$junos-inner-vlan-tag-protocol-id	Name of VLAN map to activate	Yes
26-212	\$junos-routing-services	Enables or disables routing services capability. If you enable this variable in your configuration and RADIUS does not return the VSA, then routing services are disabled for the subscriber.	No
26-213	\$junos-interface-set-target-weight	Specify a weight for an interface set to associate it and its member links with an aggregated Ethernet member link for targeted distribution.	Yes

Table 7: RADIUS Attributes and Corresponding Junos OS Predefined Variables (Continued)

Attribute Number and Name	Junos OS Predefined Variable	Description	Default Value Support for Junos OS Predefined Variable
26-214	\$junos-interface-target-weight	Specify a weight for an interface to associate it with an interface set and thus with the set's aggregated Ethernet member link for targeted distribution. When an interface set does not have a weight, then the interface weight value for the first authorized subscriber interface is used for the set.	Yes

Predefined Variable Defaults for Dynamic Client Profiles

You can optionally configure default values for many predefined variables. The Junos OS uses the default value in the following cases:

- When the external RADIUS server is not available
- When the VSA returned by the RADIUS server does not contain a value for the predefined variable

The RADIUS value for a predefined variable takes precedence over the default value. For example, if you have configured a default for a predefined variable, but RADIUS also returns a value, the system uses the value from RADIUS instead.

The default value must be appropriate to the variable, such as an integer or an alphanumeric string. Starting in Junos OS Release 19.3R1, you can also configure the default value of a predefined variable to be another predefined variable by using a variable expression. In earlier releases, the default value must be fixed; it cannot be a variable.

NOTE: Expressions are typically configured for user-defined variables and dynamic service profiles. See ["Using Variable Expressions in User-Defined Variables" on page 114](#) for more information.

When you use a variable expression, you are setting up a condition that determines the default value of the predefined variable. The value of the default is different when the condition is matched than when it is not matched. In dynamic client profiles, you can configure any of the following operators for variable expressions:

- `equals`—Assigns a predefined variable as the default value.
- `ifNotZero(parameter-1, parameter-2)`—Sets a condition to be matched. Assigns the value from *parameter-2* as the default value only when *parameter-1* is nonzero, meaning that the parameter resolved to some value.
- `ifZero(parameter-1, parameter-2)`—Sets a condition to be matched. Assigns the value from *parameter-2* as the default value only when *parameter-1* is zero, meaning that the parameter did not resolve to any value. If *parameter-1* did resolve to a value (therefore it is not zero), then the value from *parameter-1* is assigned as the default.

You can also nest expressions, which provides additional conditions for setting the variable value. For example, a dynamic profile for a subscriber in a heterogeneous network might have the following configuration for the predefined-variable-defaults statement:

```
predefined-variable-defaults {
    aggregation-interface-set-name equals "$junos-phy-ifd-underlying-intf-set-name";
    interface-set-name equals "ifZero($junos-default-interface-set-name, $junos-phy-ifd-
interface-set-name)";
    default-interface-set-name equals "ifZero($junos-interface-set-name, ifNotZero($junos-
aggregation-interface-set-name, $junos-aggregation-interface-set-name##'-default'))";
}
```

See *Dynamic Level 2 and Level 3 Interface Set Naming with Predefined Variables* for a detailed explanation of how to evaluate these expressions in the context of a heterogeneous network.

Configuring Predefined Dynamic Variables in Dynamic Profiles

This topic discusses how to configure predefined variables in a dynamic profile. The dynamic profile obtains and replaces data for these variables from an incoming client data packet. You can specify these

variables in the body of a dynamic profile without having to first define the variables at the [edit dynamic-profiles *profile-name* variables] hierarchy level.

Before you configure dynamic variables:

1. Create a basic dynamic profile.

See ["Configuring a Basic Dynamic Profile" on page 51](#).

2. Ensure that the router hardware is configured in the network to accept subscriber access.

To configure predefined variables in a dynamic profile:

1. Access the desired dynamic profile.

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

2. Configure the necessary variables (in this example, for a protocol interface).

```
[edit dynamic-profiles profile-name]
user@host# set protocols protocol-name interface predefined-variable-name
```

For example, the following simple configuration uses a predefined variable to dynamically create the interface accessed by the IGMP client, enabling IGMP on the subscriber interface:

```
[edit]
user@host# set dynamic-profiles igmp1-prof protocols igmp interface $junos-interface-name
```

For a complete list of supported predefined variables, see ["Junos OS Predefined Variables" on page 59](#).

Configuring Default Values for Predefined Variables in a Dynamic Profile

For any Junos OS predefined variable that can be sourced from RADIUS, you can specify a default value in a dynamic client profile. These default values are used when RADIUS does not supply a value.

Defining default values for these predefined variables enables you to determine whether to source values locally from the profile instead of only from RADIUS. This enables you to use RADIUS as a way to selectively override predefined variable values, instead of being the sole source of those values.

For a list of predefined variables and options for which you can configure default values, see ["Junos OS Predefined Variables That Correspond to RADIUS Attributes and VSAs" on page 94](#).

To configure default values for Junos predefined variables:

1. Specify that you want to configure the dynamic client profile.

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

2. Configure the default value for a predefined variable or for a specific option within a predefined variable.

```
[edit dynamic-profiles profile-name]
user@host# set predefined-variable-defaults predefined-variable variable-option default-value
```

NOTE: When you specify the *predefined-variable*, you use the name of the Junos OS predefined variable, but you omit the leading \$junos- prefix.

For example, consider the behavior when you have the following configuration to specify a default value for the \$junos-routing-instance predefined variable:

```
[edit dynamic-profiles prof1]
user@host# set predefined-variable-defaults routing-instances RI-def
```

- When RADIUS does not return a routing instance, the subscribers come up in the RI-def routing instance.
- When RADIUS returns routing-instance RI-res, the subscribers come up in the RI-res routing instance.

When you do not configure a default value for the \$junos-routing-instance predefined variable and RADIUS does not return a value, the subscribers come up in the master routing instance, which is the Junos OS default.

Release History Table

Release	Description
19.3R1	Starting in Junos OS Release 19.3R1, you can also configure the default value of a predefined variable to be another predefined variable by using a variable expression.

17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv6 input service filter to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv6 service set to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv4 input service filter to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv4 input service set to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv6 service filter to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv6 service set to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv4 service filter to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of an IPv4 output service set to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of a PCEF profile to be attached.
17.2R1	Starting in Junos OS Release 17.2R1, name of a PCC rule to activate.
16.1R4	Starting in Junos OS Release 16.1R4, identifier for the inner VLAN tag for Layer 2 wholesale, ANCP-triggered, autosensed dynamic VLANs.
16.1	Starting in Junos OS Release 16.1, 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 an IPv4 preferred source address.
16.1	Starting in Junos OS Release 16.1, 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 an IPv6 preferred source address.
16.1	Starting in Junos OS Release 16.1, you can reduce the CoS resources wasted on residential access by collecting the residential subscribers into an interface set associated with the physical interface.
16.1	Starting in Junos OS Release 16.1, 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.

RELATED DOCUMENTATION

[Dynamic Variables Overview | 57](#)

[User-Defined Variables in Dynamic Profiles | 112](#)

Standard and Vendor-Specific RADIUS Attributes

Dynamic Level 2 and Level 3 Interface Set Naming with Predefined Variables

[Dynamic Profiles for Subscriber Management | 46](#)

Example: Firewall Dynamic Profile

Example: IGMP Dynamic Profile

User-Defined Variables in Dynamic Profiles

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- [User-Defined Variables | 112](#)
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- [Using Variable Expressions in User-Defined Variables | 114](#)
- [Configuring Variable Expressions in Dynamic Profiles | 119](#)
- [Conditional Configuration for Dynamic Profile Overview | 121](#)

User-Defined Variables

In dynamic service profiles, the Junos OS enables you to configure custom variables at the `[edit dynamic-profiles profile-name variables]` hierarchy level and use those variables in the `[edit dynamic-profiles]` hierarchy. The dynamic profile obtains and replaces data for these variables from an external server (for example, RADIUS) during the subscriber authentication process. At run time, the variables are replaced by actual values and used to configure subscriber interfaces.

You can use any of the following statements to configure user-defined variables:

- `default-value`—Configure a default value for a user-defined variable in a dynamic profile. The values that the system uses for these variables are applied when the subscriber authenticates. Specifying a default value provides a standalone configuration for the associated statement or a backup for the

statement configuration if the external server is inaccessible or does not contain a value for the variable.

- **equals**—Configure an expression for a user-defined variable that is evaluated at run time and returned as the variable value.
- **mandatory**—Specify that an external server (for example, RADIUS) must return a value for the user-defined variable. If the external server does not return a value for the variable, the dynamic profile fails.

NOTE: The order in which you define how variables are obtained is important. To ensure that you obtain any mandatory variables from an external server, and not derive values from defaults or through variable expressions, you must define any mandatory variables first.

- **uid**—Configure a unique ID for parameterized filters and CoS in a dynamic profile created for services.
- **uid-reference**—Configure a variable that references a unique ID for parameterized filters or CoS in a dynamic profile created for services.

Configuring User-Defined Dynamic Variables in Dynamic Profiles

This topic discusses how to configure a user-defined dynamic variable in a dynamic service profile. You can define a variable at the [edit dynamic-profiles *profile-name* variables] hierarchy level that is used elsewhere in the dynamic service profile. You can optionally specify a default value for any dynamic variable that appears in the body of the dynamic profile. The default variable values are used in the event the router is unable to access an external server (for example, RADIUS) or otherwise obtain a value for use as the dynamic variable. Alternatively, you can specify that using a RADIUS-returned value is mandatory; if that value is not received, then the profile fails.

Before you configure any dynamic variable default values:

1. Create a basic dynamic profile.

See ["Configuring a Basic Dynamic Profile" on page 51](#).

2. Ensure that the router is configured to enable communication between the client and the RADIUS server.

See *Specifying the Authentication and Accounting Methods for Subscriber Access*.

3. Configure all RADIUS values that you want the profiles to use when validating subscribers.

See *RADIUS Servers and Parameters for Subscriber Access*

To configure variables in a dynamic service profile:

1. Access the variables stanza in the desired dynamic service profile.

```
[edit]
user@host# edit dynamic-profiles Profile1 variables
```

2. Define the variable.

```
[edit dynamic-profiles Profile1 variables]
user@host# set video-filter equals "Filter1"
```

3. (Optional) Specify a default value for use by the variable in the event the router cannot contact the external server or if the external server does not contain a value for the assigned attribute.

```
[edit dynamic-profiles Profile1 variables]
user@host# set video-filter default-value Filter_default
```

4. (Optional) Specify that the external server must return a value for a user-defined variable.

```
[edit dynamic-profiles Profile1 variables]
user@host# set video-filter mandatory
```

NOTE: When you include the `mandatory` statement, if the external server does not return a value for the variable, the dynamic service profile fails.

Using Variable Expressions in User-Defined Variables

Junos OS enables you to create expressions—groups of arithmetic operators, string operators, and operands—for use as variables within dynamic profiles. You configure variable expressions at the `[dynamic-profiles profile-name variables]` hierarchy level. At run time, the variable expressions are calculated and used as variable values to configure dynamic subscriber interfaces.

When configuring expressions in dynamic profiles, you must adhere to the following rules:

- You can configure expressions only within a variable stanza of a dynamic profile.

NOTE: Starting in Junos OS Release 19.3R1, you can configure expressions in the predefined-variable-defaults statement in a dynamic profile. See ["Predefined Variable Defaults for Dynamic Client Profiles" on page 107](#).

- Dynamic profiles that contain expressions for user-defined variables must be used only for service activation.
- You generally assign expressions only to user-defined variables. You cannot assign expressions to internal variables or predefined variables.

NOTE: Starting in Junos OS Release 19.3R1, you can configure a limited number of expressions to establish default values for predefined variables. See ["Predefined Variable Defaults for Dynamic Client Profiles" on page 107](#).

- Expression values are given precedence over default values.
- Entire expressions must be contained within quotation marks (" ").
- Strings within the expressions must be quoted within single quotation marks (') and the single quotation marks can contain only strings.
- White space is treated as a delimiter for all operands and operators. Strings containing spaces that you create within expressions are treated as single strings and include any leading or trailing white space. For example:

```
dynamic-profiles {
  service profile {
    variables {
      scheduler-name;
      video-filter equals " ' Filter 1 ' " # Everything within the single
quotation marks is considered a string, including the leading and trailing white space
    }
  }
}
```

- The expression must be either all arithmetic operators or all string operators; mixing arithmetic operators and string operators is not allowed unless properly converted to the correct type.

- Expressions can refer to other system predefined variables or other user-defined variables. However, no circular referencing between variables is allowed. For example, the following reference is incorrect:

```
dynamic-profiles {
    Service_Profile_1 {
        variables {
            scheduler-name;
            transmit-rate2 equals " ( $transmit-rate1 * 2)/3" # refers to transmit-rate1
            transmit-rate1 equals " ( $transmit-rate2 * 2)/3" # refers to transmit-rate2
        }
    }
}
```

- Any mandatory variable that does not contain a “default” value or an “equals” expression must contain a value as a part of service activation. For example, a RADIUS service VSA like “service-video(value1, value2)” that contains two or fewer mandatory variables in the dynamic service profile definition “service-video” succeeds. The service activation fails if at least one mandatory variable does not have any value associated with it, either through “default” or “equals” attribute evaluation.

Table 8 on page 116 lists supported operators and functions you can use to create expressions.

NOTE: Precedence 5 is the highest level.

Table 8: Operators and Functions

Operation	Operator	Associativity	Precedence	Action
Arithmetic Addition	+	Left	1	Adds the elements to the right and left of the operator together.
Arithmetic Subtraction	-	Left	1	Subtracts the element to the right of the operator from the element to the left of the operator.
Arithmetic Multiplication	*	Left	2	Multiplies the element to the left of the operator by the element to the right of the operator.

Table 8: Operators and Functions *(Continued)*

Operation	Operator	Associativity	Precedence	Action
Arithmetic Division	/	Left	2	Divides the element to the left of the operator by the element to the right of the operator.
Arithmetic Modulo	%	Left	2	Divides the element to the left of the operator by the element to the right of the operator and returns the integer remainder. If the element to the left of the operator is less than the element to the right of the operator, the result is the element to the left of the operator.
Concatenation	##	Left	3	Creates a new string by joining the string values to the left of the operator and the values to the right of the operator together.
Maximum	max(param1,param2)	Left	4	Takes the maximum of the two values passed as parameters.
Minimum	min(param1,param2)	Left	4	Takes the minimum of the two values passed as parameters.
Round	round(param1)	-	4	Rounds the value to the nearest integer.
Truncate	trunc(param1)	-	4	Truncates a non-integer value to the value left of the decimal point.
Convert to String	toStr(param1)	-	4	Converts the variable inside the parentheses to a null terminated string.

Table 8: Operators and Functions (Continued)

Operation	Operator	Associativity	Precedence	Action
Convert to Integer	toInt(param1)	-	4	Converts the parameter to an integer. A single string or variable is allowed as a parameter.
Random	rand()	-	4	Generates a random numerical value.
If Not Zero	ifNotZero(param1, param2)	Left	4	Returns the second parameter if the first parameter is not zero. Returns NULL if first parameter is zero.
Parentheses	()	-	5	Groups operands and operators to achieve results different from simple precedence; effectively has the highest precedence.

Expressions are evaluated after variables are populated with values. The evaluation is conducted immediately before profile instantiation and includes value checking. If the computed values are not acceptable, or rules governing expression syntax are broken, the expression evaluation fails, profile instantiation does not occur, and messages are logged to describe the errors.

[Table 9 on page 118](#) lists the possible expression error scenarios and the action taken by the router software.

Table 9: Expression Errors and Actions

Error	Occurance	Action	Variable Value
Parsing error	Commit check phase	Commit fails	not applicable
Circular variable dependency error	Commit check phase	Commit fails	not applicable
Variables inside the expressions are not defined	Commit check phase	Commit fails	not applicable

Table 9: Expression Errors and Actions *(Continued)*

Error	Occurance	Action	Variable Value
Divide by zero	Profile Instantiation	Profile instantiation fails	Zero (0)
Adding string to a number	Profile Instantiation	Profile instantiation fails	Zero (0)
Overflow error	Profile Instantiation	Profile instantiation fails	Undefined
Underflow error	Profile Instantiation	Profile instantiation fails	Undefined

You can also configure the user-defined variables with a default value. The default value provides a standalone configuration for the associated statement or a backup for the statement configuration if the RADIUS server is inaccessible or the VSA attribute does not contain a value.

Configuring Variable Expressions in Dynamic Profiles

You can create expressions—groups of arithmetic operators, string operators, and operands—for use as variables within dynamic profiles. These expressions are used as variable values to configure dynamic subscriber interfaces.

To configure dynamic profile variable expressions:

1. Access the dynamic profile for which you want to create variable expressions.

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

2. Access the variables hierarchy for the dynamic profile.

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


3. Define the variable using the expression operators and operands described in ["Using Variable Expressions in User-Defined Variables"](#) on page 114.

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

Table 10 on page 120 provides several examples of expressions that you can create using the supported operators and functions.

Table 10: Expression Examples

Example	Description
video-filter equals " Filter1 "	Assigns the string " Filter1 " to the dynamic \$video-filter variable.
video-filter2 equals "\$video-filter ## ' Filter2' "	Converts dynamic variable "\$video-filter" to a string and concatenates the new string with the string " Filter2". The result is the string "\$video-filter Filter2" assigned to the \$video-filter2 variable.
tempvar equals "120"	Converts "120" to an integer and assigns the integer to the \$tempvar variable.
transmit-rate2 equals " (\$transmit-rate1 * 2)/3 + \$tempvar)"	Multiplies the "transmit-rate1" variable by 2 and divides that value by the sum of 3 and the value of "\$tempvar". The result is assigned to the \$transmit-rate2 variable.
host-ip equals " '203.0.113.2' "	Assigns the string "203.0.113.2" to the \$host-ip variable.
max-val "max(\$max1,\$max2)"	Assigns the greater of value "max1" or "max2" to the \$max-val variable.
min-val "\$min(\$var1,30)"	Assign the smaller of value "var1" and "30" to the \$min-val variable.
rounded-var equals "round(\$var1)"	Rounds off the value of the variable "\$var1" to the nearest integer and assigns the value to the \$rounded-var variable.

Table 10: Expression Examples (*Continued*)

Example	Description
trunc-var equals "trunc(1234.5)"	Truncates the value in parentheses to the left side of the decimal and assigns the resulting value to the \$trunc-var variable.
bwg-shaping-rate equals "\$anqp-downstream - (\$anqp-downstream % 2 * (1 - \$sp-qos-cell-mode))"	Evaluates the expression as per the precedence set in the parentheses.
temp-filter1 equals "'Filter1' ## toStr(\$filter)"	Converts the "\$filter" variable to a string value and concatenates the converted string to the string "Filter1". The resulting combined string is assigned to the \$temp-filter1 variable.

Conditional Configuration for Dynamic Profile Overview

You can configure conditional configuration statements for dynamic profiles to dynamically obtain subscriber information for a client or service.

Conditional configuration involves two main steps:

1. Defining the conditional variable
2. Referencing the conditional variable in a *configuration statement*

A conditional variable is defined as an expression **ifNotZero** (*param1*, *param2*). In this expression, *param1* is a user-defined variable whose value is derived from an external server such as RADIUS and *param2* can be a user-defined variable, a function, operation, number, or string. A conditional variable can be user-defined or Unique ID (UID) *reference* variable. It cannot be a predefined or UID variable. In Junos OS, conditional variables are supported only for the service dynamic profiles.

The configuration statements in which the conditional variables are referenced are called *conditional* configuration statements. After the conditional variable are defined, they are referenced in **dynamic-profiles** configuration statements and are processed when the service profile is instantiated. The following service profile configuration statements support conditional variables:

- dynamic-profiles *profile-name* interfaces *interface-name* unit *unit-no* family *type* filter input *filter-name*
- dynamic-profiles *profile-name* interfaces *interface-name* unit *unit-no* family *type* filter output *filter-name*

- dynamic-profiles *profile-name* firewall family *type* filter *filter-name* term *term-name*
- dynamic-profiles *profile-name* firewall family *type* filter *filter-name* term *term-name* then policer *policer-name*
- dynamic-profiles *profile-name* firewall family *type* filter *filter-name* term *term-name* then hierarchical-policer *policer-name*
- dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name* forwarding-class *class-name* scheduler *scheduler-name*

The system follows the following set of rules while evaluating the conditional variables and conditional configuration statements during service profile instantiation:

- In the function `ifNotZero(param1, param2)`, if the value of a *param1* is not received from an external server and if the default value is not configured, the value of the variable is treated as non-zero and *param2* is evaluated.
- If the value of *param1* in the function `ifNotZero(param1, param2)` is 0, then NULL is returned as the value of the expression and *param2* is not evaluated. In this case, the value of the conditional variable becomes NULL and the configuration statement in which the conditional variable is referenced is ignored.
- If the value of *param1* is non-zero, then *param2* is evaluated and its value is returned as the value of the expression.

The following **filter-service** and **cos-service** configuration examples show how the rules are applied:

Filter Service Configuration Example

```
filter-service {
  variables {
    input-filter-var mandatory;
    output-filter-var mandatory;
    bw-limit-var mandatory;
    term1-var default-value term1;
    input-filter-ref {
      equals "ifNotZero($input-filter-var,$input-filter-var)";
      uid-reference;
    }
    output-filter-ref {
      equals "ifNotZero($output-filter-var,$output-filter-var)";
      uid-reference;
    }
    policer1-ref {
      equals "ifNotZero($bw-limit-var,'policer1')";
```



```

        uid-reference;
    }

    term1 equals "ifNotZero($term1-var,$term1-var)";
    input-filter uid;
    output-filter uid;
    policer1 uid;
}
interfaces {
    pp0 {
        unit "$junos-interface-unit" {
            family inet {
                filter {
                    input "$input-filter-ref" precedence 50;
                    output "$output-filter-ref" precedence 50;
                }
            }
        }
    }
}
firewall {
    family inet {
        filter "$input-filter" {
            interface-specific;
            term $term1 {
                then {
                    policer "$policer1-ref";
                    service-accounting;
                }
            }
            term rest {
                then accept;
            }
        }
        filter "$output-filter" {
            interface-specific;
            term rest {
                then accept;
            }
        }
    }
    policer "$policer1" {
        if-exceeding {

```



```

        bandwidth-limit "$bw-limit-var";
        burst-size-limit 15k;
    }
    then discard;
}
}
}
}

```

In the **filter-service** configuration example, input-filter-ref, output-filter-ref, policer1-ref, and term1 are conditional variables while input "\$input-filter-ref" precedence 50, output "\$output-filter-ref" precedence 50, term \$term1, and policer "\$policer1-ref" are conditional configuration statements. In this example, if the value of input-filter-var is 0, the value of the conditional variable input-filter-ref becomes NULL. Thus the entire configuration statement, input "\$input-filter-ref" precedence 50, in which the conditional variable is referenced, is ignored. If, however, the value of the variable is non-zero, the configuration statement is processed during the service profile instantiation.

CoS Service Configuration Example

```

cos-service {
    variables {
        sch1_var mandatory;
        sch2_var mandatory;
        sch1_ref {
            equals "ifNotZero($sch1_var,$sch1_var)";
            uid-reference;
        }
        sch2_ref {
            equals "ifNotZero($sch2_var,$sch2_var)";
            uid-reference;
        }
        smap1 uid;
        sch1 uid;
        sch2 uid;
    }
    class-of-service {
        scheduler-maps {
            "$smap1" {
                forwarding-class best-effort scheduler "$sch1_ref";
                forwarding-class assured-forwarding scheduler "$sch2_ref";
            }
        }
    }
    schedulers {

```



```

    "$sch1" {
        transmit-rate percent 30;
        buffer-size percent 30;
        priority low;
    }
    "$sch2" {
        transmit-rate percent 10;
        buffer-size percent 10;
        priority high;
    }
}
}
}

```

In the **cos-service** configuration example, `sch1_ref` and `sch2_ref` are conditional variables while forwarding-class best-effort scheduler "`$sch1_ref`" and forwarding-class assured-forwarding scheduler "`$sch2_ref`" are conditional configuration statements. Similar to the evaluation in the **filter-service** configuration example, if the value of any variable, referenced in a conditional variable is 0, the configuration statement in which the conditional variable is referenced is ignored and not processed during CoS service profile instantiation.

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[Dynamic Variables Overview | 57](#)

[Predefined Variables in Dynamic Profiles | 59](#)

Standard and Vendor-Specific RADIUS Attributes

RADIUS Servers and Parameters for Subscriber Access

Versioning for Dynamic Profiles

IN THIS SECTION

- [Enabling Dynamic Profiles to Use Multiple Versions | 126](#)
- [Modifying Dynamic Profiles with Versioning Disabled | 127](#)

Enabling Dynamic Profiles to Use Multiple Versions

You can create new versions of dynamic profiles that are currently in use by subscribers. Any subscriber that logs in following a dynamic profile modification uses the latest version of the dynamic profile. Subscribers that are already active continue to use the older version of the dynamic profile until they log out or their session terminates.

NOTE: You must enable or disable dynamic profile version creation before creating or using any dynamic profiles on the router. Enabling or disabling dynamic profile version creation after dynamic profiles are configured is not supported.

To configure versioning for dynamic profiles:

1. Access the router system hierarchy level.

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

2. Access the global dynamic profile options.

```
[edit system]  
user@host# edit dynamic-profile-options
```

3. Enable version creation for dynamic profiles on the router.

```
[edit system dynamic-profile-options]  
user@host# set versioning
```


Modifying Dynamic Profiles with Versioning Disabled

You use dynamic profiles to configure large groups of subscribers. However, after you have configured and applied dynamic profiles, be cautious when modifying any dynamic profiles that are in use by active subscribers on the router if you have not enabled the router to use dynamic profile versioning. This section provides guidelines and procedures for modifying existing profiles and applying them to subscriber interfaces if dynamic profile versioning is not enabled on the router.

When modifying dynamic profiles, keep the following considerations in mind:

- Do not modify a dynamic profile when dynamic profile versioning is disabled and the dynamic profile is in use by active subscribers.
- Modifying a dynamic profile when dynamic profile versioning is disabled and when the dynamic profile is in use by active subscribers can lead to unpredictable behavior.

When a dynamic profile is modified and committed when dynamic profile versioning is not enabled, the router:

1. Logs a warning that the profiles are being modified and committed.
2. Determines whether the profile is currently being use by any subscriber.
3. If the profile is in use by a subscriber, the commit fails and the router logs errors to report the conflict.

We recommend that you only modify dynamic profiles when you have enabled dynamic profile versioning on the router. However, to properly modify a dynamic profile when dynamic profile versioning is disabled on the router:

1. Ensure that no subscribers are using the dynamic profile.
2. Create a new dynamic profile with a different name that contains the desired changes:

Original Profile

```
profile1 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            input "$junos-input-filter";
          }
        }
      }
    }
  }
}
```



```
    }
  }
}
```

Original DHCP Configuration

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
    .....
    dynamic-profile profile1;
    .....
  }
}
```

New Profile

```
profile2 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            input "$junos-input-filter";
            output "$junos-output-filter; /* added output filter variable */";
          }
        }
      }
    }
  }
}
```

Modified DHCP Configuration

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
  }
}
```



```

.....
dynamic-profile profile2; /* Name changed from profile1 */
.....
}
}

```

3. Commit the configuration containing the modified profile.

The modified profile is used for any new subscribers that access the router.

Distinguishing Profile Versions with a Configurable Alias

You can configure a version alias to identify a specific configuration variant of a base dynamic client profile. The version alias is a text description that lets you decide how to name different profile variants, so they have an identifier independent of the dynamic version name that is automatically created by the BNG.

The need for a version alias results from the practice of using a given base dynamic profile across multiple BNGs in a network. Dynamic versioning enables you to modify a base dynamic profile to provide specific capabilities to subscribers that subsequently log in with the base dynamic profile. The different variations might be for subscribers on different BNGs or to new subscribers on a given BNG.

Dynamic versioning assigns a name to each new variation in the base profile. Consequently, the version name may vary for subscribers on one BNG or across multiple BNGs. In either case, RADIUS cannot determine which version of a profile is in use by any subscriber. This creates an operational challenge because RADIUS is unable to return corresponding attributes and VSAs in a CoA message that are compatible with that version of the profile.

When you configure a version alias for a dynamic client profile, the BNG sends the version alias to the RADIUS server during authentication. It is conveyed in the Juniper Networks client-profile-name VSA (26-4874-174). The version alias is an independent tag that enables you to track which profile variations are in use. Because RADIUS can distinguish the different profile versions, you can normalize the RADIUS back-end configuration for efficient use of CoA messages.

By default, the Client-Profile-Name VSA carries the name of the base dynamic profile. The version alias string is concatenated to the end of the profile name in the VSA, like this:

client-profile-name:version-alias-string

- To configure a version alias for a dynamic client profile:

```

[edit dynamic-profiles profile-name]
user@host# set version-alias version-alias-string

```


- To display the alias for a dynamic client profile:

```
user@host> show subscribers detail

Type: PPPoE
User Name: DEFAULTUSER
IP Address: 192.0.2.21
IP Netmask: 255.255.255.255
IPv6 Address: 2001:db8::17
Logical System: default
Routing Instance: default
Interface: pp0.3221225720
Interface type: Dynamic
Underlying Interface: demux0.3221225719
Dynamic Profile Name: pppoe-client-profile
Dynamic Profile Version Alias: profile-version1a
MAC Address: 00:00:5E:00:53:38
State: Active
Radius Accounting ID: 288
Session ID: 288
PFE Flow ID: 344
VLAN Id: 1
Login Time: 2019-09-23 10:40:56 IST
```

RELATED DOCUMENTATION

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4

CHAPTER

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Syntax

```
chassis {  
    limit limit;  
}
```

Hierarchy Level

```
[edit system services resource-monitor subscribers-limit client-type name]
```

Description

Configure the maximum number of subscribers of the specified client type allowed to be logged in on the chassis. When that number is reached, subsequent logins on the chassis are denied until the current number of subscribers drops below the maximum allowed. You can also specify the maximum number of subscribers of a client type allowed per port, per MIC, and per MPC.

Options

limit Maximum number of subscribers.

- **Range:** 1 through 1,000,000

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor | 42](#)

[Resource Monitoring for Subscriber Management and Services | 34](#)

client-type (Subscriber Limits)

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Syntax

```
client-type (any | dhcp | l2tp | pppoe) {  
    chassis {  
        limit limit;  
    }  
    fpc slot-number {  
        limit limit;  
        pic number {  
            limit limit;  
            port number {  
                limit limit;  
            }  
        }  
    }  
}
```

Hierarchy Level

```
[edit system services resource-monitor subscribers-limit]
```

Description

Configure the maximum number of subscribers of the client type that are allowed to be logged in. You can configure limits for subscribers per chassis, per MPC, per MIC, and per port. When the configured maximum number of subscribers is logged in for any level, subsequent logins at that level are denied until the current number of subscribers drops below the maximum allowed.

Options

name Type of client for which subscriber limits are configured.

- Values:
 - any—Apply the limit to the sum of all DHCP, L2TP, and PPPoE clients.
 - dhcp—Apply the limit to DHCP clients.
 - l2tp—Apply the limit to L2TP clients.
 - pppoe—Apply the limit to PPPoE clients.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

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default-value

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Syntax

```
default-value default-value;
```

Hierarchy Level

```
[edit dynamic-profiles profile-name variables variable-name]
```

Description

Configure a default value for a user-defined variable in a dynamic profile. The values that the system uses for these variables are applied when the subscriber authenticates.

Options

default-value—Default value for the variable.

Required Privilege Level

interface—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

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[Using Variable Expressions in User-Defined Variables | 114](#)

[Configuring User-Defined Dynamic Variables in Dynamic Profiles | 113](#)

dynamic-profile-options

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- [Hierarchy Level | 139](#)
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- [Release Information | 139](#)

Syntax

```
dynamic-profile-options {  
    versioning;  
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure global dynamic profile options.

The remaining statement is explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

routing—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

| [Versioning for Dynamic Profiles](#) | 125

dynamic-profiles

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Syntax

```
dynamic-profiles {
  profile-name {
    class-of-service {
      dynamic-class-of-service-options {
        vendor-specific-tags tag;
      }
      interfaces {
        interface-name ;
      }
      unit logical-unit-number {
        classifiers {
          type (classifier-name | default);
        }
        output-traffic-control-profile (profile-name | $junos-cos-traffic-control-
profile);

        report-ingress-shaping-rate bps;
        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>;
  max-burst-size cells;
  overhead-accounting (frame-mode | cell-mode) <bytes byte-value>;
  peak-rate rate;
  scheduler-map map-name;
  shaping-rate (percent percentage | rate | predefined-variable) <burst-size
bytes>;

  shaping-rate-excess-high (percent percentage | rate) <burst-size bytes>;
  shaping-rate-excess-medium-high (percent percentage | rate) <burst-size bytes>;
  shaping-rate-excess-medium-low (percent percentage | rate) <burst-size bytes>;
  shaping-rate-excess-low (percent percentage | rate) <burst-size bytes>;
  shaping-rate-priority-high (percent percentage | rate) <burst-size bytes>;
  shaping-rate-priority-low (percent percentage | rate) <burst-size bytes>;
  shaping-rate-priority-medium (percent percentage | rate) <burst-size bytes>;

```



```

shaping-rate-priority-medium-low (percent percentage | rate) <burst-size bytes>;
shaping-rate-priority-strict-high (percent percentage | rate) <burst-size bytes>;
sustained-rate rate;
}
}
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;
            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;
    }
}
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;
    }
}
}
}
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 {
    actual-transit-statistics;
    auto-configure {
        agent-circuit-identifier {
            dynamic-profile profile-name;
        }
        line-identity {
            include {
                accept-no-ids;
                circuit-id;
                remote-id;
            }
            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;
}
pcef pcef-profile-name {
    activate rule-name | activate-all;
}
}
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;
    }
}
host-prefix-only;
ppp-options {
    aaa-options aaa-options-name;
    authentication [ authentication-protocols ];
    chap {
        challenge-length minimum minimum-length maximum maximum-length;
        local-name name;
    }
    ignore-magic-number-mismatch;
    initiate-ncp (dual-stack-passive | ipv6 | ip)
    ipcp-suggest-dns-option;
    mru size;
    mtu (size | use-lower-layer);
    on-demand-ip-address;
    pap;
    peer-ip-address-optional;
    local-authentication {
        password password;
        username-include {

```



```

        circuit-id;
        delimiter character;
        domain-name name;
        mac-address;
        remote-id;
    }
}
reassemble-packets;
targeted-options {
    backup backup;
    group group;
    primary primary;
    weight ($junos-interface-target-weight | weight-value);
}
telemetry {
    subscriber-statistics;
    queue-statistics {
        interface $junos-interface-name {
            refresh rate;
            queues queue set;
        }
        interface-set $junos-interface-set-name {
            refresh rate;
            queues queue set;
        }
    }
}
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;
profile-type remote-device-service;
protocols {
    igmp {
        interface interface-name {
            accounting;
            disable;
            group-limit limit;
            group-policy;
            group-threshold value;
            immediate-leave
            log-interval seconds;
            no-accounting;
            oif-map;
            passive;
            promiscuous-mode;
            ssm-map ssm-map-name;
            ssm-map-policy ssm-map-policy-name
            static {
                group group {
                    source source;
                }
            }
            version version;
        }
    }
}
mld {
    interface interface-name {
        (accounting | no-accounting);
        disable;
        group-limit limit;
        group-policy;
        group-threshold value;
        immediate-leave;
        log-interval seconds;
        oif-map;
        passive;
        ssm-map ssm-map-name;
        ssm-map-policy ssm-map-policy-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;
        dns-server-address
        (managed-configuration | no-managed-configuration);
        max-advertisement-interval seconds;
        min-advertisement-interval seconds;
        (other-stateful-configuration | no-other-stateful-configuration);
        prefix prefix {
            (autonomous | no-autonomous);
            (on-link | no-on-link);
            preferred-lifetime seconds;
            valid-lifetime seconds;
        }
        reachable-time milliseconds;
        retransmit-timer milliseconds;
    }
}
}
routing-instances routing-instance-name {
    interface interface-name;
    routing-options {
        access {
            route prefix {
                next-hop next-hop;
                metric route-cost;
                preference route-distance;
                tag route-tag;
                tag2 route-tag2;
            }
        }
    }
}

```



```

        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;
            tag2 route-tag2;
        }
    }
    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;
            tag2 route-tag2;
        }
    }
}
access-internal {

```



```

        route subscriber-ip-address {
            qualified-next-hop underlying-interface {
                mac-address address;
            }
        }
    }
    multicast {
        interface interface-name {
            no-qos-adjust;
        }
    }
}
services {
    captive-portal-content-delivery {
        auto-deactivate value;
        rule name {
            match-direction (input | input-output | output);
            term name {
                then {
                    accept;
                    redirect url;
                    rewrite destination-address address <destination-port port-number>;
                    syslog;
                }
            }
        }
    }
}
variables {
    variable-name {
        default-value default-value;
        equals expression;
        mandatory;
        uid;
        uid-reference;
    }
}
version-alias profile-alias-string;
}
}

```


Hierarchy Level

[edit]

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.

reassemble-packets (Optional) Enables IPv4 reassembly of fragmented GRE packets conveyed across a soft GRE tunnel from a Wi-Fi access point to a Wi-Fi access gateway on a BNG. Reassembly is supported for fragments that range in size from 256 bytes through 8192 bytes.

NOTE:

- The maximum reassembled packet size is 13,310 bytes; this requires an MTU of 1500 bytes. The router drops reassembled packets that are larger than 13,310 bytes. The router also drops DHCP discover packets that are smaller than the MTU.
- Ordering is not maintained between fragmented packets and non-fragmented packets.
- The WAG does not support soft GRE packets with keys. Fragmented packets GRE with key are not reassembled.
- Soft GRE packet reassembly is not supported for pseudowires over redundant logical tunnels (RLT).
- The order of the last arriving fragment is not guaranteed when the reassembled packets are forwarded.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

routing—To view this statement in the configuration.

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

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.

RELATED DOCUMENTATION

[Configuring a Basic Dynamic Profile | 51](#)

Configuring Dynamic VLANs Based on Agent Circuit Identifier Information

[Dynamic Profiles for Subscriber Management | 46](#)

event (Enhanced Subscriber Management)

IN THIS SECTION

- [Syntax | 154](#)
- [Hierarchy Level | 154](#)
- [Description | 154](#)
- [Options | 154](#)
- [Required Privilege Level | 155](#)
- [Release Information | 155](#)

Syntax

```
event {
    catastrophic-failure {
        reboot (master | standby);
    }
}
```

Hierarchy Level

```
[edit system services subscriber-management overrides]
```

Description

Configure the router to detect a type of event and automatically take action when the event is detected.

Options

catastrophic-failure

Specify that the event is a corruption of the shared memory.

reboot (master | standby)

Specify which Routing Engine is rebooted when the shared memory corruption is detected. You can configure both Routing Engines to be rebooted, but that requires two separate set commands.

NOTE: If you do not configure this automatic reboot, then you must perform a manual reboot to clear out the shared memory. Otherwise, the memory remains corrupted and can cause applications that share the memory to generate core errors repeatedly.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 19.1R1.

RELATED DOCUMENTATION

[Configuring Junos OS Enhanced Subscriber Management](#) | 15

fpc (Subscriber Limits)

IN THIS SECTION

- [Syntax](#) | 155
- [Hierarchy Level](#) | 156
- [Description](#) | 156
- [Options](#) | 156
- [Required Privilege Level](#) | 156
- [Release Information](#) | 157

Syntax

```
fpc slot-number {  
    limit limit;  
    pic number {
```



```

        limit limit;
    port number {
        limit limit;
    }
}

```

Hierarchy Level

```
[edit system services resource-monitor subscribers-limit client-type name]
```

Description

Configure the maximum number of subscribers of a client type allowed to be logged in on the MPC in the specified slot. When that number is reached, subsequent logins on the card are denied until the current number of subscribers drops below the maximum allowed. You can also specify the maximum number of subscribers of a client type allowed per port, per MIC, and per chassis.

Options

<i>limit</i>	Maximum number of subscribers.
	<ul style="list-style-type: none"> • Range: 1 through 256,000
<i>slot-number</i>	Number of the MPC slot in the chassis.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor](#) | 42

[Resource Monitoring for Subscriber Management and Services](#) | 34

mandatory

IN THIS SECTION

- [Syntax](#) | 157
- [Hierarchy Level](#) | 158
- [Description](#) | 158
- [Required Privilege Level](#) | 158
- [Release Information](#) | 158

Syntax

```
mandatory;
```


Hierarchy Level

```
[edit dynamic-profiles profile-name variables variable-name]
```

Description

Specify that the external server (for example, RADIUS) must return a value for a user-defined variable. If the external server does not return a value for the variable, the dynamic profile fails.

NOTE: When a dynamic profile has mandatory and non-mandatory variables, configure mandatory variables first in the profile.

Required Privilege Level

interface—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

[User-Defined Variables](#) | 112

[Using Variable Expressions in User-Defined Variables](#) | 114

[Configuring User-Defined Dynamic Variables in Dynamic Profiles](#) | 113

mtu (Dynamic Profiles)

IN THIS SECTION

- [Syntax | 159](#)
- [Hierarchy Level | 159](#)
- [Description | 159](#)
- [Options | 160](#)
- [Required Privilege Level | 160](#)
- [Release Information | 160](#)

Syntax

```
mtu mtu;
```

Hierarchy Level

```
[edit dynamic-profiles name interfaces name unit name family inet ],  
[edit dynamic-profiles name logical-systems name interfaces name unit name family inet ],  
[edit interfaces name unit name family inet ]
```

Description

Configure a per-subscriber maximum transmission unit (MTU) on a logical interface. A subscriber logical interface can specify MTU through its dynamic profile for the same underlying physical interfaces. The dynamic logical interface MTU must be no greater than the physical interface MTU minus the dynamic VLAN header size). You can configure either a static value or the predefined variable, \$junos-interface-

mtu. The value of the variable is returned by RADIUS during authentication in the Framed-MTU attribute (12). By default, the variable value is the MTU of the payload.

If you specify the predefined variable but RADIUS does not return a value in the Framed-MTU attribute,

Options

mtu MTU for the subscriber logical interface. You can specify a static value or the predefined variable, \$junos-interface-mtu.

Required Privilege Level

interface

Release Information

Statement introduced in Junos OS Release 18.1R1 on MX Series routers.

RELATED DOCUMENTATION

[Understanding Per-subscriber Support of Maximum Transmission Unit for Dynamic Profiles | 53](#)

overrides (Enhanced Subscriber Management)

IN THIS SECTION

- [Syntax | 161](#)
- [Hierarchy Level | 162](#)
- [Description | 162](#)

- Options | 162
- Required Privilege Level | 163
- Release Information | 163

Syntax

```

overrides {
    event {
        catastrophic-failure {
            reboot (master | standby);
        }
    }
    interfaces {
        family (inet | inet6) {
            layer2-liveness-detection;
            ipoe-dynamic-arp-enable;
            receive-gratuitous-arp;
        }
    }
    no-unsolicited-ra;
    ra-initial-interval-max seconds;
    ra-initial-interval-min seconds;
    shmlog {
        disable;
        file filename <files maximum-no-files> <size maximum-file-size>;
        filtering enable;
        log-name {
            all;
            logname {
                <brief | detail | extensive | none | terse>;
                <file-logging |no-file-logging>;
            }
        }
        log-type (debug | info | notice);
    }
}

```


Hierarchy Level

```
[edit system services subscriber-management]
```

Description

Override the default configuration settings for the Junos OS enhanced subscriber management software for subscriber management.

Options

ra-initial-interval-max
seconds

Specify the high end of the range from which the router randomly selects an interval for sending the first three unsolicited IPv6 router advertisement messages. You must also configure the ra-initial-interval-min option.

- **Range:** 1 through 16

ra-initial-interval-min
seconds

Specify the low end of the range from which the router randomly selects an interval for sending the first three unsolicited IPv6 router advertisement messages. You must also configure the ra-initial-interval-max option.

BEST PRACTICE: Always configure the value of ra-initial-interval-min to be less than or equal to the value of ra-initial-interval-max. If you configure the values to be the same, the initial router advertisement intervals are constant and not randomized.

- **Range:** 1 through 16

ipoe-dynamic-arp-enable

Enable dynamic ARP to resolve the MAC address for IPv4 framed host (32-bit) routes. By default the framed route is permanently associated with the source MAC address received in the packet that triggered creation of the dynamic VLAN.

receive-gratuitous-arp

Enable the router to compare the source MAC address received in a gratuitous ARP request or reply packet with the value in the ARP cache. The router updates the cache

with the received MAC address when it determines this address is different from the cache entry.

This situation occurs when an IPv4 address is moved to a different device. The device broadcasts a gratuitous ARP reply packet with its MAC address as the source MAC address. When the `receive-gratuitous-arp` option is configured, the router compares the MAC addresses and updates the cache to associate the IPv4 address with the new MAC address.

If the `receive-gratuitous-arp` option is not configured, the router does not accept the gratuitous ARP request or reply packet and cannot quickly learn about the new address. Instead, the original dynamic ARP entry in the cache eventually times out. Before deleting the entry, the router sends an ARP request for the target IP address. The client responds with the new MAC address. This delay in learning about the new address means there is a period during which the MAC address in the ARP cache does not match the address in the new device's NIC.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1R3.

`ra-initial-interval-max` and `ra-initial-interval-min` options added in Junos OS Release 18.2R1 on MX Series routers.

`ipoe-dynamic-arp-enable` and `receive-gratuitous-arp` options added in Junos OS Release 18.4R1 on MX Series routers.

RELATED DOCUMENTATION

[Configuring Junos OS Enhanced Subscriber Management](#) | 15

[Junos OS Enhanced Subscriber Management Overview | 10](#)

[DHCP Liveness Detection Using ARP and Neighbor Discovery Packets](#)

Configuring an Interval Range for Unsolicited Router Advertisements to IPv6 Neighbors

pic (Subscriber Limits)

IN THIS SECTION

- [Syntax | 164](#)
- [Hierarchy Level | 164](#)
- [Description | 165](#)
- [Options | 165](#)
- [Required Privilege Level | 165](#)
- [Release Information | 165](#)

Syntax

```
pic number {  
    limit limit;  
    port number {  
        limit limit;  
    }  
}
```

Hierarchy Level

```
[edit system services resource-monitor subscribers-limit client-type name fpc slot-number]
```


Description

Configure the maximum number of subscribers of a client type allowed to be logged in on the specified MIC. When that number is reached, subsequent logins on the MIC are denied until the current number of subscribers drops below the maximum allowed. You can also specify the maximum number of subscribers of a client type allowed per port, per MPC, and per chassis.

Options

<i>number</i>	MIC number.
	<ul style="list-style-type: none"> • Range: 0 through 3
<i>limit</i>	Maximum number of subscribers.
	<ul style="list-style-type: none"> • Range: 1 through 256,000

The remaining statement is explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor](#) | 42

[Resource Monitoring for Subscriber Management and Services](#) | 34

port (Subscriber Limits)

IN THIS SECTION

- [Syntax | 166](#)
- [Hierarchy Level | 166](#)
- [Description | 166](#)
- [Options | 167](#)
- [Required Privilege Level | 167](#)
- [Release Information | 167](#)

Syntax

```
port number {  
    limit limit;  
}
```

Hierarchy Level

```
[edit system services resource-monitor subscribers-limit client-type name fpc slot-number pic  
number]
```

Description

Configure the maximum number of subscribers of a client type allowed to be logged in on the specified port. When that number is reached, subsequent logins on the port are denied until the current number of subscribers drops below the maximum allowed. You can also specify the maximum number of subscribers of a client type allowed per MIC, per MPC, and per chassis.

Options

<i>number</i>	Port number.
<i>limit</i>	Maximum number of subscribers. <ul style="list-style-type: none"> • Range: 1 through 256,000

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor | 42](#)

[Resource Monitoring for Subscriber Management and Services | 34](#)

predefined-variable-defaults (Dynamic Client Profiles)

IN THIS SECTION

- [Syntax | 168](#)
- [Hierarchy Level | 168](#)

- [Description | 168](#)
- [Options | 169](#)
- [Required Privilege Level | 170](#)
- [Release Information | 171](#)

Syntax

```
predefined-variable-defaults {
    cos-excess-rate <percent percentage> <proportion number>;
    cos-excess-rate-low <percent percentage> <proportion number>;
    cos-excess-rate-high <percent percentage> <proportion number>;
    cos-scheduler-bs <percent percentage> <temporal microseconds>;
    cos-scheduler-shaping-rate <percent percentage> <rate bps>;
    cos-scheduler-tx <percent percentage> <rate bps>;
    predefined-variable default-value;
}
```

Hierarchy Level

```
[edit dynamic-profiles profile-name]
```

Description

Configure default values for the predefined variables that are configured in a dynamic client profile. These default values are used when RADIUS does not supply a value. Omit the predefined variable prefix, \$junos-, when you configure a default. Most predefined variables support only a single default value; these predefined variables are not listed separately here. The listed predefined variables support default values for two attributes; for these you can specify the default value for either attribute or for both attributes.

NOTE: Not all predefined variables support default values. For a list of predefined variables and options for which you can configure default values, see ["Junos OS Predefined Variables That Correspond to RADIUS Attributes and VSAs" on page 94](#)

Defining default values for these predefined variables enables you to determine whether to source values locally from the profile instead of only from RADIUS. This enables you to use RADIUS as a way to selectively override predefined variable values, instead of being the sole source of those values.

NOTE: The `proportion` option provides greater granularity than the `percent` option, enabling you to specify the equivalent of a tenth of a percent. Configuring `proportion 121` applies a value equivalent to 12.1 percent, which you cannot achieve with the `percent` option.

NOTE: Do not use this statement in a dynamic service profile.

Options

<code>cos-excess-rate percent</code> <i>percentage</i>	Specify the percentage of excess bandwidth to share from all traffic. <ul style="list-style-type: none"> • Range: 1 through 100
<code>cos-excess-rate proportion</code> <i>number</i>	Specify the proportion of excess bandwidth to share from all traffic. <ul style="list-style-type: none"> • Range: 0 through 1000
<code>cos-excess-rate-low percent</code> <i>percentage</i>	Specify the percentage of excess bandwidth to share from low-priority traffic. <ul style="list-style-type: none"> • Range: 1 through 100
<code>cos-excess-rate-low proportion</code> <i>number</i>	Specify the proportion of excess bandwidth to share from low-priority traffic. <ul style="list-style-type: none"> • Range: 0 through 1000
<code>cos-excess-rate-high percent</code> <i>percentage</i>	Specify the percentage of excess bandwidth to share from high-priority traffic.

	<ul style="list-style-type: none"> • Range: 1 through 100
cos-excess-rate-high proportion <i>number</i>	Specify the proportion of excess bandwidth to share from high-priority traffic. <ul style="list-style-type: none"> • Range: 0 through 1000
cos-scheduler-bs percent <i>percentage</i>	Specify the buffer size as a percentage of the total buffer. <ul style="list-style-type: none"> • Range: 0 through 100
cos-scheduler-bs temporal <i>microseconds</i>	Specify the temporal value that determines the buffer size. The temporal value multiplied by the logical interface speed determines the size. <ul style="list-style-type: none"> • Range: 0 through 4294967295
cos-scheduler-shaping-rate percent <i>number</i>	Specify the shaping rate as a percentage of the available interface bandwidth. <ul style="list-style-type: none"> • Range: 1 through 100
cos-scheduler-shaping-rate rate <i>bps</i>	Specify the shaping rate in bits per second. <ul style="list-style-type: none"> • Range: 3200 through 160,000,000,000
cos-scheduler-tx percent <i>number</i>	Specify the transmit rate as a percentage of the total available bandwidth. <ul style="list-style-type: none"> • Range: 0 through 100
cos-scheduler-tx rate <i>bps</i>	Specify the transmit rate in bits per second. <ul style="list-style-type: none"> • Range: 3200 through 160,000,000,000

default-value—Default value that you want to assign to the predefined variable. Use this for predefined variables that support only a single value.

predefined-variable—Name of the Junos OS predefined variable to which you want to assign a default value. Do not include the \$junos- prefix.

Required Privilege Level

interface—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 10.2.

Support for the \$junos-interface-mtu predefined variable (interface-mtu) introduced in Junos OS Release 18.1R1 on MX Series.

RELATED DOCUMENTATION

[Configuring Default Values for Predefined Variables in a Dynamic Profile | 109](#)

[Per-Subscriber Support of Maximum Transmission Unit for Dynamic Profiles | 53](#)

resource-monitor

IN THIS SECTION

- [Syntax | 171](#)
- [Hierarchy Level | 172](#)
- [Description | 173](#)
- [Required Privilege Level | 173](#)
- [Release Information | 173](#)

Syntax

```
resource-monitor {  
    free-fw-memory-watermark number;  
    free-heap-memory-watermark number;  
    free-nh-memory-watermark number;  
    high-cos-queue-threshold number;  
    high-threshold number;  
    no-logging;  
    no-throttle;
```



```

resource-category jtree {
    resource-type (contiguous-pages | free-dwords | free-pages) {
        low-watermark number;
        high-watermark number;
    }
}

subscribers-limit {
    client-type (any | dhcp | l2tp | pppoe) {
        chassis {
            limit limit;
        }
        fpc slot-number {
            limit limit;
            pic number {
                limit limit;
                port number {
                    limit limit;
                }
            }
        }
    }
}

traceoptions {
    file filename <files number> <match regular-expression> <size maximum-file-size> <world-
readable | no-world-readable>;
    flag flag;
    no-remote-trace;
}
}

```

Hierarchy Level

```
[edit system services]
```


Description

Enable the resource monitoring capability to provision sufficient headroom (memory space limits that are set for the application or virtual router) for monitoring the health and operating efficiency of DPCs and MPCs. This feature also enables the memory resource monitoring mechanism to avoid the system operations from compromising on the health and traffic-handling stability of the line cards by generating error logs when a specified watermark value for memory regions and threshold value for the jtree memory region are exceeded. A trade-off on the system performance can be detrimental for supporting live traffic and protocols.

The variable *number* in the Syntax section represents a percentage.

You can configure the resource-monitoring capability on MX240, MX480, MX960, MX2010, and MX2020 routers with I-chip-based DPCs and Trio-based FPCs.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1.

high-cos-queue-threshold option introduced in Junos OS Release 17.4R1.

RELATED DOCUMENTATION

[Diagnosing and Debugging System Performance by Configuring Memory Resource Usage Monitoring on MX Series Routers](#)

[Resource Monitoring for Subscriber Management and Services | 34](#)

[Resource Monitoring Usage Computation Overview](#)

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor | 42](#)

routing-service (Dynamic Profiles)

IN THIS SECTION

- [Syntax | 174](#)
- [Hierarchy Level | 174](#)
- [Description | 174](#)
- [Options | 176](#)
- [Required Privilege Level | 176](#)
- [Release Information | 176](#)

Syntax

```
routing-service (disable <:$junos-routing-services> | enable<:$junos-routing-services>);
```

Hierarchy Level

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-name]
```

Description

Enable configuration of additional routing protocols required by client connections on dynamically created enhanced subscriber management interfaces.

NOTE: When clients use only the standard access-internal routes, access routes, and framed routes, you do not need to configure routing services. In other words, the routing service configuration is not required for simple client reachability purposes.

NOTE: You do not need to configure routing services for Internet Group Management Protocol (IGMP) and the Multicast Listener Discovery (MLD) protocol because these protocols are natively supported on enhanced subscriber management interfaces.

NOTE: `routing-service` is supported for the Layer 2 Tunneling Protocol (L2TP) network server subscribers and Point-to-Point Protocol over Ethernet (PPPoE) subscribers. Any other access models, otherwise mentioned, for example aggregated inline service interface, Multilink Point-to-Point Protocol (MLPPP) over L2TP network server (LNS) are not supported.

Enable configuration of all routing protocols except Internet Group Management Protocol (IGMP) and the Multicast Listener Discovery (MLD) protocol on dynamically created enhanced subscriber management interfaces. IGMP and MLD are natively supported on enhanced subscriber management interfaces, and therefore do not require you to specify the `routing-service` statement in the dynamic profile.

When a dynamic profile containing the `routing-service` statement is instantiated, the router creates an enhanced subscriber management logical interface, also referred to as a pseudo logical interface, in the form `demux0.nnnnnnnnnn` (for example, `demux0.3221225472`). Any associated subscriber routes or routes learned from a routing protocol running on the enhanced subscriber management interface use this pseudo interface as the next-hop interface.

NOTE: The `routing-service` statement replaces the deprecated ["routing-services" on page 177](#) statement. If you upgrade to Junos OS Release 18.4R1 or higher with a configuration that has active subscribers with ["routing-services" on page 177](#) enabled, then routing services remain enabled for those subscribers. For all new subscribers after the upgrade, you must use the ["routing-service" on page 174](#) statement.

You can specify the `$junos-routing-services` predefined variable to determine, per subscriber, whether routing services can be enabled or disabled by the value of the Routing-Services VSA (26-212) returned in the RADIUS Access-Accept message during subscriber authentication. A value of 0x0000 disables installation of routing services. A value of 0x0001 enables the installation of routing services. Any other value is rejected.

NOTE: The `routing-service` statement is not supported for DHCP dynamic profiles. Do not enable it for DHCP dynamic profiles. However, if the `routing-service` statement is enabled for a dynamic VLAN profile, that VLAN can stack DHCP subscribers.

Options

<code>disable</code>	Disable routing services for all subscribers instantiated on the interface by the profile.
<code>disable:\$junos-routing-services</code>	Prevent routing services from being enabled or disabled by the value of the Routing-Services VSA (26-212) for the subscriber being authenticated.
<code>enable</code>	Enable routing services for all subscribers instantiated on the interface by the profile.
<code>enable:\$junos-routing-services</code>	Allow routing services to be enabled or disabled by the value of the Routing-Services VSA (26-212) for the subscriber being authenticated.

Required Privilege Level

interface

Release Information

Statement introduced in Junos OS Release 18.4R1.

RELATED DOCUMENTATION

[Junos OS Enhanced Subscriber Management | 9](#)

Juniper Networks VSAs Supported by the AAA Service Framework

AAA Access Messages and Supported RADIUS Attributes and Juniper Networks VSAs for Junos OS

[Predefined Variables in Dynamic Profiles | 59](#)

routing-services (Enhanced Subscriber Management)

IN THIS SECTION

- [Syntax | 177](#)
- [Hierarchy Level | 177](#)
- [Description | 177](#)
- [Default | 179](#)
- [Required Privilege Level | 179](#)
- [Release Information | 179](#)

Syntax

```
routing-services;
```

Hierarchy Level

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-name]
```

Description

Enable configuration of additional routing protocols required by client connections on dynamically created enhanced subscriber management interfaces.

NOTE: When clients use only the standard access-internal routes, access routes, and framed routes, you do not need to configure routing services. In other words, the routing service configuration is not required for simple client reachability purposes.

NOTE: You do not need to configure routing services for Internet Group Management Protocol (IGMP) and the Multicast Listener Discovery (MLD) protocol because these protocols are natively supported on enhanced subscriber management interfaces.

NOTE: routing-services is supported only for the Layer 2 Tunneling Protocol (L2TP) network server subscribers. Any other access models, otherwise mentioned, for example aggregated inline service interface, Multilink Point-to-Point Protocol (MLPPP) over L2TP network server (LNS) are not supported.

When a dynamic profile containing the routing-services statement is instantiated, the router creates an enhanced subscriber management logical interface, also referred to as a pseudo logical interface, in the form demux0.nnnnnnnnnn (for example, demux0.3221225472). Any associated subscriber routes or routes learned from a routing protocol running on the enhanced subscriber management interface use this pseudo interface as the next-hop interface.

NOTE: Starting in Junos OS Release 18.4R1, the routing-services statement is deprecated. It is replaced by the routing-service statement. If you upgrade to Junos OS Release 18.4R1 or higher with a configuration that has active subscribers with "routing-services" on page 177 enabled, then routing services remain enabled for those subscribers. For all new subscribers after the upgrade, you must use the "routing-service" on page 174 statement.

NOTE: The routing-services statement is not supported for DHCP dynamic profiles. Do not enable it for DHCP dynamic profiles. However, if the routing-services statement is enabled for a dynamic VLAN profile, that VLAN can stack DHCP subscribers.

Default

Configuration of additional routing protocols associated with the client connection is disabled by default on enhanced subscriber management dynamic interfaces when you do not include this statement in the dynamic profile.

Required Privilege Level

interface—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 15.1R3.

Statement deprecated in Junos OS Release 18.4R1.

RELATED DOCUMENTATION

[Junos OS Enhanced Subscriber Management](#) | 9

services (System Services)

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- [Description](#) | 186
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Syntax

```

services {
  dhcp { # DHCP is not supported on a DCF
    dhcp_services;
  }
  dtcp-only
  finger {
    connection-limit limit;
    rate-limit limit;
  }
  flow-tap-dtcp {
    ssh {
      connection-limit limit;
      rate-limit limit;
    }
  }
  ftp {
    authentication-order [authentication-methods];
    connection-limit limit;
    rate-limit limit;
  }
  grpc {
    request-response {
      grpc {
        ssl {
          address ip-address;
          local-certificate local-certificate;
          port port;
        }
        max-connections max-connections;
      }
    }
    notification {
      port port;
      max-connections max-connections;
      allow-clients {
        address ip-address;
      }
    }
  }
  traceoptions {

```



```

        file <filename> <files number> <match regex> <size size> <world-readable | no-world-
readable>;
        flag flag;
        no-remote-trace;
    }
}
netconf {
    flatten-commit-results;
    hello-message {
        yang-module-capabilities {
            advertise-native-yang-modules;
            advertise-custom-yang-modules;
            advertise-standard-yang-modules;
        }
    }
    netconf-monitoring {
        netconf-state-schemas {
            retrieve-custom-yang-modules;
            retrieve-standard-yang-modules;
        }
    }
    notification;
    rfc-compliant;
    ssh {
        client-alive-count-max number;
        client-alive-interval seconds;
        connection-limit limit;
        port port;
        rate-limit limit;
    }
    tls {
        client-identity client-id {
            fingerprint fingerprint;
            map-type (san-dirname-cn | specified);
            username username;
        }
        default-client-identity {
            map-type (san-dirname-cn | specified);
            username username;
        }
        local-certificate local-certificate;
        traceoptions {
            file <filename> <files files> <match match> <size size> <(world-readable | no-

```



```

world-readable)>;
    flag name;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
}
}
traceoptions {
    file <filename> <files number> <match regular-expression> <size size> <world-
readable | no-world-readable>;
    flag flag;
    no-remote-trace;
    on-demand;
}
yang-compliant;
yang-modules {
    device-specific;
    emit-extensions;
}
}
outbound-https {
    client client-id {
        address {
            port port;
            trusted-cert trusted-cert;
        }
        device-id device-id;
        reconnect-strategy (in-order | sticky);
        secret password;
        waittime seconds;
    }
}
service-deployment {
    servers address {
        port-number port-number;
    }
    source-address address;
}
ssh {
    authentication-order [method 1 method2...];
    authorized-keys-command authorized-keys-command;
    authorized-keys-command-user authorized-keys-command-user;
    ciphers [ cipher-1 cipher-2 cipher-3 ...];
    client-alive-count-max number;
}

```



```

client-alive-interval seconds;
connection-limit limit;
fingerprint-hash (md5 | sha2-256);
hostkey-algorithm (algorithm | no-algorithm);
key-exchange [algorithm1 algorithm2...];
log-key-changes log-key-changes;
macs [algorithm1 algorithm2...];
max-pre-authentication-packets number;
max-sessions-per-connection number;
no-challenge-response;
no-password-authentication;
no-passwords;
no-public-keys;
allow-tcp-forwarding;
port port-number;
protocol-version [v2];
rate-limit number;
rekey {
    data-limit bytes;
    time-limit minutes;
}
root-login (allow | deny | deny-password);
sftp-server;
}
tcp-forwarding;
resource-monitor {
    free-fw-memory-watermark number;
    free-heap-memory-watermark number;
    free-nh-memory-watermark number;
    high-threshold number;
    no-logging;
    no-throttle;
    resource-category jtree {
        resource-category jtree (contiguous-pages | free-dwords | free-pages) {
            low-watermark number;
            high-watermark number;
        }
    }
}
subscribers-limit {
    (any | dhcp | l2tp | pppoe) {
        {
            limit limit;
        }
    }
}

```



```

        filtering enable;
        log-name {
            all;
            logname {
                <brief | detail | extensive | none | terse>;
                <file-logging |no-file-logging>;
            }
        }
        log-type (debug | info | notice);
    |
}
redundancy {
    interface name {
        local-inet-address v4-address;
        local-inet6-address v6-address;
        shared-key string;
        virtual-inet-address virtual-v4-address;
        virtual-inet6-address virtual-v6-address;
    }
    no-advertise-routes-on-backup;
    protocol {
        pseudo-wire;
        vrrp;
    }
}
traceoptions {
    file filename <files number> <match regular-expression> <size maximum-file-size>
    <world-readable | no-world-readable>;
    flag flag;
}
}
telnet {
    authentication-order [authentication-methods];
    connection-limit limit;
    rate-limit limit;
}
web-management {
    http {
        interfaces [ names ];
        port port;
    }
    https {
        interfaces [ names ];
    }
}

```



```

        local-certificate name;
        port port;
    }
    session {
        idle-timeout [ minutes ];
        session-limit [ limit ];
    }
}
xnm-ssl {
    connection-limit limit;
    local-certificate name;
    rate-limit limit;
    ssl-renegotiation;
}
}

```

Hierarchy Level

```
[edit system]
```

Description

Configure the router or switch so that users on remote systems can access the local router or switch through the DHCP server, DTCP over SSH, finger, outbound HTTPS, rlogin, SSH, telnet, Web management, Junos XML protocol SSL, and network utilities, or enable Junos OS to work with the Session and Resource Control (SRC) software. Also, enable configuration of third-party applications developed using the Juniper Extension Toolkit (JET) to run on Junos OS.

Starting in Junos OS Release 22.2R1, we've disabled the SSH TCP forwarding feature by default to enhance security. To enable the SSH TCP forwarding feature, you can configure the `allow-tcp-forwarding` statement at the `[edit system services ssh]` hierarchy level. In addition, we've deprecated the `tcp-forwarding` and `no-tcp-forwarding` statements at the `[edit system services ssh]` hierarchy level.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

extension-service option added in Junos OS Release 16.1 for MX80, MX104, MX240, MX480, MX960, MX2010, MX2020, vMX Series.

grpc option added in Junos OS Release 16.2 for MX80, MX104, MX240, MX480, MX960, MX2010, MX2020, vMX Series.

allow-tcp-forwarding option added in Junos OS Release 22.2R1.

RELATED DOCUMENTATION

[Configuring the Junos OS to Work with SRC Software](#)

How to Configure M:N Subscriber Redundancy with VRRP and DHCP Binding Synchronization

subscriber-management (Subscriber Management)

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- [Hierarchy Level | 189](#)
- [Description | 189](#)
- [Required Privilege Level | 189](#)
- [Release Information | 190](#)

Syntax

```

subscriber-management {
    enable;
    enforce-strict-scale-limit-license;
    gres-route-flush-delay;
}
overrides {
    event {
        catastrophic-failure {
            reboot (master | standby);
        }
    }
    interfaces {
        family (inet | inet6) {
            layer2-liveness-detection;
            ipoe-dynamic-arp-enable;
            receive-gratuitous-arp;
        }
    }
    no-unsolicited-ra;
    ra-initial-interval-max seconds;
    ra-initial-interval-min seconds;
    shmlog {
        disable;
        file filename <files maximum-no-files> <size maximum-file-size>;
        filtering enable;
        log-name {
            all;
            logname {
                <brief | detail | extensive | none | terse>;
                <file-logging |no-file-logging>;
            }
        }
        log-type (debug | info | notice);
    }
}
redundancy {
    interface name {
        local-inet-address v4-address;
        local-inet6-address v6-address;
    }
}

```



```

        shared-key string;
        virtual-inet-address virtual-v4-address;
        virtual-inet6-address virtual-v6-address;
    }
    no-advertise-routes-on-backup;
    protocol {
        pseudo-wire;
        vrrp;
    }
}
}
traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size> <world-
readable | no-world-readable>;
    flag flag;
}
}

```

Hierarchy Level

[edit system [services](#)]

Description

Configure global services for subscriber management, such as maintaining subscribers, tracing operations, and enabling enhanced subscriber management.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.1.

RELATED DOCUMENTATION

Configuring the Router to Maintain DHCP Subscribers During Interface Delete Events

[Tracing Subscriber Management Database Events for Troubleshooting](#) | 25

[Junos OS Enhanced Subscriber Management](#) | 9

[Configuring Junos OS Enhanced Subscriber Management](#) | 15

[DHCP Liveness Detection Using ARP and Neighbor Discovery Packets](#)

Minimize Traffic Loss Due to Stale Route Removal After a Graceful Routing Engine Switchover

How to Configure M:N Subscriber Redundancy with VRRP and DHCP Binding Synchronization

subscribers-limit (Resource Monitor)

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Syntax

```
subscribers-limit {
  client-type (any | dhcp | l2tp | pppoe) {
    chassis {
      limit limit;
```



```

    }
    fpc slot-number {
        limit limit;
        pic number {
            limit limit;
            port number {
                limit limit;
            }
        }
    }
}

```

Hierarchy Level

```
[edit system services resource-monitor]
```

Description

Configure the maximum number of subscribers of a specified client type allowed to be logged in on the chassis, per MPC, per MIC, and per port. When that number is reached, subsequent logins are denied until the current number of subscribers drops below the maximum allowed.

Limit the number of subscribers allowed to log in per chassis, MPC, MIC, or port.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor](#) | 42

[Resource Monitoring for Subscriber Management and Services](#) | 34

traceoptions (Subscriber Management)

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Syntax

```
traceoptions {  
    file filename <files number> <match regular-expression> <size maximum-file-size> <world-  
readable | no-world-readable>;  
    flag flag;  
}
```


Hierarchy Level

```
[edit system services subscriber-management]
```

Description

Define tracing operations for subscriber management interface processes.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the filename within quotation marks. All files are placed in the directory `/var/log`.

files *number*—(Optional) Maximum number of trace files to create before overwriting the oldest one. If you specify a maximum number of files, you also must specify a maximum file size with the `size` option.

- **Range:** 2 through 1000
- **Default:** 3 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags:

- `all`—Trace all operations.
- `database`—Trace database events.
- `general`—Trace general events.
- `issu`—Trace unified ISSU events.
- `server`—Trace server events.
- `session-db`—Trace session database interactions.
- `ui`—Trace user interface events.

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-world-readable—(Optional) Disable unrestricted file access.

`size` *maximum-file-size*—(Optional) Maximum size of each trace file. By default, the number entered is treated as bytes. Alternatively, you can include a suffix to the number to indicate kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the `files` option.

- **Syntax:** *sizek* to specify KB, *sizem* to specify MB, or *sizeg* to specify GB
- **Range:** 10240 through 1073741824
- **Default:** 128 KB

`world-readable`—(Optional) Enable unrestricted file access.

Required Privilege Level

`trace`—To view this statement in the configuration.

`trace-control`—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.1.

RELATED DOCUMENTATION

[Tracing Subscriber Management Database Events for Troubleshooting](#) | 25

traceoptions (Subscriber Session Database Replication)

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- Hierarchy Level | 195
- Description | 195
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Syntax

```
traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size> <world-
readable | no-world-readable>;
    flag flag;
    no-remote-trace;
}
```

Hierarchy Level

```
[edit system services database-replication]
```

Description

Define tracing operations for subscriber management session database replication processes.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory `/var/log`.

`files number`—(Optional) Maximum number of trace files to create before overwriting the oldest one. If you specify a maximum number of files, you also must specify a maximum file size with the `size` option.

- **Range:** 2 through 1000
- **Default:** 3 files

`flag flag`—Tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags:

- `all`—Trace all operations.
- `database`—Trace database events.
- `general`—Trace general flow.
- `mirror`—Trace mirroring events.
- `replication`—Trace database replication events.
- `server`—Trace server events.
- `session-db`—Trace session database interactions.
- `ui`—Trace user interface events.

`match regular-expression`—(Optional) Refine the output to include lines that contain the regular expression.

`no-remote-trace`—Disable remote tracing.

`no-world-readable`—(Optional) Disable unrestricted file access.

`size maximum-file-size`—(Optional) Maximum size of each trace file. By default, the number entered is treated as bytes. Alternatively, you can include a suffix to the number to indicate kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the `files` option.

- **Syntax:** `sizek` to specify KB, `sizem` to specify MB, or `sizeg` to specify GB
- **Range:** 10240 through 1073741824
- **Default:** 128 KB

`world-readable`—(Optional) Enable unrestricted file access.

Required Privilege Level

trace—To view this statement in the configuration.

trace-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

[Tracing Subscriber Management Session Database Replication Events for Troubleshooting](#) | 28

variables (Dynamic Service Profiles)

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Syntax

```
variables variable-name {  
    default-value default-value;  
    equals expression;
```



```

mandatory;
uid;
uid-reference;
}

```

Hierarchy Level

```
[edit dynamic-profiles profile-name]
```

Description

Configure user-defined variables in a dynamic service profile. The values that the system uses for these variables are provided by the RADIUS server and applied when the subscriber authenticates. You can configure default values that are used when RADIUS does not return a value. Alternatively, you can specify that the profile fails if RADIUS does not return a value for a variable.

NOTE: Do not use this statement in a dynamic client profile.

Options

variable-name—Name of the variable.

The remaining statements are explained separately. Search for a statement in [CLI Explorer](#) or click a linked statement in the Syntax section for details.

Required Privilege Level

interface—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

[Dynamic Variables Overview](#) | 57

[User-Defined Variables in Dynamic Profiles](#) | 112

versioning

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- [Hierarchy Level](#) | 199
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Syntax

```
versioning;
```

Hierarchy Level

```
[edit system dynamic-profile-options]
```


Description

Enable version support for dynamic profiles on the system. This means that you can create new versions of dynamic profiles that are currently in use by subscribers. Each new version of the profile is stored as a new profile. The profile name is in the format *base-profile-name*\$\$*number*, where *number* varies sequentially from 01 to 10. There can be up to 10 modified versions of a base profile.

Required Privilege Level

routing—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

[Versioning for Dynamic Profiles](#) | 125

version-alias (Dynamic Profiles)

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- [Hierarchy Level](#) | 201
- [Description](#) | 201
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- [Release Information](#) | 202

Syntax

```
version-alias version-alias-string;
```

Hierarchy Level

```
[edit dynamic-profiles profile-name]
```

Description

Configure an alias to identify a specific configuration variant of a base dynamic client profile. The version alias is a text description that lets you decide how to name different profile variants, so they have an identifier independent of the dynamic version name that is automatically created by the BNG.

The need for a version alias results from the practice of using a given base dynamic profile across multiple BNGs in a network. When you enable dynamic versioning, you can modify the base dynamic profile to provide specific capabilities to subscribers on different BNGs or to new subscribers on a given BNG. Dynamic versioning assigns a version name to each new variation in the base profile.

Consequently, the version name may vary for subscribers on one BNG or across multiple BNGs. In either case, RADIUS cannot determine which version of a profile is in use by any subscriber. This creates an operational challenge because RADIUS is unable to return corresponding attributes and VSAs in a CoA message that are compatible with that version of the profile.

When you configure a version alias for a dynamic client profile, the BNG sends the version alias to the RADIUS server during authentication. It is conveyed in the Juniper Networks client-profile-name VSA (26–4874–174). The version alias is an independent tag that enables you to track which profile variations are in use. Because RADIUS can tell apart the different profile versions, you can normalize the RADIUS back-end configuration for efficient use of CoA messages.

By default, the Client-Profile-Name VSA carries the name of the base dynamic profile. The version alias string is concatenated to the end of the profile name in the VSA, like this:

client-profile-name:version-alias-string

Options

version-alias-string

String that identifies a particular version of a dynamic profile. The maximum size of the string is 64 bytes.

Required Privilege Level

routing—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 20.2R1.

RELATED DOCUMENTATION

[Versioning for Dynamic Profiles](#) | 125

5

CHAPTER

Operational Commands

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show dynamic-profile session

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Syntax

```
show dynamic-profile session  
<client-id client-id>  
<profile-name profile-name>  
<service-id service-id>
```

Description

Display dynamic profile (client or service) information for all subscribers or for subscribers specified by client ID or service session ID. You can filter the output by also specifying a dynamic profile.

NOTE:

- The output does not display the variable stanzas defined in the dynamic profile configuration.
- The variables in the profile configuration are replaced with subscriber specific values.

- If the conditional variable in the dynamic profile is evaluated as NULL, the subscriber value for the variable is displayed as NONE in the command output.
- The variable is also displayed as NONE when the variable (any variable and not necessarily conditional) in the dynamic profile has no value associated with it.
- The format in which the configuration is displayed looks similar, but not exactly the same as the format of the `show configuration dynamic-profiles` command.

Options

client-id <i>client-id</i>	Display dynamic profile information for subscribers associated with the specified client.
profile-name <i>profile-name</i>	(Optional) Display dynamic profile information for the specified subscriber or service profile.
service-id <i>service-id</i>	Display dynamic profile information for subscribers associated with the specified service session.

Required Privilege Level

view

Output Fields

This command displays the dynamic client or service profile configuration for each subscriber.

Sample Output

show dynamic-profile session client-id (Client ID)

```

user@host>show dynamic-profile session client-id 20
pppoe {
  interfaces {
    pp0 {
      unit 1073741831 {
        ppp-options {
          chap;
          pap;
        }
        pppoe-options {
          underlying-interface ge-2/0/0.0;
          server;
        }
        family {
          inet {
            unnumbered-address lo0.0;
          }
        }
      }
    }
  }
}
class-of-service {
  traffic-control-profiles {
    tcp1 {
      scheduler-map smap1_UID1024;
      shaping-rate 100m;
    }
  }
  interfaces {
    pp0 {
      unit 1073741831 {
        output-traffic-control-profile tcp1;
      }
    }
  }
  scheduler-maps {
    smap1_UID1024 {

```



```

        forwarding-class best-effort scheduler sch1_UID1023;
    }
}
schedulers {
    sch1_UID1023 {
        transmit-rate percent 40;
        buffer-size percent 40;
        priority low;
    }
}
}
}
filter-service {
    interfaces {
        pp0 {
            unit 1073741831 {
                family {
                    inet {
                        filter {
                            input input-filter_UID1026 precedence 50;
                            output output-filter_UID1027 precedence 50;
                        }
                    }
                }
            }
        }
    }
}
firewall {
    family {
        inet {
            filter input-filter_UID1026 {
                interface-specific;
                term t1 {
                    then {
                        policer policer1_UID1025;
                        service-accounting;
                    }
                }
                term rest {
                    then accept;
                }
            }
            filter output-filter_UID1027 {

```



```

        interface-specific;
        term rest {
            then accept;
        }
    }
}

policer policer1_UID1025 {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 15k;
    }
    then discard;
}

}

}

cos-service {
    class-of-service {
        scheduler-maps {
            smap2_UID1029 {
                forwarding-class assured-forwarding scheduler sch2_UID1028;
            }
        }
        schedulers {
            sch2_UID1028 {
                transmit-rate percent 60;
                buffer-size percent 60;
                priority high;
            }
        }
    }
}

}

```

show dynamic-profile session client-id profile-name (Client ID and Dynamic Profile)

```

user@host>show dynamic-profile session client-id 20 profile-name cos-service
cos-service {
    class-of-service {
        scheduler-maps {
            smap2_UID1029 {
                forwarding-class assured-forwarding scheduler sch2_UID1028;
            }
        }
    }
}

```



```

    }
  }
  schedulers {
    sch2_UID1028 {
      transmit-rate percent 60;
      buffer-size percent 60;
      priority high;
    }
  }
}
}
}

```

show dynamic-profile session service-id (Service Session)

```

user@host>show dynamic-profile session service-id 21
filter-service {
  interfaces {
    pp0 {
      unit 1073741831 {
        family {
          inet {
            filter {
              input input-filter_UID1026 precedence 50;
              output output-filter_UID1027 precedence 50;
            }
          }
        }
      }
    }
  }
}
firewall {
  family {
    inet {
      filter input-filter_UID1026 {
        interface-specific;
        term t1 {
          then {
            policer policer1_UID1025;
            service-accounting;
          }
        }
      }
    }
  }
}

```



```
    }  
    term rest {  
        then accept;  
    }  
}  
filter output-filter_UID1027 {  
    interface-specific;  
    term rest {  
        then accept;  
    }  
}  
}  
}  
policer policer1_UID1025 {  
    if-exceeding {  
        bandwidth-limit 1m;  
        burst-size-limit 15k;  
    }  
    then discard;  
}  
}  
}
```

Release Information

Command introduced in Junos OS Release 13.3.

show system resource-monitor ifd-cos-queue-mapping fpc

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Syntax

```
show system resource-monitor ifd-cos-queue-mapping fpc slot-number
```

Description

Display the scheduler usage of each Packet Forwarding Engine and the mapping of scheduler blocks to CoS-capable physical interface (IFDs).

Options

slot-number Display the Junos OS utilization information of memory resources for the specified slot number in which the FPC is installed.

Required Privilege Level

view

Output Fields

Table 11 on page 212 lists the output fields for the `show system resource-monitor ifd-cos-queue-mapping fpc` command. Output fields are listed in the approximate order in which they appear.

Table 11: show system resource-monitor ifd-cos-queue-mapping fpc Output Fields

Field	Field Description
PFE #	Number or identifier of the Packet Forwarding Engine in the specified line-card slot.
Scheduler Block #	Scheduler block identifier. For each Packet Forwarding Engine there are multiple schedulers.
used	Scheduler queues used.
%	Percentage of queue resource used.
Devices	List of physical interfaces that map the scheduler.

Sample Output

show system resource-monitor ifd-cos-queue-mapping fpc

```

user@host> show system resource-monitor ifd-cos-queue-mapping fpc 0
  PFE #   Scheduler Block #   used   %   Devices
    0           0   13142   10 ge-1/0/0, ge-1/0/1, ge-1/0/2,
                        ge-1/0/3, ..
                        ge-1/0/8, si-1/0/0, ...
    0           1   13142   10 ge-1/1/0, ge-1/1/1, ge-1/1/2,

```


				ge-1/1/3, ..
				ge-1/1/8
1	0	24058	18	ge-1/2/0, ...
1	1	24058	18	ge-1/3/0, ...

Release Information

Command introduced in Junos OS Release 17.4R1.

RELATED DOCUMENTATION

[Resource Monitoring for Subscriber Management and Services Overview | 34](#)

[show system resource-monitor fpc](#)

[show system resource-monitor subscribers-limit | 213](#)

show system resource-monitor subscribers-limit

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Syntax

```
show system resource-monitor subscribers-limit  
<chassis>  
<fpc slot-number>  
<pic number>  
<port number>  
<extensive>
```

Description

Display information about subscriber limits for the specified hardware element, chassis, MPC, MIC, or port by client type. Shows the configured limit, the number of subscribers of the type currently logged in, and the number of subscribers that have been denied login because the limit has been reached. Use the *extensive* option to display information for the specified element and all subordinate elements that have a configured subscriber limit.

Options

extensive	(Optional) Display information for the specified hardware element and all subordinate elements that have a configured subscriber limit.
chassis	(Optional) Subscriber limit statistics for the chassis.
fpc slot-number	(Optional) Subscriber limit statistics for MPC in the specified slot.
pic number	(Optional) Subscriber limit statistics for the specified MIC.
port number	(Optional) Subscriber limit statistics for the specified port.

Required Privilege Level

view

Output Fields

Table 12 on page 215 lists the output fields for the `show system resource-monitor subscribers-limit` command. Output fields are listed in the approximate order in which they appear.

Table 12: show system resource-monitor subscribers-limit Output Fields

Field Name	Field Description	Level of Output
fpc, pic, port	Hardware element on which a maximum subscriber limit is configured. fpc corresponds to MPC. pic corresponds to MIC.	All levels
Client-type	Type of client for which a maximum subscriber limit is configured on the specified hardware element: ANY, DHCP, L2TP, or PPPoE.	All levels
Configured limit	Maximum number of subscribers that can be logged in for the client type.	All levels
Current count	Current number of subscribers that can log in for the client type.	All levels
Denied count	Number of subscribers for the client type that have been denied login because the maximum subscriber limit has been reached.	All levels

Sample Output

`show system resource-monitor subscribers-limit (Chassis)`

```
user@host> show system resource-monitor subscribers-limit chassis
Client-type : pppoe
  Configured limit : 0
  Current count   : 1
  Denied count    : 0
```



```

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

show system resource-monitor subscribers-limit (Chassis Extensive)

```
user@host> show system resource-monitor subscribers-limit chassis extensive
```

```

Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

```

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

```
fpc : 1
```

```

Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

```

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

```
pic : 2
```

```

Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

```

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```



```

port : 0
Client-type : pppoe
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

Client-type : any
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

```

show system resource-monitor subscribers-limit (MPC)

```

user@host> show system resource-monitor subscribers-limit fpc 1
Client-type : pppoe
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

Client-type : any
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

```

show system resource-monitor subscribers-limit (MPC Extensive)

```

user@host> show system resource-monitor subscribers-limit fpc 1 extensive
Client-type : pppoe
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

Client-type : any
    Configured limit : 0
    Current count    : 1
    Denied count     : 0

pic : 2
Client-type : pppoe
    Configured limit : 0

```



```

Current count      : 1
Denied count       : 0

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

port : 0
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

show system resource-monitor subscribers-limit (MIC)

```

user@host> show system resource-monitor subscribers-limit fpc 1 pic 2
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```

show system resource-monitor subscribers-limit (MIC Extensive)

```

user@host> show system resource-monitor subscribers-limit fpc 1 pic 2 extensive
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0

```



```
Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

```
port : 0
```

```
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

```
Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

show system resource-monitor subscribers-limit (Port)

```
user@host> show system resource-monitor subscribers-limit fpc 1 pic 2 port 0
```

```
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

```
Client-type : any
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

show system resource-monitor subscribers-limit (Port Extensive)

```
user@host> show system resource-monitor subscribers-limit fpc 1 pic 2 port 0 extensive
```

```
Client-type : pppoe
  Configured limit : 0
  Current count    : 1
  Denied count     : 0
```

```
Client-type : any
  Configured limit : 0
```



```
Current count      : 1
Denied count       : 0
```

Release Information

Command introduced in Junos OS 17.3R1.

RELATED DOCUMENTATION

[Limiting Subscribers by Client Type and Hardware Element with Resource Monitor | 42](#)

[show system resource-monitor fpc](#)

[show system resource-monitor ifd-cos-queue-mapping fpc | 211](#)

show system subscriber-management resiliency

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Syntax

```
show system subscriber-management resiliency
<detail>
```



```
<extensive>  
<summary>
```

Description

Display information that indicates the health and relationship of session database replication between the primary and standby Routing Engines.

Options

- detail** (Optional) Displays brief information about the shared memory state for the primary and standby Routing Engines.
- extensive** (Optional) Displays very detailed statistics for the SDB components in shared memory for the primary and standby Routing Engines, enabling you to evaluate the state of replication between the two.
- summary** (Optional) Displays only an indication of whether the system is okay (replication is normal) or has some unexpected condition.

Required Privilege Level

system

Output Fields

[Table 13 on page 222](#) lists the output fields for the `show system subscriber-management resiliency` command. Output fields are listed in the approximate order in which they appear.

Table 13: show system subscriber-management resiliency Output

Field Name	Field Description	Level
Overall Status	<p>Indicates the condition of the system:</p> <ul style="list-style-type: none"> • 0k—The system is functioning normally. • Not-0k—An unexpected condition has been discovered. This status may require investigation by the Juniper Networks Technical Assistance Center (JTAC) to confirm whether anything is wrong and the root cause of the status. 	summary
shared memory type	<p>One of the following types of shared memory objects:</p> <ul style="list-style-type: none"> • mmap—Memory-mapped file that stores the hash or entry data for an MMDB. • mmap Database (MMDB)—Memory-mapped database that uses memory-mapped files to store the MMDB hash and entry data. Each MMDB typically stores a type of statistic, such as statistics related logical interfaces, logical interface sets, or subscribers. • Shared Memory Segment—An operating system object that is a chunk of contiguous shared memory. <p>Total—Number of memory objects of all types.</p>	detail
count	Number of shared memory instances of a type.	detail
mapped bytes	Number of bytes mapped into process space.	detail
mmfs	Memory-mapped file information.	extensive
Name	<p>File path including the filename of the shared memory object.</p> <p>For MMFs, the filename is the name of its associated MMDB and a suffix to indicate whether it stores hash or data.</p> <p>For MMDBs, the filename indicates the type of statistics stored in the database.</p>	extensive
Current Bytes	Current total size of the shared memory object.	extensive

Table 13: show system subscriber-management resiliency Output (Continued)

Field Name	Field Description	Level
Maximum Bytes	Maximum size of the shared memory object.	extensive
Mapped Bytes	Number of bytes mapped into process space.	extensive
Lock Count	Number of times the shared memory object has been locked by a global, inter-process lock.	extensive
Contention Count	Number of times that a process or thread object waited to lock a shared memory object because a different process or thread already has the lock. This is a global, inter-process lock.	extensive
Lock Wait Secs	How long a process or thread taking a global, inter-process lock waited because a different process or thread already had the lock.	extensive
mmap Count	Number of times that parts of the overall memory mapped data have been mapped.	extensive
Shared Memory Segments	Information about the shared memory segments; each segment is a chunk of contiguous shared memory.	extensive
Size in Bytes	Number of bytes in the shared memory segment.	extensive
MMDBs	Information about the memory-mapped file databases that use memory-mapped files to store data (typically statistics associated with interfaces and subscribers).	extensive
Hash Entries	Number of different hash entries a key could be hashed to in this table.	extensive
PLock Count	Number of times the MMDB shared memory object has been locked by a process-level, intra-process lock.	extensive

Table 13: show system subscriber-management resiliency Output (Continued)

Field Name	Field Description	Level
PLock Contention Count	Number of times that a process or thread object waited to lock a shared memory object because a different process or thread already has the lock. This is a process-level, intra-process lock.	extensive
PLock Wait Secs	How long a process or thread taking a process-level, intra-process lock waited because a different process or thread already had the lock.	extensive

Sample Output

show system subscriber-management resiliency (Summary)

```
user@host> show system subscriber-management resiliency summary
Overall Status: Ok
```

show system subscriber-management resiliency (Detail)

```
user@host> show system subscriber-management resiliency detail
Master:
shared memory type      count mapped bytes
mmap                    43    195027200
mmap Database (MMDB)    9      (in mmap)
Shared Memory Segment    6    39163504
Total                   58    234190704

Standby:
shared memory type      count mapped bytes
mmap                    41    192930048
mmap Database (MMDB)    9      (in mmap)
Shared Memory Segment    6    39163504
Total                   56    232093552
```


show system subscriber-management resiliency (Extensive)

```
user@host> show system subscriber-management resiliency extensive
```

```
Master:
```

```
mmfs:
  Name
  Mapped bytes  Lock Count Lock Contention Count  Lock Wait Secs  Current Bytes Maximum Bytes
  /mfs/var/smm_accounting-stats-db_hash 15736832
15736832 15736832 17 0 0.000000 0
  /mfs/var/smm_accounting-stats-db_data 1139015680
9112125440 2097152 17 0 0.000000 18
  /mfs/var/mmcq/mmdb_rep_mmcq 1048576
104857600 1048576 25 1 0.011021 0
  /mfs/var/smm_accounting-ifl-db_hash 28672
28672 28672 17 0 0.000000 0
  /mfs/var/smm_accounting-ifl-db_data 33554432
536870912 4194304 17 0 0.000000 18
  /mfs/var/smm_accounting-iflset-db_hash 28672
28672 28672 17 0 0.000000 0
  /mfs/var/smm_accounting-iflset-db_data 33554432
536870912 4194304 17 0 0.000000 18
  /mfs/var/sdb/shmem/sdb.head 7680256
7680256 7680256 384006 0 0.000000 0
  /mfs/var/sdb/shmem/sdb.lts.data 1620049920
8589934592 20971520 41 0 0.000000 60
  /mfs/var/sdb/shmem/sdb_sts_data 51216384
51216384 51216384 20012 0 0.000000 0
  /mfs/var/sdb/shmem/sdb_intf.db 409600
409600 409600 0 0 0.000000 0
  /mfs/var/sdb/shmem/subscriber_hash 2408448
2408448 2408448 21 0 0.000000 0
  /mfs/var/sdb/shmem/subscriber_data 33554432
536870912 2097152 22 0 0.000000 22
  /mfs/var/sdb/shmem/service_hash 2408448
2408448 2408448 21 0 0.000000 0
  /mfs/var/sdb/shmem/service_data 33554432
536870912 2097152 22 0 0.000000 22
  /mfs/var/sdb/shmem/interface_hash 28672
28672 28672 21 0 0.000000 0
  /mfs/var/sdb/shmem/interface_data 33554432
536870912 4194304 109 0 0.000000 22
```


	/mfs/var/sdb/shmem/interface_set_hash				28672	
28672	28672	21	0	0.000000	0	
	/mfs/var/sdb/shmem/interface_set_data				33554432	
536870912	4194304	22	0	0.000000	22	
	/mfs/var/sdb/shmem/mobile_subs_location_hash				1208320	
1208320	1208320	21	0	0.000000	0	
	/mfs/var/sdb/shmem/mobile_subs_location_data				33554432	
536870912	2097152	22	0	0.000000	22	
	/mfs/var/sdb/shmem/mobile_subscriber_hash				1208320	
1208320	1208320	21	0	0.000000	0	
	/mfs/var/sdb/shmem/mobile_subscriber_data				33554432	
536870912	2097152	21	0	0.000000	22	
	/mfs/var/mmqq/mmqq_queue				126976	
126976	126976	5	0	0.000000	0	
	/mfs/var/mmqq/mmqq_heap				5120000	
5120000	5120000	4	0	0.000000	0	
	/mfs/var/mmccq/sdb_bbe_mmccq				25165824	
318767104	25165824	21	0	0.000000	0	
	/mfs/var/mmccq/authdRxQueue				1048576	
20971520	1048576	6	0	0.000000	0	
	/mfs/var/mmccq/pppdRxQueue				1048576	
20971520	1048576	4	0	0.000000	0	
	/mfs/var/mmccq/bbeStatsdGetCollector				1048576	
20971520	1048576	16	0	0.000000	0	
	/mfs/var/mmdb/mmdb_ack_registry				8192	
8192	8192	141	0	0.000000	0	
	/mfs/var/mmccq/mmdb_ackq_bbe-statsd				1048576	
67108864	1048576	2	0	0.000000	0	
	/mfs/var/mmccq/jdchpdAccountingClientApp				1048576	
20971520	1048576	2	0	0.000000	0	
	/mfs/var/ss/domain.0.data				16777216	
2147483648	4194304	262	0	0.000000	18	
	/mfs/var/tmp/bbe_throttle_control				8192	
8192	8192	7	0	0.000000	0	
	/mfs/var/mmccq/statsPluginGCCClient				1048576	
20971520	1048576	2	0	0.000000	0	
	/mfs/var/sdb/shmem/sdb_reg_info				8192	
8192	8192	2	0	0.000000	0	
	/mfs/var/mmccq/sdb_reg_q_bbe-statsd				16777216	
16777216	16777216	2	0	0.000000	0	
	/mfs/var/mmccq/jl2tpdCliRxQ				1048576	
20971520	1048576	2	0	0.000000	0	
	/mfs/var/mmccq/jl2tpdSnpRxQ				1048576	

20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/authd				1048576	
20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/jpppdAccountingClientApp				1048576	
20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/mmdb_mmcq_0				1048576	
104857600	1048576	42	0	0.000000	0
/mfs/var/ss/domain.0				409600	
4294967295	409600	6400000	3037	0.002642	0

Shared Memory Segments:

Name	Size in Bytes
/mfs/var/shmlog/shmlog	39071744
sdb_rsmon_shared_memory	22536
sdb_rsmon_ae_table	4096
sdb_rsmon_ps_table	60008
sdb_rsmon_rlt_table	1024
sdb_bbe_rep_mailbox	4096

MMDBs:

Name	Hash Entries	Lock Count
/mfs/var/smm_accounting-stats-db	655360	
7208990	0	0.000000
0.000000	1966111	0
/mfs/var/smm_accounting-ifl-db	1000	
11024	0	0.000000
0.000000	3025	0
/mfs/var/smm_accounting-iflset-db	1000	
11024	0	0.000000
0.000000	3025	0
/mfs/var/sdb/shmem/subscriber	100000	
1400010	2	0.043705
0.000000	400012	0
/mfs/var/sdb/shmem/service	100000	
1400010	0	0.000000
0.000000	400012	0
/mfs/var/sdb/shmem/interface	1000	
14430	0	0.000000
0.000000	4427	0
/mfs/var/sdb/shmem/interface_set	1000	
14010	0	0.000000
0.000000	4012	0


```

    /mfs/var/sdb/shmem/mobile_subs_location          50000
700018          0          0.000000          200020          0
0.000000

    /mfs/var/sdb/shmem/mobile_subscriber          50000
700010          0          0.000000          200012          0
0.000000

Total Mapped Bytes          234190704

Standby:

mmfs:
Name
Mapped bytes  Lock Count Lock Contention Count  Lock Wait Secs  Current Bytes Maxiumum Bytes
mmap Count
    /mfs/var/smm_accounting-stats-db_hash          15736832
15736832      15736832          13          0          0.000000          0
    /mfs/var/smm_accounting-stats-db_data          1139015680
9112125440      2097152          13          0          0.000000          14
    /mfs/var/mmcq/mmdb_rep_mmcq          1048576
104857600      1048576          15          0          0.000000          0
    /mfs/var/smm_accounting-ifl-db_hash          28672
28672          28672          13          0          0.000000          0
    /mfs/var/smm_accounting-ifl-db_data          33554432
536870912      4194304          13          0          0.000000          14
    /mfs/var/smm_accounting-iflset-db_hash          28672
28672          28672          13          0          0.000000          0
    /mfs/var/smm_accounting-iflset-db_data          33554432
536870912      4194304          13          0          0.000000          14
    /mfs/var/sdb/shmem/sdb.head          7680256
7680256      7680256          384005          0          0.000000          0
    /mfs/var/sdb/shmem/sdb.lts.data          1620049920
8589934592      20971520          11          0          0.000000          20
    /mfs/var/sdb/shmem/sdb_sts_data          51216384
51216384      51216384          17510          0          0.000000          0
    /mfs/var/sdb/shmem/sdb_intf.db          409600
409600          409600          0          0          0.000000          0
    /mfs/var/sdb/shmem/subscriber_hash          2408448
2408448      2408448          5          0          0.000000          0
    /mfs/var/sdb/shmem/subscriber_data          33554432
536870912      2097152          4          0          0.000000          6
    /mfs/var/sdb/shmem/service_hash          2408448
2408448      2408448          5          0          0.000000          0
    /mfs/var/sdb/shmem/service_data          33554432

```


536870912	2097152	4	0	0.000000	6
/mfs/var/sdb/shmem/interface_hash					28672
28672	28672	5	0	0.000000	0
/mfs/var/sdb/shmem/interface_data					33554432
536870912	4194304	4	0	0.000000	6
/mfs/var/sdb/shmem/interface_set_hash					28672
28672	28672	5	0	0.000000	0
/mfs/var/sdb/shmem/interface_set_data					33554432
536870912	4194304	4	0	0.000000	6
/mfs/var/sdb/shmem/mobile_subs_location_hash					1208320
1208320	1208320	5	0	0.000000	0
/mfs/var/sdb/shmem/mobile_subs_location_data					33554432
536870912	2097152	4	0	0.000000	6
/mfs/var/sdb/shmem/mobile_subscriber_hash					1208320
1208320	1208320	5	0	0.000000	0
/mfs/var/sdb/shmem/mobile_subscriber_data					33554432
536870912	2097152	4	0	0.000000	6
/mfs/var/mmqq/mmqq_queue					126976
126976	126976	4	0	0.000000	0
/mfs/var/mmqq/mmqq_heap					5120000
5120000	5120000	3	0	0.000000	0
/mfs/var/mmcq/sdb_bbe_mmcq					25165824
318767104	25165824	11	0	0.000000	0
/mfs/var/mmcq/authdRxQueue					1048576
20971520	1048576	6	0	0.000000	0
/mfs/var/mmcq/pppdRxQueue					1048576
20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/bbeStatsdGetCollector					1048576
20971520	1048576	14	0	0.000000	0
/mfs/var/mmdb/mmdb_ack_registry					8192
8192	8192	2	0	0.000000	0
/mfs/var/mmcq/mmdb_ackq_bbe-statsd					1048576
67108864	1048576	2	0	0.000000	0
/mfs/var/mmcq/jdchpdAccountingClientApp					1048576
20971520	1048576	2	0	0.000000	0
/mfs/var/ss/domain.0.data					16777216
2147483648	4194304	261	0	0.000000	16
/mfs/var/tmp/bbe_throttle_control					8192
8192	8192	6	0	0.000000	0
/mfs/var/mmcq/statsPluginGCCClient					1048576
20971520	1048576	2	0	0.000000	0
/mfs/var/sdb/shmem/sdb_reg_info					8192
8192	8192	2	0	0.000000	0

/mfs/var/mmcq/sdb_reg_q_bbe-statsd				16777216	
16777216	16777216	2	0	0.000000	0
/mfs/var/mmcq/jl2tpdCliRxQ				1048576	
20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/jl2tpdSnmpRxQ				1048576	
20971520	1048576	2	0	0.000000	0
/mfs/var/mmcq/authd				1048576	
20971520	1048576	2	0	0.000000	0
/mfs/var/ss/domain.0				409600	
4294967295	409600	8000000	4044	0.002962	0

Shared Memory Segments:

Name	Size in Bytes
/mfs/var/shmlog/shmlog	39071744
sdb_rsmon_shared_memory	22536
sdb_rsmon_ae_table	4096
sdb_rsmon_ps_table	60008
sdb_rsmon_rlt_table	1024
sdb_bbe_rep_mailbox	4096

MMDBs:

Name	Hash Entries	Lock Count
/mfs/var/smm_accounting-stats-db	655360	
5898264	0	0.000000
0.000000	1966105	0
/mfs/var/smm_accounting-ifl-db	1000	
9020	0	0.000000
0.000000	3021	0
/mfs/var/smm_accounting-iflset-db	1000	
9020	0	0.000000
0.000000	3021	0
/mfs/var/sdb/shmem/subscriber	100000	
300002	0	0.000000
0.000000	100003	0
/mfs/var/sdb/shmem/service	100000	
300002	0	0.000000
0.000000	100003	0
/mfs/var/sdb/shmem/interface	1000	
3002	0	0.000000
0.000000	1003	0
/mfs/var/sdb/shmem/interface_set	1000	
3002	0	0.000000
	1003	0

0.000000				
/mfs/var/sdb/shmem/mobile_subs_location				50000
150002	0	0.000000	50003	0
0.000000				
/mfs/var/sdb/shmem/mobile_subscriber				50000
150002	0	0.000000	50003	0
0.000000				
Total Mapped Bytes				232093552

Release Information

Command introduced in Junos OS Release 19.1R1.

RELATED DOCUMENTATION

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show system subscriber-management route

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Syntax

```
show system subscriber-management route
<family family>
<incomplete>
<level (brief | detail)>
<next-hop index>
<prefix>
<routing-instance name>>
<route-type type>
<rrt-index index>
<summary>
```

Description

Display information about how routes are mapped to specific enhanced subscriber management interfaces. You can customize the output by including one or more optional filters in the command. With the exception of the `summary` option, all filter options can be combined in a single command.

Options

family <i>family</i>	(Optional) Display route mapping information for the specified protocol family: <code>inet</code> (IPv4) or <code>inet6</code> (IPv6).
incomplete	(Optional) Display route mapping information for incomplete routes that are missing elements required to add the routes to the routing table.
level (brief detail)	(Optional) Display the specified level of output: <code>brief</code> or <code>detail</code> .
next-hop <i>index</i>	(Optional) Display the next hop associated with the route entry with the specified next-hop index, in the range 1 through 65535.
prefix <i>address</i>	(Optional) Use the same prefix and prefix length as the subscriber host address. Output includes attributes that originate in the Famed-Route record of an upstream RADIUS server (Tag, Metric, Preference).

route-type <i>type</i>	(Optional) Display route mapping information for the specified route type: access, access-internal, kernel, or local.
routing-instance <i>name</i>	(Optional) Display route mapping information for the specified routing-instance
rtt-index <i>index</i>	(Optional) Display mapping information for the specified routing table index, in the range 0 through 65535. An rtt-index value of 0 (zero) denotes routes in the default routing table managed by enhanced subscriber management.
summary	(Optional) Display summary information about the routes managed by enhanced subscriber management.

Required Privilege Level

view

Output Fields

Table 14 on page 233 lists the output fields for the `show system subscriber-management route` command. Output fields are listed in the approximate order in which they appear.

Table 14: show system subscriber-management route Output Fields

Field Name	Field Description	Level of Output
<i>address</i>	IPv4 or IPv6 address associated with the route entry.	All levels
Route Type	One of the following route types: <ul style="list-style-type: none"> • Access • Access-internal • Framed • Kernel • Local 	All levels

Table 14: show system subscriber-management route Output Fields (Continued)

Field Name	Field Description	Level of Output
Interface	Name of the enhanced subscriber management interface associated with the route entry.	All levels
Next-hop	Next-hop associated with the route entry.	All levels
Tag	Reflects the Tag attribute used in the RADIUS Framed-Route type record.	All levels
Metric	Reflects the Metric attribute used in the RADIUS Framed-Route type record.	All levels
Preference	Reflects the Preference attribute used in the RADIUS Framed-Route type record.	All levels
Rtt-index	Value of the routing table index. A value of 0 (zero) denotes a route in the default routing table managed by enhanced subscriber management.	detail
Bbe index	Value of the interface index for the control plane.	detail
Flow id	Value of the route object index.	detail
Reference Count	Used for internal accounting.	detail
Dirty Flags	Used for internal accounting.	detail
Flags	Used for internal accounting.	detail
Family	One of the following protocol families: <ul style="list-style-type: none"> • AF_INET—IPv4 • AF_INET6—IPv6 	detail

Sample Output

show system subscriber-management route prefix <address>

rtt-index 0

```
user@host> show system subscriber-management route prefix 10.10.0.1/32
Route: 10.10.0.1/32
  Routing-instance:      default:default
  Kernel rt-table id :   0
  Family:                AF_INET
  Route Type:            Framed
  Protocol Type:         Unspecified
  Interface:             pp0.3221225491
  Interface index:       26
  Internal Interface index: 26
  Route index:           20
  Next-Hop:              684
  Tag:                   9999
  Metric:                56
  Preference:            10
  Reference-count:       1
  L2 Address:            00:00:5e:00:53:0b
  Flags:                 0x0
  Dirty Flags:           0x0
```

show system subscriber-management route family route-type rtt-index level brief

The following example displays abbreviated information about IPv6 access routes in the default routing table (rtt-index 0) managed by enhanced subscriber management.

```
user@host> show system subscriber-management route family inet6 route-type access rtt-index 0
level brief
2001:db8::/64
  Route Type: Access
  Interface: pp0.3221225479, Next-hop:721
2001:db8:0:0:1::/64
  Route Type: Access
  Interface: pp0.3221225477, Next-hop:721
2001:db8:0:0:2::/64
```



```

Route Type: Access
Interface: pp0.3221225478, Next-hop:721
2001:db8:0:0:3::/64
Route Type: Access
Interface: pp0.3221225480, Next-hop:721
2001:db8:0:0:4::/64
Route Type: Access
Interface: pp0.3221225481, Next-hop:721
2001:db8:2002::/84
Route Type: Access
Interface: demux0.3221225492, Next-hop:721
2001:db8:0:0:5::/64
Route Type: Access
Interface: pp0.3221225487, Next-hop:721
2001:db8:0:0:6::/64
Route Type: Access

```

show system subscriber-management route family route-type rtt-index level detail

The following example displays detailed information about IPv6 access routes in the default routing table (rtt-index 0) managed by enhanced subscriber management.

```

user@host> show system subscriber-management route family inet6 route-type access rtt-index 0
level detail
2001:db8::/64
Route Type:      Access
Interface:       pp0.3221225479
Next-hop:        721
Rtt-index:       0
Bbe index:       9
Flow id:         1
Reference Count: 1
Dirty Flags:     0
Flags:           0x10082
Family:          AF_INET6
2001:db8:0:0:1::/64
Route Type:      Access
Interface:       pp0.3221225477
Next-hop:        721
Rtt-index:       0
Bbe index:       9

```



```

Flow id:      1
Reference Count: 1
Dirty Flags:  0
Flags:        0x10082
Family:       AF_INET6
2001:db8:0:0:2::/64
Route Type:   Access
Interface:    pp0.3221225478
Next-hop:     721
Rtt-index:    0
Bbe index:    9
Flow id:      1
Reference Count: 1
Dirty Flags:  0
Flags:        0x10082
Family:       AF_INET6
2001:db8:0:0:3::/64
Route Type:   Access
Interface:    pp0.3221225480
Next-hop:     721
Rtt-index:    0
Bbe index:    9
Flow id:      1
Reference Count: 1
Dirty Flags:  0
Flags:        0x10082
Family:       AF_INET6

```

show system subscriber-management route family route-type rtt-index level brief

The following example displays abbreviated information about IPv6 access routes in the default routing table (rtt-index 0) managed by enhanced subscriber management.

```

user@host> show system subscriber-management route family inet6 route-type access rtt-index 0
level brief
2001:db8::/64
Route Type: Access
Interface: pp0.3221225479, Next-hop:721
2001:db8:0:0:1::/64
Route Type: Access
Interface: pp0.3221225477, Next-hop:721

```



```

2001:db8:0:0:2::/64
    Route Type: Access
    Interface: pp0.3221225478, Next-hop:721
2001:db8:0:0:3::/64
    Route Type: Access
    Interface: pp0.3221225480, Next-hop:721
2001:db8:0:0:4::/64
    Route Type: Access
    Interface: pp0.3221225481, Next-hop:721
2001:db8:2002::/84
    Route Type: Access
    Interface: demux0.3221225492, Next-hop:721
2001:db8:0:0:5::/64
    Route Type: Access
    Interface: pp0.3221225487, Next-hop:721
2001:db8:0:0:6::/64
    Route Type: Access

```

Release Information

Command introduced in Junos OS Release 15.1R3.

Support for passing **Framed-Route** attributes from a RADIUS server to the router was added in Junos OS Release 17.2 on MX Series routers for enhanced subscriber management. This allows the tagged subscriber host routes to be imported to the routing table and advertised by BGP.

RELATED DOCUMENTATION

[Verifying and Managing Junos OS Enhanced Subscriber Management](#) | 22