JUNOS® Software

Subscriber Access Configuration Guide

Release 9.3

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JUNOS® Software Subscriber Access Configuration Guide
Release 9.3

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Juniper Networks hardware and software products are Year 2000 compliant. The JUNOS software has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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About This Guide

This preface provides the following guidelines for using the *JUNOS® Software Subscriber Access Configuration Guide*:

Objectives

This guide provides an overview of the subscriber access management features of the JUNOS software and describes how to configure and manage remote subscriber access on the routing platform.

NOTE: This guide documents Release 9.3 of the JUNOS software. For additional information about JUNOS software—either corrections to or information that might have been omitted from this guide—see the software release notes at http://www.juniper.net.

Audience

This guide is designed for network administrators who are configuring and monitoring a Juniper Networks MX-series routing platform.

To use this guide, you need a broad understanding of networks in general, the Internet in particular, networking principles, and network configuration. You must also be familiar with one or more of the following Internet routing protocols:

- Border Gateway Protocol (BGP)
- Distance Vector Multicast Routing Protocol (DVMRP)

- Intermediate System-to-Intermediate System (IS-IS)
- Internet Control Message Protocol (ICMP) router discovery
- Internet Group Management Protocol (IGMP)
- Multiprotocol Label Switching (MPLS)
- Open Shortest Path First (OSPF)
- Protocol-Independent Multicast (PIM)
- Resource Reservation Protocol (RSVP)
- Routing Information Protocol (RIP)
- Simple Network Management Protocol (SNMP)

Personnel operating the equipment must be trained and competent; must not conduct themselves in a careless, willfully negligent, or hostile manner; and must abide by the instructions provided by the documentation.

Supported Routing Platforms

For the features described in this manual, the JUNOS software currently supports the following routing platforms:

- MX-series

Using the Indexes

This reference contains two indexes: a complete index that includes topic entries, and an index of statements and commands only.

In the index of statements and commands, an entry refers to a statement summary section only. In the complete index, the entry for a configuration statement or command contains at least two parts:

- The primary entry refers to the statement summary section.
- The secondary entry, usage guidelines, refers to the section in a configuration guidelines chapter that describes how to use the statement or command.

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the load merge or the load merge relative command. These commands cause the software to merge the incoming configuration into the current candidate configuration. If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the load merge command.

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

Convention	Description	Examples
Italic text like this	■ Introduces important new terms. ■ Identifies book names. ■ Identifies RFC and Internet draft titles.	■ A policy *term* is a named structure that defines match conditions and actions. ■ *JUNOS System Basics Configuration Guide* ■ RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Plain text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; configuration hierarchy levels; or labels on routing platform components.	■ To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. ■ The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	stub <default-metric *metric*>;
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast | multicast (*string1* | *string2* | *string3*)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [*community-ids*]

Indention and braces ({ })	Identify a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	■ In the Logical Interfaces box, select **All Interfaces**. ■ To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols > Ospf**.

List of Technical Publications

Table 3 on page xxx lists the software and hardware guides and release notes for Juniper Networks J-series, M-series, MX-series, and T-series routing platforms and describes the contents of each document. Table 4 on page xxxiv lists the books included in the *Network Operations Guide* series. Table 5 on page xxxv lists the manuals and release notes supporting JUNOS software with enhanced services. All documents are available at http://www.juniper.net/techpubs/.

Table 6 on page xxxvi lists additional books on Juniper Networks solutions that you can order through your bookstore. A complete list of such books is available at http://www.juniper.net/books.

Table 3: Technical Documentation for Supported Routing Platforms

Book	Description
JUNOS Software for Supported Routing Platforms	
Access Privilege	Explains how to configure access privileges in user classes by using permission flags and regular expressions. Lists the permission flags along with their associated command-line interface (CLI) operational mode commands and configuration statements.
Class of Service	Provides an overview of the class-of-service (CoS) functions of the JUNOS software and describes how to configure CoS features, including configuring multiple forwarding classes for transmitting packets, defining which packets are placed into each output queue, scheduling the transmission service level for each queue, and managing congestion through the random early detection (RED) algorithm.
CLI User Guide	Describes how to use the JUNOS command-line interface (CLI) to configure, monitor, and manage Juniper Networks routing platforms. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
Feature Guide	Provides a detailed explanation and configuration examples for several of the most complex features in the JUNOS software.
High Availability	Provides an overview of hardware and software resources that ensure a high level of continuous routing platform operation and describes how to configure high availability (HA) features such as nonstop active routing (NSR) and graceful Routing Engine switchover (GRES).
MPLS Applications	Provides an overview of traffic engineering concepts and describes how to configure traffic engineering protocols.
Multicast Protocols	Provides an overview of multicast concepts and describes how to configure multicast routing protocols.
Multiplay Solutions	Describes how you can deploy IPTV and voice over IP (VoIP) services in your network.

Table 3: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
MX-series Solutions Guide	Describes common configuration scenarios for the Layer 2 features supported on the MX-series routers, including basic bridged VLANs with normalized VLAN tags, aggregated Ethernet links, bridge domains, Multiple Spanning Tree Protocol (MSTP), and integrated routing and bridging (IRB).
Network Interfaces	Provides an overview of the network interface functions of the JUNOS software and describes how to configure the network interfaces on the routing platform.
Network Management	Provides an overview of network management concepts and describes how to configure various network management features, such as SNMP and accounting options.
Policy Framework	Provides an overview of policy concepts and describes how to configure routing policy, firewall filters, and forwarding options.
Protected System Domain	Provides an overview of the JCS 1200 platform and the concept of Protected System Domains (PSDs). The JCS 1200 platform, which contains up to six redundant pairs of Routing Engines running JUNOS software, is connected to a T320 router or to a T640 or T1600 routing node. To configure a PSD, you assign any number of Flexible PIC concentrators (FPCs) in the T-series routing platform to a pair of Routing Engines on the JCS 1200 platform. Each PSD has the same capabilities and functionality as a physical router, with its own control plane, forwarding plane, and administration.
Routing Protocols	Provides an overview of routing concepts and describes how to configure routing, routing instances, and unicast routing protocols.
Secure Configuration Guide for Common Criteria and JUNOS-FIPS	Provides an overview of secure Common Criteria and JUNOS-FIPS protocols for the JUNOS software and describes how to install and configure secure Common Criteria and JUNOS-FIPS on a routing platform.
Services Interfaces	Provides an overview of the services interfaces functions of the JUNOS software and describes how to configure the services interfaces on the router.
Software Installation and Upgrade Guide	Describes the JUNOS software components and packaging and explains how to initially configure, reinstall, and upgrade the JUNOS system software. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
Subscriber Access	Provides an overview of the subscriber access features of the JUNOS software and describes how to configure subscriber access support on the router, including dynamic profiles, class of service, AAA, and access methods.
System Basics	Describes Juniper Networks routing platforms and explains how to configure basic system parameters, supported protocols and software processes, authentication, and a variety of utilities for managing your router on the network.

Table 3: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
VPNs	Provides an overview and describes how to configure Layer 2 and Layer 3 virtual private networks (VPNs), virtual private LAN service (VPLS), and Layer 2 circuits. Provides configuration examples.
JUNOS References	
Hierarchy and RFC Reference	Describes the JUNOS configuration mode commands. Provides a hierarchy reference that displays each level of a configuration hierarchy, and includes all possible configuration statements that can be used at that level. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
Interfaces Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot interfaces.
Routing Protocols and Policies Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot routing policies and protocols, including firewall filters.
System Basics and Services Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot system basics, including commands for real-time monitoring and route (or path) tracing, system software management, and chassis management. Also describes commands for monitoring and troubleshooting services such as class of service (CoS), IP Security (IPSec), stateful firewalls, flow collection, and flow monitoring.
System Log Messages Reference	Describes how to access and interpret system log messages generated by JUNOS software modules and provides a reference page for each message.
J-Web User Guide	
J-Web Interface User Guide	Describes how to use the J-Web graphical user interface (GUI) to configure, monitor, and manage Juniper Networks routing platforms.
JUNOS API and Scripting Documentation	
JUNOScript API Guide	Describes how to use the JUNOScript application programming interface (API) to monitor and configure Juniper Networks routing platforms.
JUNOS XML API Configuration Reference	Provides reference pages for the configuration tag elements in the JUNOS XML API.
JUNOS XML API Operational Reference	Provides reference pages for the operational tag elements in the JUNOS XML API.
NETCONF API Guide	Describes how to use the NETCONF API to monitor and configure Juniper Networks routing platforms.

Table 3: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
JUNOS Configuration and Diagnostic Automation Guide	Describes how to use the commit script and self-diagnosis features of the JUNOS software. This guide explains how to enforce custom configuration rules defined in scripts, how to use commit script macros to provide simplified aliases for frequently used configuration statements, and how to configure diagnostic event policies.
Hardware Documentation	
Hardware Guide	Describes how to install, maintain, and troubleshoot routing platforms and components. Each platform has its own hardware guide.
PIC Guide	Describes the routing platform's Physical Interface Cards (PICs). Each platform has its own PIC guide.
DPC Guide	Describes the Dense Port Concentrators (DPCs) for all MX-series routers.
JUNOScope Documentation	
JUNOScope Software User Guide	Describes the JUNOScope software graphical user interface (GUI), how to install and administer the software, and how to use the software to manage routing platform configuration files and monitor routing platform operations.
Advanced Insight Solutions (AIS) Documentation	
Advanced Insight Solutions Guide	Describes the Advanced Insight Manager (AIM) application, which provides a gateway between JUNOS devices and Juniper Support Systems (JSS) for case management and intelligence updates. Explains how to run AI scripts on Juniper Networks devices.
J-series Routing Platform Documentation	
Getting Started Guide	Provides an overview, basic instructions, and specifications for J-series routing platforms. The guide explains how to prepare your site for installation, unpack and install the router and its components, install licenses, and establish basic connectivity. Use the *Getting Started Guide* for your router model.
Basic LAN and WAN Access Configuration Guide	Explains how to configure the interfaces on J-series Services Routers for basic IP routing with standard routing protocols, ISDN backup, and digital subscriber line (DSL) connections.
Advanced WAN Access Configuration Guide	Explains how to configure J-series Services Routers in virtual private networks (VPNs) and multicast networks, configure data link switching (DLSw) services, and apply routing techniques such as policies, stateless and stateful firewall filters, IP Security (IPSec) tunnels, and class-of-service (CoS) classification for safer, more efficient routing.
Administration Guide	Shows how to manage users and operations, monitor network performance, upgrade software, and diagnose common problems on J-series Services Routers.
Release Notes	

Table 3: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
JUNOS Release Notes	Summarize new features and known problems for a particular software release, provide corrections and updates to published JUNOS, JUNOScript, and NETCONF manuals, provide information that might have been omitted from the manuals, and describe upgrade and downgrade procedures.
Hardware Release Notes	Describe the available documentation for the routing platform and summarize known problems with the hardware and accompanying software. Each platform has its own release notes.
JUNOScope Release Notes	Contain corrections and updates to the published JUNOScope manual, provide information that might have been omitted from the manual, and describe upgrade and downgrade procedures.
AIS Release Notes	Summarize AIS new features and guidelines, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide initial setup, upgrade, and downgrade procedures.
AIS AI Script Release Notes	Summarize AI Scripts new features, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide instructions for automatic and manual installation, including deleting and rolling back.
J-series Services Router Release Notes	Briefly describe Services Router features, identify known hardware problems, and provide upgrade and downgrade instructions.

Table 4: JUNOS Software Network Operations Guides

Book	Description
Baseline	Describes the most basic tasks for running a network using Juniper Networks products. Tasks include upgrading and reinstalling JUNOS software, gathering basic system management information, verifying your network topology, and searching log messages.
Interfaces	Describes tasks for monitoring interfaces. Tasks include using loopback testing and locating alarms.
MPLS	Describes tasks for configuring, monitoring, and troubleshooting an example MPLS network. Tasks include verifying the correct configuration of the MPLS and RSVP protocols, displaying the status and statistics of MPLS running on all routing platforms in the network, and using the layered MPLS troubleshooting model to investigate problems with an MPLS network.
MPLS Log Reference	Describes MPLS status and error messages that appear in the output of the show mpls lsp extensive command. The guide also describes how and when to configure Constrained Shortest Path First (CSPF) and RSVP trace options, and how to examine a CSPF or RSVP failure in a sample network.

Table 4: JUNOS Software Network Operations Guides *(continued)*

Book	Description
MPLS Fast Reroute	Describes operational information helpful in monitoring and troubleshooting an MPLS network configured with fast reroute (FRR) and load balancing.
Hardware	Describes tasks for monitoring M-series and T-series routing platforms.

To configure and operate a J-series Services Router or SRX-series services gateway running JUNOS software with enhanced services, you must also use the configuration statements and operational mode commands documented in JUNOS configuration guides and command references. To configure and operate a WX Integrated Services Module, you must also use WX documentation.

Table 5: JUNOS Software with Enhanced Services Documentation

Book	Description
All Platforms	
JUNOS Software Interfaces and Routing Configuration Guide	Explains how to configure J-series and SRX-series interfaces for basic IP routing with standard routing protocols, ISDN service, firewall filters (access control lists), and class-of-service (CoS) traffic classification.
JUNOS Software Security Configuration Guide	Explains how to configure and manage security services such as stateful firewall policies, IP Security (IPsec) virtual private networks (VPNs), firewall screens, Network Address Translation (NAT), Public Key Cryptography, and Application Layer Gateways (ALGs).
JUNOS Software Administration Guide	Shows how to monitor J-series and SRX-series devices and routing operations, firewall and security services, system alarms and events, and network performance. This guide also shows how to administer user authentication and access, upgrade software, and diagnose common problems.
JUNOS Software CLI Reference	Provides the complete JUNOS software with enhanced services configuration hierarchy and describes the configuration statements and operational mode commands not documented in the standard JUNOS manuals.
J-series Only	
JUNOS Software with Enhanced Services Design and Implementation Guide	Provides guidelines and examples for designing and implementing IP Security (IPsec) virtual private networks (VPNs), firewalls, and routing on J-series Services Routers running JUNOS software with enhanced services.
JUNOS Software with Enhanced Services Quick Start	Explains how to quickly set up a J-series Services Router. This document contains router declarations of conformity.

Table 5: JUNOS Software with Enhanced Services Documentation *(continued)*

Book	Description
JUNOS Software with Enhanced Services Hardware Guide	Provides an overview, basic instructions, and specifications for J-series Services Routers. This guide explains how to prepare a site, unpack and install the router, replace router hardware, and establish basic router connectivity. This guide contains hardware descriptions and specifications.
JUNOS Software with Enhanced Services Migration Guide	Provides instructions for migrating an SSG device running ScreenOS software or a J-series Services Router running the JUNOS software to JUNOS software with enhanced services.
WXC Integrated Services Module Installation and Configuration Guide	Explains how to install and initially configure a WXC Integrated Services Module in a J-series Services Router for application acceleration.
JUNOS Software with Enhanced Services Release Notes	Summarizes new features and known problems for a particular release of JUNOS software with enhanced services on J-series Services Routers, including J-Web interface features and problems. The release notes also contain corrections and updates to the manuals and software upgrade and downgrade instructions for JUNOS software with enhanced services.
SRX-series Only	
JUNOS Software for SRX-series Services Gateway Release Notes	Summarize new features and known problems for a particular release of JUNOS software with enhanced services on SRX-series Secure Services Routers, including J-Web interface features and problems. The release notes also contain corrections and updates to the manuals and software upgrade and downgrade instructions for JUNOS software with enhanced services.

Table 6: Additional Books Available Through http://www.juniper.net/books

Book	Description
Interdomain Multicast Routing	Provides background and in-depth analysis of multicast routing using Protocol Independent Multicast sparse mode (PIM SM) and Multicast Source Discovery Protocol (MSDP); details any-source and source-specific multicast delivery models; explores multiprotocol BGP (MBGP) and multicast IS-IS; explains Internet Gateway Management Protocol (IGMP) versions 1, 2, and 3; lists packet formats for IGMP, PIM, and MSDP; and provides a complete glossary of multicast terms.
JUNOS Cookbook	Provides detailed examples of common JUNOS software configuration tasks, such as basic router configuration and file management, security and access control, logging, routing policy, firewalls, routing protocols, MPLS, and VPNs.
MPLS-Enabled Applications	Provides an overview of Multiprotocol Label Switching (MPLS) applications (such as Layer 3 virtual private networks [VPNs], Layer 2 VPNs, virtual private LAN service [VPLS], and pseudowires), explains how to apply MPLS, examines the scaling requirements of equipment at different points in the network, and covers the following topics: point-to-multipoint label switched paths (LSPs), DiffServ-aware traffic engineering, class of service, interdomain traffic engineering, path computation, route target filtering, multicast support for Layer 3 VPNs, and management and troubleshooting of MPLS networks.

Table 6: Additional Books Available Through http://www.juniper.net/books *(continued)*

Book	Description
OSPF and IS-IS: Choosing an IGP for Large-Scale Networks	Explores the full range of characteristics and capabilities for the two major link-state routing protocols: Open Shortest Path First (OSPF) and IS-IS. Explains architecture, packet types, and addressing; demonstrates how to improve scalability; shows how to design large-scale networks for maximum security and reliability; details protocol extensions for MPLS-based traffic engineering, IPv6, and multitopology routing; and covers troubleshooting for OSPF and IS-IS networks.
Routing Policy and Protocols for Multivendor IP Networks	Provides a brief history of the Internet, explains IP addressing and routing (Routing Information Protocol [RIP], OSPF, IS-IS, and Border Gateway Protocol [BGP]), explores ISP peering and routing policies, and displays configurations for both Juniper Networks and other vendors' routers.
The Complete IS-IS Protocol	Provides the insight and practical solutions necessary to understand the IS-IS protocol and how it works by using a multivendor, real-world approach.

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- Document name
- Document part number
- Page number
- Software release version (not required for *Network Operations Guides [NOGs])*

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

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at http://www.juniper.net/customers/support/downloads/710059.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
- JTAC Hours of Operation —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
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To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool located at https://tools.juniper.net/SerialNumberEntitlementSearch/.

Opening a Case with JTAC

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

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

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

Part 1
Managing Access Networks

Chapter 1

Subscriber Access Overview

Subscriber Access Overview

The JUNOS subscriber access 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 act 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 once 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.

Subscriber Access Terms and Acronyms

Table 7 on page 4 defines terms and acronyms that are used in this discussion of subscriber access.

Table 7: Subscriber Access Terms and Acronyms

Term	Definition
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.
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.
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.

Related Topics

- Subscriber Access Environment on page 4
- Subscriber Access Licensing Overview on page 6
- Subscriber Access Operation Flow on page 6
- Configuring Subscriber Access on page 8

Subscriber Access Environment

A subscriber access environment can include various components, including subscriber access and authentication protocols.

The subscriber access protocols include:

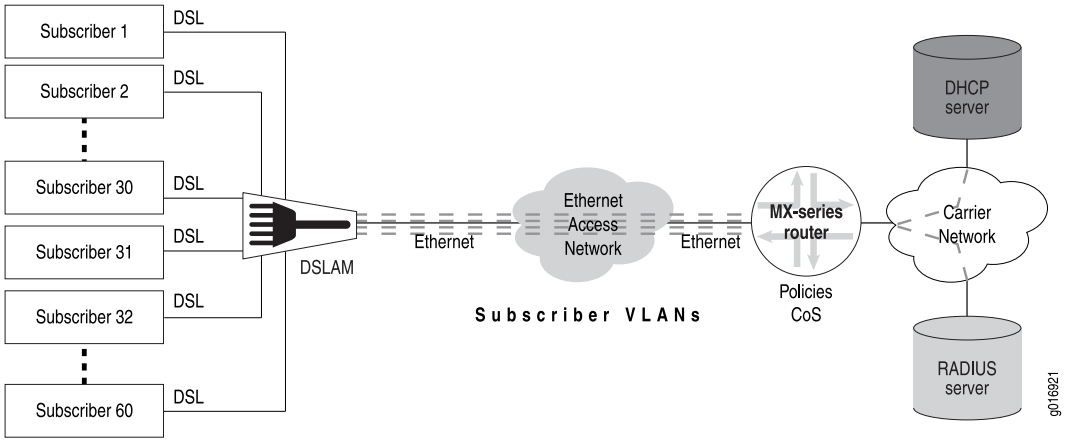
- Dynamic Host Configuration Protocol (DHCP) server
  - Local DHCP server
  - External DHCP server

The subscriber authentication protocols include the RADIUS server.

In addition to these components, a subscriber access environment would also include various access protocols (for example, DHCP) and might use local authentication instead of authenticating clients through a RADIUS server.

Figure 1 on page 5 shows an example of a basic subscriber access network.

Figure 1: Subscriber Access Network Example



Related Topics
- Subscriber Access Overview on page 3

Relationship Between Subscribers and Interfaces in an Access Network

To the router, a subscriber is an authenticated user. This release supports configurations of only one subscriber per logical interface. However, a subscriber can be either an individual, authenticated client or a group of clients on a single, authenticated VLAN.

Related Topics
- Subscriber Interface Overview on page 273

Subscriber Access Support Limitations

The subscriber access feature is limited to MX-series routers and the interfaces you can use when configuring dynamic profiles.

Platform Support

Even though many statements appear in the CLI for various other platforms, Juniper Networks supports subscriber access configuration only on MX-series routers.

Interface Support

In this release, you can use dynamic profiles to configure only statically created interfaces. To do so, you must first configure the interfaces on the router to which you expect clients to connect.

The subscriber access feature supports the following device types:

- GE -- Gigabit Ethernet

- XE -- 10–Gigabit Ethernet
- AE -- Aggregated Ethernet

Subscribers can be identified through a VLAN or a static IP demux interface on a supported device.

Related Topics

- Relationship Between Subscribers and Interfaces in an Access Network on page 5
- Configuring Subscriber Access on page 8

Subscriber Access Licensing Overview

To enable some JUNOS software features or router scaling levels, you might have to purchase, install, and manage separate software license packs. The presence on the router of the appropriate software license keys (passwords) determines whether you can configure and use certain features or configure a feature to a predetermined scale.

Related Topics

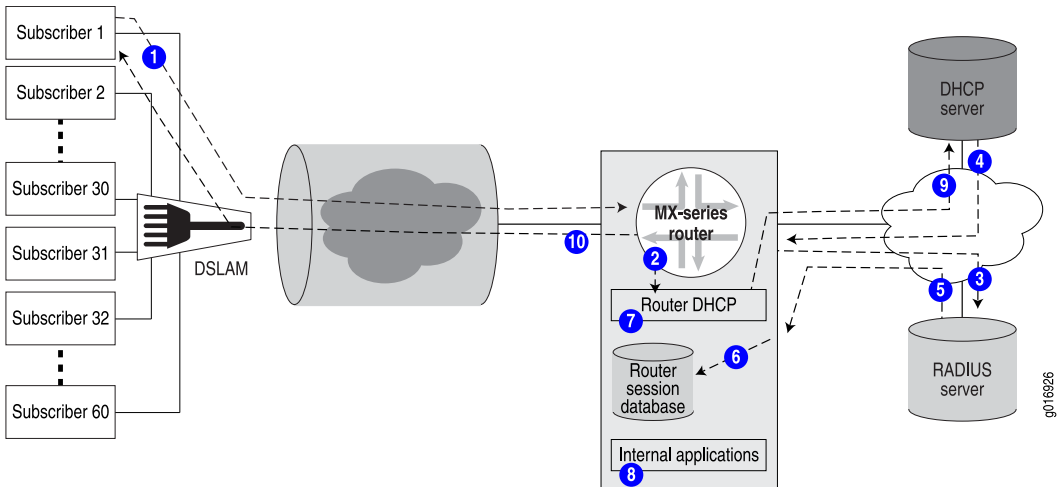
- For information about installing and managing JUNOS licenses, see the *JUNOS Software Installation and Upgrade Guide*

Subscriber Access Operation Flow

The subscriber access feature requires that a DHCP client send a DHCP discover message to the router interface to initialize dynamic configuration of that interface.

Figure 2 on page 6 shows the flow of operations that occur when the router is using DHCP relay to enable access for a subscriber.

Figure 2: Subscriber Access Operation Flow



The following general sequence occurs during access configuration for a DHCP client:

1. The client issues a DHCP discover message.
2. The router DHCP component recognizes the DHCP message and adds the client to the router session database.
3. If configured, the router issues an authorization request to the RADIUS server.
4. The DHCP server issues an IP address for the client. When the address is relayed, the address is added to the router session database.
5. RADIUS issues an authorization response to the router.
6. The router adds RADIUS authorization information to the router session database.
7. The router combines the dynamic profile with the RADIUS authorization information.
8. The router alerts all internal applications involved with the subscriber access (for example, routing protocols, dynamic firewall, and dynamic Class of Service).
9. The router passes the message through to the DHCP server.
10. The router DHCP component sends an acknowledgement back to the client.

The subscriber now has access to the network and the authorized service.

Related Topics

- Subscriber Access Overview on page 3
- Configuring Subscriber Access on page 8

Activating Subscribers and Managing Services in an Access Network

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 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 Internal Variables Used by Dynamic Profiles

The router contains several internal variables that enable dynamic association of interfaces and logical units to incoming subscriber requests. You must specify these internal variables in certain statements within a dynamic profile. When a client accesses the router, the dynamic profile configuration replaces the internal variable with the actual interface name or unit value for the interface the client is accessing.

The internal variables include:

- $junos-interface-ifd-name—Replaced with the actual interface device name.
- $junos-underlying-interface-unit—Replaced with the actual logical unit number.

Related Topics

- Dynamic Profiles Overview on page 245
- Subscriber Interface Overview on page 273

Configuring Subscriber Access

To configure subscriber access, perform the following tasks:

1. Configure the client access protocol.

   Configure one of the following DHCP access methods:

   - Configure DHCP local server.

     See “Extended DHCP Local Server Overview” on page 46.

   - Configure DHCP relay.

     See Configuring the Extended DHCP Relay Agent.

2. Configure subscriber authentication, accounting, and addressing.

a. Configure RADIUS:

1. Specify the RADIUS servers.

   See “Specifying the RADIUS Authentication and Accounting Servers for Subscriber Access” on page 21.

2. Specify any optional server attributes.

   See “Configuring RADIUS Server Options for Subscriber Access” on page 21.

3. (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” on page 27.

4. Configure subscriber accounting (RADIUS accounting).

   See “Configuring How Accounting Statistics Are Collected for Subscriber Access” on page 20.

b. Configure addressing:

- Configure address-assignment pools.

  See “Configuring Address-Assignment Pools” on page 37.

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

a. Configure a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 251.

b. Configure a dynamic profile for access.

   See “Configuring a Dynamic Profile for Client Access” on page 255.

c. Configure a dynamic profile for services.

   See “Configuring a Dynamic Profile for Various Levels of Services” on page 256.

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

   See “Configuring a Subscriber Interface with a Static VLAN Interface” on page 280.

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

   See “Associating Dynamic Profiles with Statically Created Interfaces” on page 280.

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

See “Modifying Dynamic Profiles” on page 257.

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

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

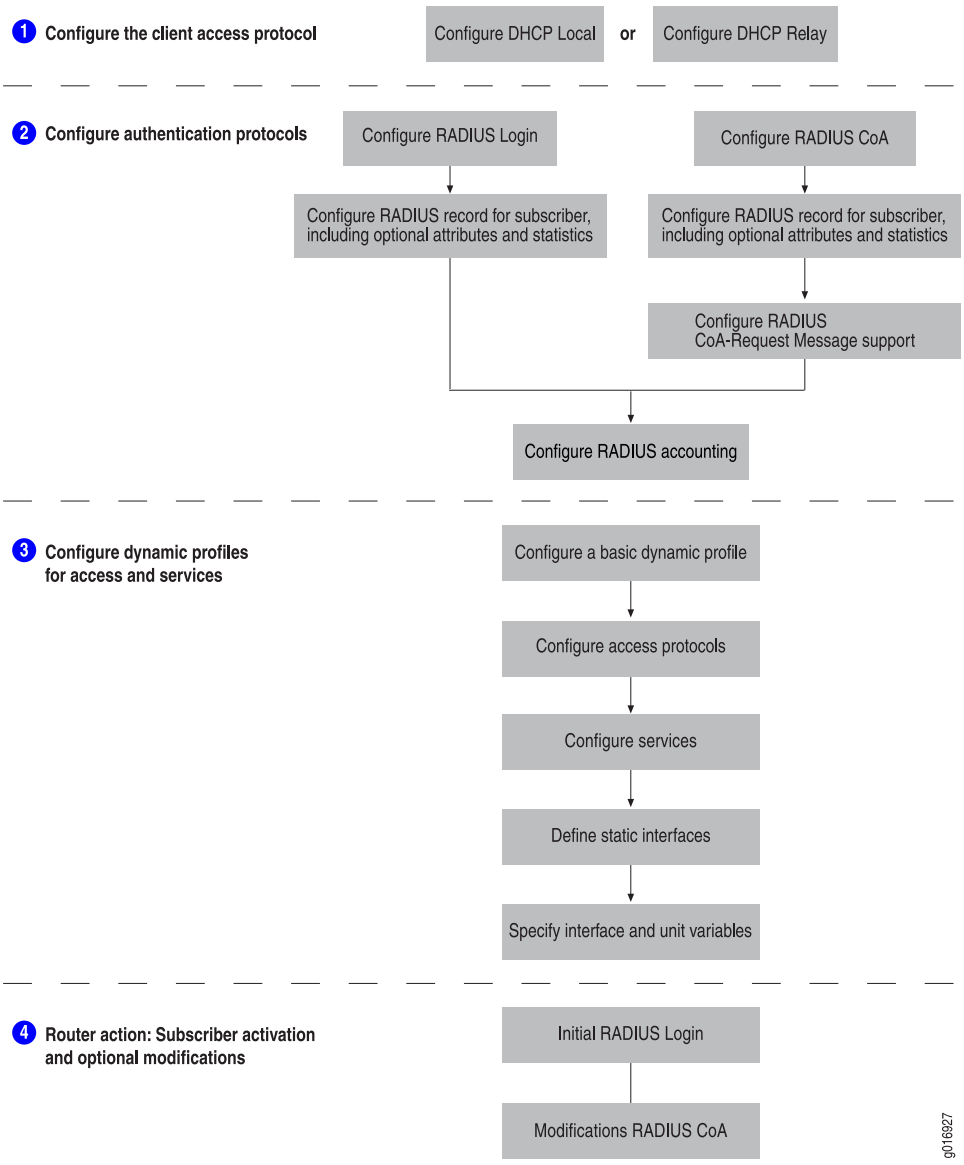
  See “Dynamic Service Activation During Login Overview” on page 25.

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

  See “RADIUS-Initiated Change of Authorization (CoA) Overview” on page 25.

Figure 3 on page 11 shows the configuration sequence you perform for subscriber access. It also shows the dynamic configuration performed by the router.

Figure 3: Subscriber Access Configuration Workflow



Related Topics

- Subscriber Access Overview on page 3
- Subscriber Access Support Limitations on page 5

Part 2
Subscriber Management

Chapter 2

Subscriber Management Overview

Subscriber Access Management Overview

The subscriber access management feature enables you to manage the subscribers that are allowed access to the network server, the services that authorized subscribers can use, and how accounting statistics are collected. The subscriber access management feature uses the AAA Service Framework to support the configuration and management of broadband subscriber access. You can statically configure different client types, such as DHCP-based subscribers, and specify the authentication, accounting, and service for the subscribers.

Chapter 3

Configuring the AAA Service Framework for Subscriber Access

AAA Service Framework Overview

The AAA Service Framework provides a single point of contact for all the authentication, authorization, accounting, address assignment, and dynamic request services that the router supports 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.

When interacting with external back-end RADIUS servers, the AAA Service Framework supports standard RADIUS attributes and Juniper Networks vendor specific attributes (VSAs). The AAA Service Framework also includes an integrated RADIUS client that is compatible with RADIUS servers that conform to RFC-2865, RFC-2866, and RFC-3576, and which can initiate requests.

You create the following types of configurations to manage subscriber access.

- Authentication—Authentication parameters defined in the access profile determine the authentication component of the AAA processing. For example, subscribers can be authenticated using an external authentication service such as RADIUS.
- Accounting— Accounting parameters in the access profile specify the accounting part of the AAA processing. For example, the parameters determine how the router collects and uses subscriber statistics.
- RADIUS-initiated dynamic requests—A list of authentication server IP addresses in the access profile specify the RADIUS servers that can initiate dynamic requests to the router. Dynamic requests include CoA requests, which specify VSA modifications and service changes, and disconnect requests, which terminate subscriber sessions. The list of authentication servers also provide RADIUS-based dynamic service activation and deactivation during subscriber login.
- Address assignment—The AAA Service Framework assigns addresses to subscribers based on the configuration of local address-assignment pools. For example, the AAA framework collaborates with RADIUS servers to assign addresses from the specified pools.

Related Topics

- RADIUS Authentication and Accounting for Subscriber Access Management
- Configuring Address-Assignment Pools on page 37

Router Interaction with RADIUS Servers Overview

To identify the RADIUS servers that the router can use and to configure how the router interacts with the servers, you include the radius-server statement at the [edit access] hierarchy level. You can specify multiple RADIUS servers on the network.

```
[edit access]
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
    secret password;
    sourceaddress source-address;
    timeout seconds;
}
```

The following list describes the radius-server configuration statements:

- *server-address*—The address of the RADIUS server to use. To configure more than one RADIUS server, include multiple *server-address* entries.
- accounting-port—The RADIUS server accounting port number. The default accounting port number is 1813.
- port-number—The port number used to contact the RADIUS server. The default is port number 1812.
- retry—The number of times that the router attempts to contact a RADIUS accounting server. You can configure the router to retry from 1 through 16 times. The default setting is 3 retry attempts.
- secret—The required secret (password) that the local router passes to the RADIUS client. Secrets can contain spaces.
- source-address—A source address for the RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address. The source address is a valid IPv4 address configured on one of the router interfaces.
- timeout—The length of time that the local router waits to receive a response from a RADIUS server. By default, the router waits 3 seconds. You can configure the timeout to be from 1 to 90 seconds.

Configuring Authentication and Accounting Parameters for Subscriber Access

You use an access profile to configure authentication and accounting support for the subscriber access management feature. The access profile enables you to specify the type of methods used for authentication and accounting. You can also configure how subscriber access management collects and uses accounting statistics.

Related Topics

- Specifying the Authentication and Accounting Methods for Subscriber Access on page 19
- Configuring How Accounting Statistics Are Collected for Subscriber Access on page 20

Specifying the Authentication and Accounting Methods for Subscriber Access

To specify the authentication and accounting methods that subscriber access management uses, you include the authentication-order statement and accounting order statements at the [edit access profile *profile-name*] hierarchy level.

```
[edit access profile profile-name]
authentication-order [ authentication-methods ]
}
accounting {
   order [ accounting-methods ];
}
```

You can configure multiple authentication and accounting methods—the authentication-order and accounting order statements specify the order in which the subscriber access management feature uses the methods. For example, an

authentication entry of radius none specifies that RADIUS authentication is performed first and, if it fails, no authentication (none) is done.

```
[edit access profile profile-name]
authentication-order radius none;
```

You can specify the following authentication methods:

- none—No authentication
- password—Local authentication
- radius—RADIUS-based authentication

You can specify the following accounting methods:

- radius—RADIUS-based accounting

Configuring How Accounting Statistics Are Collected for Subscriber Access

Include the accounting statement at the [edit access profile profile-name] hierarchy level to specify how the subscriber access management feature collects and uses accounting statistics.

```
[edit access profile profile-name]
accounting {
    accounting-stop-on-access-deny;
    accounting-stop-on-failure;
    order [ accounting-method ];
    statistics (time);
    update-interval minutes;
}
```

The following list describes the accounting statements:

- accounting-stop-on-access-deny—Configures AAA to issue an Acct-Stop message if the AAA server denies access to the subscriber.
- accounting-stop-on-failure—Configures the AAA servers to send an Acct-Stop message if the subscriber fails AAA but is granted access by the AAA-server.
- order—The order in which multiple accounting methods are used. For example, an entry of radius specifies that the router use RADIUS accounting and, if that fails, no accounting is performed.
- statistics—The types of statistics to gather. Currently, only time statistics are gathered.
- update-interval—Configures the number of minutes between accounting updates. You can configure an interval from 10 to 1440 minutes. If you specify an interval between 10 and 15, the interval is rounded up to 15.

Configuring RADIUS Server Parameters for Subscriber Access

Include the radius statement at the [edit access profile *profile-name*] hierarchy level to specify the RADIUS parameters for the subscriber access manager feature. You can specify the IP addresses of the RADIUS servers used for authentication and accounting, options that provide configuration information for the RADIUS servers, and how RADIUS attributes are used.

- Specifying the RADIUS Authentication and Accounting Servers for Subscriber Access on page 21
- Configuring RADIUS Server Options for Subscriber Access on page 21
- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 22

Specifying the RADIUS Authentication and Accounting Servers for Subscriber Access

To specify one or more RADIUS authentication or accounting servers to use for subscriber access management, include the authentication-server and accounting-server statements at the [edit access profile profile-name radius] hierarchy level. You must specify the IP address for the authentication or accounting server.

```
[edit access profile profile-name radius]
authentication-server [ ip-address ];
accounting-server [ ip-address ];
```

To configure multiple RADIUS authentication or accounting servers, include multiple *ip-address* entries, for example:

```
[edit access profile profile-name radius]
authentication-server 192.168.1.1 192.168.1.2 192.168.1.3;
accounting-server 192.168.1.1 192.168.1.3 192.168.1.4;
```

Configuring RADIUS Server Options for Subscriber Access

Include the options statement at the [edit access profile *profile-name* radius] hierarchy level to specify the options used by the RADIUS authentication and accounting servers.

```
[edit access profile profile-name radius]
options {
    accounting-session-id-format (decimal | description);
    ethernet-port-type-virtual;
    interface-description-format [sub-interface | adapter];
    nas-identifier identifier-value;
    nas-port-extended-format {
        adapter-width width;
        port-width width;
        slot-width width;
        stacked-vlan-width width;
        vlan-width width;
    }
    override-nas-information;
    revert-interval interval;
    vlan-nas-port-stacked-format;
}
```

The following list describes the accounting options:

- accounting-session-id-format—The format the router uses to identify the accounting session. The identifier can be in one of the following formats. The router uses decimal format by default.
  - decimal—For example, 435264
  - description—In the format, jnpr *interface-specifier*:*subscriber-session-id*. For example, jnpr fastEthernat 3/2.6:1010101010101
- ethernet-port-type-virtual—The physical port type the router uses to authenticate clients. The port type is passed in RADIUS attribute 61 (NAS-Port-Type). This statement specifies a port type of virtual; by default the router passes a port type of ethernet in RADIUS attribute 61.
- interface-description-format—The information that is included in or omitted from the interface description that the router passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the router includes both the subinterface and the adapter in the interface description.
- nas-identifier—The value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests. You can specify a string in the range 1 to 64 characters.
- nas-port-extended-format—Configures the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.
  - adapter-width *width*—Number of bits in the adapter field.
  - port-width *width*—Number of bits in the port field.
  - slot-width *width*—Number of bits in the slot field.
  - stacked-vlan-width *width*—Number of bits in the SVLAN ID field.
  - vlan-width *width*—Number of bits in the VLAN ID field.
- revert-interval—The amount of time that the router waits after a server has become unreachable. The router rechecks the connection to the server when the revert-interval expires. If the server is then reachable, it is used in accordance with the order of the server list.
- vlan-nas-port-stacked-format—Configures RADIUS attribute 5 (NAS-Port) to include the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

Configuring How RADIUS Attributes Are Used for Subscriber Access

Include the attributes statement at the [edit access profile *profile-name* radius] hierarchy level to specify attributes that are ignored in RADIUS Access-Accept messages, or that are excluded from particular RADIUS message types.

```
[edit access profile profile-name radius]
attributes {
   ignore {
      framed-ip-netmask;
      input-filter;
```

```
        logical-system:routing-instance;
        output-filter;
    }
    exclude
        accounting-authentic [ accounting-on | accounting-off ];
        accounting-delay-time [ accounting-on | accounting-off ];
        accounting-session-id [ access-request | accounting-on | accounting-off |
            accounting-stop ];
        accounting-terminate-cause [ accounting-off ];
        called-station-id [ access-request | accounting-start | accounting-stop ];
        calling-station-id [ access-request | accounting-start | accounting-stop ];
        class [ accounting-start | accounting-stop ];
        dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
        dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
        output-filter [ accounting-start | accounting-stop ];
        event-timestamp [ accounting-on | accounting-off | accounting-start |
            accounting-stop ];
        framed-ip-address [ accounting-start | accounting-stop ];
        framed-ip-netmask [ accounting-start | accounting-stop ];
        input-filter [ accounting-start | accounting-stop ];
        input-gigapackets [ accounting-stop ];
        input-gigawords [ accounting-stop ];
        interface-description [ access-request | accounting-start | accounting-stop ];
        nas-identifier [ access-request | accounting-on | accounting-off | accounting-start
            | accounting-stop ];
        nas-port [ access-request | accounting-start | accounting-stop ];
        nas-port-id [ access-request | accounting-start | accounting-stop ];
        nas-port-type [ access-request | accounting-start | accounting-stop ];
        output-gigapackets [ accounting-stop ];
        output-gigawords [ accounting-stop ];
    }
}
```

The following list describes the ignore and exclude statements:

- Use the **ignore** statement to configure the router to ignore a particular attribute in RADIUS Access-Accept messages. By default, the router processes the attributes received from the external AAA server. You can specify that the following attributes are ignored:
  - **framed-ip-netmask**—Framed-Ip-Netmask, RADIUS attribute 9
  - **input-filter**—Ingress-Policy-Name, VSA 26-10
  - **logical-system:routing-instance**—Virtual-Router, VSA 26-1
  - **output-filter**—Egress-Policy-Name, VSA 26-11
- Use the **exclude** statement to configure the router to exclude the specified attributes from the specified type of RADIUS message. Not all attributes appear in all types of RADIUS messages—the CLI indicates the RADIUS message type. By default, the router includes the specified attributes in RADIUS Access-Request, Acct-On, Acct-Off, Acct-Start, and Acct-Stop messages. You can configure the router to exclude the following attributes:
  - **accounting-authentic**—RADIUS attribute 45, Acct-Authentic
  - **accounting-delay-time**—RADIUS attribute 41, Acct-Delay-Time

- accounting-session-id—RADIUS attribute 44, Acct-Session-Id
- accounting-terminate-cause—RADIUS attribute 49, Acct-Terminate-Cause
- called-station-id—RADIUS attribute 30, Called-Station-Id
- calling-station-id—RADIUS attribute 31, Calling-Station-Id
- class—RADIUS attribute 25, Class
- dhcp-gi-address—Juniper VSA 26-57, DHCP-GI-Address
- dhcp-mac-address—Juniper VSA 26-56, DHCP-MAC-Address
- event-timestamp—RADIUS attribute 55, Event-Timestamp
- framed-ip-address—RADIUS attribute 8, Framed-IP-Address
- framed-ip-netmask—RADIUS attribute 9, Framed-IP-Netmask
- input-filter—Juniper VSA 26-10, Ingress-Policy-Name
- input-gigapackets—Juniper VSA 26-42, Acct-Input-Gigapackets
- input-gigawords—RADIUS attribute 52, Acct-Input-Gigawards
- interface-description—Juniper VSA 26-53, Interface-Desc
- nas-identifier—RADIUS attribute 32, NAS-Identifier
- nas-port—RADIUS attribute 5, NAS-Port
- nas-port-id—RADIUS attribute 87, NAS-Port-Id
- nas-port-type—RADIUS attribute 61, NAS-Port-Type
- output-filter—Juniper VSA 26-11, Egress-Policy-Name
- output-gigapackets—Juniper VSA 25-43, Acct-Output-Gigapackets
- output-gigawords—RADIUS attribute 53, Acct-Output-Gigawords

Using RADIUS Dynamic Requests for Subscriber Access Management

RADIUS dynamic requests provide an efficient way to centrally manage subscriber sessions. The AAA Service Framework's RADIUS dynamic request support allows RADIUS servers to initiate user-related operations, such as a termination operation, by sending unsolicited request messages to the router. Without the RADIUS dynamic request feature, the only way to disconnect a RADIUS user is from the router, which can be cumbersome and time-consuming in large networks.

In a typical client-server RADIUS environment, the router functions as the client and initiates requests sent to the remote RADIUS server. However, when using RADIUS dynamic requests, the roles are reversed. For example, during a disconnect operation, the remote RADIUS server performs as the client and initiates the request (the disconnect action) — the router functions as the server in the relationship.

You create an access profile to configure the router to support RADIUS dynamic requests. This configuration enables the router to receive and act on the following types of messages from remote RADIUS servers:

- Access-Accept messages—Dynamically activate services based on attributes in RADIUS Access-Accept messages received when a subscriber logs in.
- Change-of-Authorization (CoA) messages—Dynamically modify active sessions based on attributes in CoA messages. CoA messages can include service creation requests, deletion requests, RADIUS attributes, and Juniper Networks VSAs.
- Disconnect messages—Immediately terminate specific subscriber sessions.

Related Topics

- Dynamic Service Activation During Login Overview on page 25
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 25
- RADIUS-Initiated Disconnect Overview on page 26
- Configuring RADIUS-Initiated Dynamic Request Support on page 27
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 28
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 34

Dynamic Service Activation During Login Overview

The AAA Service Framework enables the router to dynamically activate subscriber services as part of a subscriber login operation.

The framework sets up the subscriber session and then completes the service action specified by the Juniper Networks VSA 26–65 that is received in the Access-Accept message. If the service request is unsuccessful, the framework logs out the subscriber.

RADIUS-Initiated Change of Authorization (CoA) Overview

The AAA Service Framework uses CoA messages to dynamically modify active subscriber sessions. For example, RADIUS attributes in CoA messages might instruct the framework to create, modify, or terminate a subscriber service.

CoA Messages

Dynamic request support enables the router to receive and process unsolicited CoA messages from external RADIUS servers. RADIUS-initiated CoA messages use the following codes in request and response messages:

- CoA-Request (43)
- CoA-ACK (44)
- CoA-NAK (45)

Qualifications for Change of Authorization

To complete the change of authorization for a user, the CoA-Request must contain the two RADIUS attributes shown in the following list to uniquely identify subscribers. The request must also include the appropriate VSA shown in the following list to perform the required operation. The AAA Service Framework handles the actual request.

- User-Name [attribute 1]
- Acct-Session-ID [attribute 44]
- Activate-Service [VSA 26–65]
- Deactivate-Service [VSA 26–66]

NOTE: If only the User-Name attribute is included in the CoA-Request, the router uses the first match for the username.

Message Exchange

The RADIUS server and the AAA Service Framework on the router exchange messages using UDP. The CoA-Request message sent by the RADIUS server has the same format as the Disconnect-Request packet that is sent for a disconnect operation.

The response is either a CoA-ACK or a CoA-NAK message:

- If the AAA Service Framework successfully changes the authorization, the response is a RADIUS-formatted packet with a CoA-ACK message, and the data filter is applied to the session.
- If AAA Service Framework is unsuccessful, the request is malformed, or attributes are missing, the response is a RADIUS-formatted packet with a CoA-NAK message.

NOTE: The AAA Service Framework processes one dynamic request at a time per subscriber. If the framework receives a second dynamic request (either another CoA or a Disconnect-Request) while processing a previous requrest for the same subscriber, the framework responds with a CoA-NAK message.

RADIUS-Initiated Disconnect Overview

This section describes the AAA Service Framework's support for RADIUS-initiated disconnect dynamic requests. The AAA Service Framework uses disconnect messages to dynamically terminate active subscriber sessions.

Disconnect Messages

To centrally control the disconnection of remote access subscribers, the RADIUS dynamic request feature on the router receives and processes unsolicited messages from RADIUS servers.

The dynamic request feature uses the existing format of RADIUS disconnect request and response messages. RADIUS-initiated disconnect uses the following codes in its RADIUS request and response messages:

- Disconnect-Request (40)
- Disconnect-ACK (41)
- Disconnect-NAK (42)

Qualifications for Disconnect

For the AAA Service Framework to disconnect a user, the Disconnect-Request message must contain an attribute with an accounting session ID. The Disconnect-Request message can contain an Acct-Session-Id (44) attribute or an Acct-Multi-Session-Id (50) attribute for the session ID or both. If both the Acct-Session-Id and Acct-Multi-Session-Id attributes are present in the request, the router uses both attributes. If the User-Name (1) attribute is also present in the request, the username and accounting session ID are used to perform the disconnection. The AAA Service Framework handles the actual request.

Message Exchange

The RADIUS server and the AAA Service Framework exchange messages using UDP. The Disconnect-Request message sent by the RADIUS server has the same format as the CoA-Request packet that is sent for a change of authorization operation.

The disconnect response is either a Disconnect-ACK or a Disconnect-NAK message:

- If the AAA Service Framework successfully disconnects the user, the response is a RADIUS-formatted packet with a Disconnect-ACK message.
- If the AAA Service Framework cannot disconnect the user, the request is malformed, or attributes are missing from the request, the response is a RADIUS-formatted packet with a Disconnect-NAK message.

NOTE: The AAA Service Framework processes one dynamic request at a time per subscriber. If the framework receives a second dynamic request while processing a previous request (either a CoA or another Disconnect-Request) for the same subscriber, the framework responds with a Disconnect-NAK message.

Configuring RADIUS-Initiated Dynamic Request Support

To configure RADIUS dynamic request support, include the authentication-server statement at the [edit access profile profile-name radius] hierarchy level. The router

uses this list of specified servers for both authentication and dynamic request operations. The router listens on UDP port 3799 for dynamic requests.

```
[edit access profile profile-name radius]
authentication-server [ ip-address ]
```

To configure the router to support dynamic requests from more than one RADIUS server, include multiple *ip-address* entries, for example:

```
authentication-server 192.168.1.3 192.168.10.15;
```

Related Topics

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 24
- Dynamic Service Activation During Login Overview on page 25
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 25
- RADIUS-Initiated Disconnect Overview on page 26
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 28
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 34

Verifying and Managing the RADIUS Dynamic-Request Feature

To display statistics for RADIUS dynamic requests on the router, use the following operational command:

- show network-access aaa statistics dynamic-requests

For information about using this operational command, see the *JUNOS System Basics and Services Command Reference*.

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

The AAA Service Framework supports RADIUS attributes and vendor-specific attributes (VSAs)—this support provides tunable parameters that the subscriber access management feature uses when creating subscribers and services.

RADIUS attributes are carried as part of standard RADIUS request and reply messages. The subscriber management access feature uses the RADIUS attributes to exchange specific authentication, authorization and accounting information. VSAs allow the subscriber access management feature to pass implementation-specific information that provide extended capabilities, such as service activation or deactivation, and enabling and disabling filters.

The following tables list the RADIUS attributes and Juniper Networks VSAs that the AAA service frameworks supports:

- RADIUS IETF Attributes Supported by the AAA Service Framework on page 29
- Juniper Networks VSAs Supported by the AAA Service Framework on page 32

RADIUS IETF Attributes Supported by the AAA Service Framework

Table 8 on page 29 describes the RADIUS IETF attributes supported by the JUNOS software AAA Service Framework.

Table 8: Supported RADIUS IETF Attributes

Attribute Number	Attribute Name	Description
1	User-Name	■ Name of user to be authenticated ■ Configurable username override
2	User-Password	■ Password of user to be authenticated Password Authentication Protocol (PAP) ■ Configurable password override ■ Password Authentication Protocol (PAP)
4	NAS-IP-Address	IP address of the network access server (NAS) that is requesting authentication of the user
5	NAS-Port	Physical port number of the NAS that is authenticating the user
6	Service-Type	Type of service the user has requested or the type of service to be provided
8	Framed-IP-Address	■ IP address to be configured for the user ■ 0.0.0.0 or absence is interpreted as 255.255.255.254
9	Framed-IP-Netmask	■ IP network to be configured for the user when the user is a router to a network ■ Absence implies 255.255.255.255
11	Filter-ID	■ Name of the filter list for the user ■ Interpreted as input policy name
18	Reply-Message	■ Text that may be displayed to the user ■ Only the first instance of this attribute is used
22	Framed-Route	String that provides routing information to be configured for the user on the NAS; in the format: <addr>[/<maskLen>] [<nexthop> [<cost>]] (tag <tagValue>) [distance <distValue>]
25	Class	An arbitrary value that the NAS includes in all accounting packets for the user if supplied by the RADIUS server
27	Session-Timeout	Maximum number of consecutive seconds of service to be provided to the user before termination of the session
32	NAS-Identifier	Identifies the NAS originating the request

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description
40	Acct-Status-Type	Indicates whether this Accounting-Request marks the beginning of the user service (Start), the end (Stop), or the interim (Interim-Update)
41	Acct-Delay-Time	Indicates how many seconds the client has been trying to send a particular record
42	Acct-Input-Octets	Indicates how many octets have been received from the port during the time this service has been provided
43	Acct-Output-Octets	Indicates how many octets have been sent to the port during the time this service has been provided
44	Acct-Session-ID	Unique accounting identifier that makes it easy to match start and stop records in a log file. The identifier can be in one of the following formats: ■ decimal—For example, 435264 ■ description—In the generic format, jnpr *interface-specifier*:*subscriber-session-id*; Ffor example, jnpr fastEthernat 3/2.6:1010101010101
45	Acct-Authentic	Indicates how the user was authenticated: whether by RADIUS, the NAS itself, or another remote authentication protocol
46	Acct-Session-Time	Indicates how long in seconds that the user has received service
47	Acct-Input-Packets	Indicates how many packets have been received from the port during the time this service has been provided to a framed user
48	Acct-Output-Packets	Indicates how many packets have been sent to the port in the course of delivering this service to a framed user

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description
49	Acct-Terminate-Cause	Contains the reason the service (a PPP session) was terminated. The service can be terminated for the following reasons: ■ User Request (1)—User initiated the disconnect (log out) ■ Idle Timeout (4)—Idle timer has expired ■ Session Timeout (5)—Client reached the maximum continuous time allowed on the service or session ■ Admin Reset (6)—System administrator terminated the session ■ Port Error (8)—PVC failed; no hardware or no interface ■ NAS Error (9)—Negotiation failures, connection failures, or address lease expiration ■ NAS Request (10)—PPP challenge timeout, PPP request timeout, tunnel establishment failure, PPP bundle failure, IP address lease expiration, PPP keep-alive failure, Tunnel disconnect, or an unaccounted-for error
52	Acct-Input-Gigawords	Indicates how many times the Acct-Input-Octets counter has wrapped around 2^32 during the time this service has been provided. Can be present in Accounting-Request records only where the Acct-Status-Type is set to Stop or Interim-Update
53	Acct-Output-Gigawords	Indicates how many times the Acct-Output-Octets counter has wrapped around 2^32 in the course of delivering this service. Can be present in Accounting-Request records only where the Acct-Status-Type is set to Stop or Interim-Update
55	Event-Timestamp	Records the time that this event occurred on the NAS, in seconds, since January 1, 1970 00:00 UTC
61	NAS-Port-Type	Indicates the type of physical port the NAS is using to authenticate the user
85	Acct-Interim-Interval	Number of seconds between each interim accounting update for this session
87	NAS-Port-ID	Text string that identifies the physical interface of the NAS that is authenticating the user
88	Framed-Pool	Name of an assigned address pool that should be used to assign an address for the user

Juniper Networks VSAs Supported by the AAA Service Framework

Table 9 on page 32 describes Juniper Networks VSAs supported by the JUNOS software AAA Service Framework. The AAA Service Framework uses vendor ID 4874, which is assigned to Juniper Networks by the Internet Assigned Numbers Authority (IANA).

Table 9: Supported Juniper Networks VSAs

Attribute Number	Attribute Name	Description	Value
26-4	Primary-DNS	Client DNS address negotiated during IPCP	integer: 4–byte primary-dns-address
26-5	Secondary-DNS	Client DNS address negotiated during IPCP	integer: 4–byte secondary-dns-address
26-6	Primary-WINS	Client WINS (NBNS) address negotiated during IPCP	integer: 4–byte primary-wins-address
26-7	Secondary-WINS	Client WINS (NBNS) address negotiated during IPCP	integer: 4–byte secondary-wins-address
26-10	Ingress-Policy-Name	Input policy name to apply to client interface	string: input-policy-name
26-11	Egress-Policy-Name	Output policy name to apply to client interface	string: output-policy-name
26-12	Ingress-Statistics	Enable or disable input statistics on client interface	integer: ■ 0 = disable ■ 1 = enable
26-13	Egress-Statistics	Enable or disable output statistics on client interface	integer: ■ 0 = disable ■ 1 = enable
26-23	IGMP-Enable	Enable or disable IGMP on a client interface	integer: ■ 0 = disable ■ 1 = enable
26-34	Framed-IP-Route-Tag	Route tag to apply to returned framed-ip-address	integer: 4–octet
26-42	Input-Gigapackets	Number of times input-packets attribute rolls over its 4-octet field	integer

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value
26-43	Output-Gigapackets	Number of times output-packets attribute rolls over its 4-octet field	integer
26-56	DHCP-MAC-Address	Client MAC address	string: mac-address
26-57	DHCP-GI-Address	DHCP relay agent IP address	integer: 4–octet
26-63	Interface	Text string that identifies the subscriber's access interface	string: interface-description
26-65	Activate-Service	Service to activate for the subscriber	string: service-name
26-66	Deactivate-Service	Service to deactivate for the subscriber	string: service-name
26-71	IGMP-Access-Group-Name	Access List to use for the group (G) filter	string: 32–octet
26-72	IGMP-Access-Source-Group-Name	Access List to use for the source-group (S,G) filter	string: 32–octet
26-74	MLD-Access-Group-Name	Access List to use for the group (G) filter	string: 32–octet
26-75	MLD-Access-Source-Group-Name	Access List to use for the source-group (S,G) filter	string: 32–octet
26-77	MLD-Version	MLD Protocol Version	integer: 1–octet ■ 1 = MLD version ■ 2 = MLD version
26-78	IGMP-Version	IGMP Protocol Version	integer: 1–octet ■ 1 = IGMP version ■ 2 = IGMP version ■ 3 = IGMP version

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value
26-83	Acct-Service-Session	Name of the service (including parameter values) that is associated with service manager statistics	string: service-name
26-97	IGMP-Immediate-Leave	IGMP Immediate Leave	integer: 4–octet ■ 0 = disable ■ 1 = enable
26–84	Mobile-IP-Algorithm	Authentication algorithm used for Mobile-IP registration	integer: 4–octet
26–85	Mobile-IP-SPI	Security parameter index number for Mobile IP registration	integer: 4–octet
26–86	Mobile-IP-Key	Security association MD5 key for Mobile IP registration	string: key
26–87	Mobile-IP-Replay	Replay timestamp for Mobile IP registration	integer: 4–octet
26–89	Mobile-IP-Lifetime	Registration lifetime for Mobile IP registration	integer: 4–octet
26-100	MLD-Immediate-Leave	MLD Immediate Leave	integer: 4–octet ■ 0 = disable ■ 1 = enable

Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests

When a RADIUS-initiated CoA or disconnect operation is unsuccessful, the router includes an error-cause attribute (RADIUS attribute 101) in the CoA-NAK or Disconnect-NAK message that it sends back to the RADIUS server. If the detected error does not map to one of the supported error-cause attributes, the router sends the message without an error-cause attribute. Table 10 on page 35 describes the error-cause codes.

Table 10: Error-Cause Codes (RADIUS Attribute 101)

Code	Value	Description
401	Unsupported attribute	The request contains an attribute that is not supported (for example, a third-party attribute).
402	Missing attribute	A critical attribute (for example, the session identification attribute) is missing from a request.
404	Invalid response	Some other aspect of the request is invalid, such as if one or more attributes are not formatted properly.
503	Session context not found	The session context identified in the request does not exist on the router.
504	Session context not removable	The subscriber identified by attributes in the request is owned by a component that is not supported.
506	Resources unavailable	The subscriber identified by attributes in the request is owned by a component that is not supported.

Attaching Access Profiles

After you have created the access profile that specifies the subscriber access management authentication and accounting parameters, you attach the profile. Subscriber access management supports access profiles attached at the logical system:routing instance level.

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]
access-profile *profile-name*;

For example:

[edit logical-systems isp22-bos-metro-12 routing-instances isp22-cmbrg-12-32]
access-profile vz-bos-metro-fios-basic;

Verifying and Managing Subscriber Information

To display subscriber access statistics and information, use the following operational commands:

- show network-access aaa statistics
- show network-access aaa subscribers

To clear subscriber access statistics and to log out specific subscribers, use the following operational command:

- clear network-access aaa subscribers

For information about using these operational commands, see the *JUNOS System Basics and Services Command Reference*.

Chapter 4

Configuring Address-Assignment Pools for Subscriber Access

DHCP and Address Assignment Pools Overview

The address-assignment pool feature supports subscriber management functionality by enabling you to create address pools that can be shared by different client applications. For example, multiple client applications, such as DHCP, can use an address-assignment pool to provide addresses for their particular clients. Client applications can acquire addresses for either authenticated or unauthenticated clients.

Address-assignment pools support both dynamic and static address assignment. In dynamic address assignment, a client is automatically assigned an address from the address-assignment pool. In static address assignment, you reserve an address that is then always used by a particular client. Addresses that are reserved for static assignment are removed from the dynamic address pool and cannot be assigned to other clients.

Address-assignment pools support named address ranges, which are subsets of the overall address range. A client application can use named ranges to manage address assignment based on client-specific criteria. For example, you might create a named range that is based on a specific DHCP option 82 value. Then, when a DHCP client request matches the specified option 82 value, an address from the specified range is assigned to the client.

Related Topics

- Configuring Address-Assignment Pools on page 37

Configuring Address-Assignment Pools

The address-assignment pool feature supports subscriber management functionality by enabling you to create address pools that can be shared by different client applications.

NOTE: You cannot use address-assignment pools with the J-series DHCP server. Also, address-assignment pools are completely separate from L2TP address pools, which you create with the address-pool statement at the [edit access] hierarchy level, and NAT pools, which you create with the pool statement at the [edit services nat] hierarchy level.

To configure an address-assignment pool, include the address-assignment statement at the [edit access] hierarchy level. Include the dhcp-attributes statement to enable DHCP support and include configuration options in the address lease for the address-assignment pool.

```
[edit access]
address-assignment {
   pool pool-name family inet {
      network address-or-prefix</subnet-mask>;
      range range-name {
         low lower-limit high upper-limit;
      }
      host hostname {
         hardware-address mac-address;
         ip-address ip-address;
      }
      dhcp-attributes {
         [protocol-specific attributes]
      }
   }
}
```


- Configuring an Address-Assignment Pool Name and Network Address on page 38
- Configuring a Named Address Range for Dynamic Address Assignment on page 39
- Configuring Static Address Assignment on page 39
- Configuring DHCP Client-Specific Attributes on page 39

Configuring an Address-Assignment Pool Name and Network Address

To configure an address-assignment pool, include the following mandatory statements at the [edit access] hierarchy level:

```
[edit access]
address-assignment {
   pool pool-name family inet {
      network address-or-prefix</subnet-mask>;
   }
```

The address-assignment pool definition must include the pool name and the network statement. The network statement specifies the network address and prefix length for the addresses in the pool.

The following is an example of an address-assignment pool definition:

```
[edit access]
address-assignment {
   pool isp_1 family inet {
   network 192.168.0.0/16;
```

Configuring a Named Address Range for Dynamic Address Assignment

You can optionally configure multiple named subsets of addresses within an address-assignment pool. During dynamic address assignment, a client can be assigned an address from a specific named range. To create a named range, use the range statement at the [edit access address-assignment pool *pool-name* family inet] hierarchy level to identify the range and configure the lower and upper address boundaries of the range:

```
range name {
   low lower-limit high upper-limit;
}
```

Configuring Static Address Assignment

You can optionally create a static binding by reserving a specific address for a particular client. When you reserve an address, that address is removed from the address-assignment pool so that it is not assigned to another client. To configure a static address assignment, use the host statement at the [edit access address-assignment pool *pool-name* family init] hierarchy level to identify the client and create a binding between the client MAC address and the assigned IP address:

```
host hostname {
   hardware-address mac-address;
   ip-address ip-address;
}
```

The following is an example of a static binding configuration. This configuration specifies that the client with MAC address 90:00:00:01:00:01 is always assigned IP address 192.168.44.12.

```
host svale6.boston.net {
   hardware-address 90:00:00:01:00:01;
   ip-address 192.168.44.12;
}
```

Configuring DHCP Client-Specific Attributes

Use the address-assignment pool feature to include application-specific attributes when clients obtain an address. The client application, such as DHCP, uses the attributes to determine how addresses are assigned, and to also provide optional application-specific characteristics to the client. For example, the DHCP application might specify that a client that matches certain prerequisite information is dynamically assigned an address from a particular named range. Based on which named range is used, DHCP specifies additional DHCP attributes such as the boot-file that the client uses, the lease grace period, and the maximum lease time.

Use the dhcp-attributes statement at the [edit access address-assignment pool *pool-name* family inet] hierarchy level to configure client-specific attributes for DHCP clients. "DHCP Attributes Table" on page 40 describes the DHCP attributes.

```
dhcp-attributes {
    option-match {
        option-82 {
            circuit-id value range named-range;
            remote-id value range named-range;
        }
    }
    boot-file filename;
    boot-server (address | hostname);
    domain-name domain-name;
    grace-period seconds;
    maximum-lease-time seconds;
    name-server [ server-list ];
    netbios-node-type node-type;
    option {
        [ (id-number option-type option-value)
        (id-number array option-type option-value) ];
    }
    router [ router-list ];
    tftp-server address;
    wins-server [ server-list ];
}
```

Related Topics

- DHCP Attributes Table on page 40
- License Requirements for Address-Assignment Pools on page 41
- Example: Configuring an Address-Assignment Pool on page 97

DHCP Attributes Table

Table 11 on page 40 describes the DHCP client attributes that you can configure for address-assignment pools.

Table 11: DHCP-Attributes Statements

Statement	Description	Corresponding DHCP Option
boot-file	Boot filename advertised to the client, and used by the client to complete configuration.	67
boot-server	Boot server containing the boot file.	66
domain-name	Domain in which clients search for a DHCP server host.	15
grace-period	Grace period offered with the lease.	none
option-match	Maps option 82 value to named address range.	none

Table 11: DHCP-Attributes Statements *(continued)*

Statement	Description	Corresponding DHCP Option
maximum-lease-time	Maximum lease time allowed by the DHCP server.	51
name-server	IP address of domain name server.	6
netbios-node-type	NetBIOS node type.	46
option	User-defined options.	–
router	IP address for routers on the subnetwork.	3
tftp-server	Trivial File Transfer Protocol (TFTP) server that the client uses to obtain the client configuration file.	150
wins-server	IP address of the Windows NetBIOS name server.	44

License Requirements for Address-Assignment Pools

The address-assignment pool feature is part of the JUNOS Subscriber Management Feature Pack license. You must install and properly configure the license to meet the requirements for using the address-assignment pool feature.

For complete information about the JUNOS software licenses, see the "Installing and Managing JUNOS Licenses" chapter of the *JUNOS Software Installation and Upgrade Guide*.

Tracing Address-Assignment Pool Processes

To trace address-assignment pool processes, you can specify flags in the traceoptions statement at the [edit system processes general-authentication-service] hierarchy level. The default tracing behavior is the following:

- Important events are logged in a file called authd located in the /var/log directory.
- When the file authd reaches 128 kilobytes (KB), it is renamed authd.0, then authd.1, and so on, until there are 3 trace files. Then the oldest trace file (authd2. is overwritten. For more information about how log files are created, see the JUNOS System Log Messages Reference.
- Log files can be accessed only by the user who configures the tracing operation.

You cannot change the directory (/var/log) in which trace files are located. However, you can customize the other trace file settings by including the following statements at the [edit system processes general-authentication-service] hierarchy level:

```
[edit system processes general-authentication-service]
traceoptions {
    file filename {
        files number;
        size maximum-file-size;
```

```
        world-readable | no-world-readable;
        match regex;
    }
    flag address-assignment;
    flag all;
    flag configuration;
    flag framework;
    flag ldap;
    flag local-authentication;
    flag radius;
}
```

These options are described in the following sections:

- Configuring the Address-Assignment Pool Trace Log Filename on page 42
- Configuring the Number and Size of Address-Assignment Pool Processes Log Files on page 42
- Configuring Access to the Log File on page 43
- Configuring a Regular Expression for Lines to Be Logged on page 43
- Configuring the Trace Operation on page 43

Configuring the Address-Assignment Pool Trace Log Filename

By default, the name of the file that records trace output for address-assignment pools is authd. You can specify a different name by including the file statement at the [edit system processes general-authentication-service] hierarchy level:

```
[edit system processes general-authentication-service traceoptions]
file filename;
```

Configuring the Number and Size of Address-Assignment Pool Processes Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed *filename*.0, then *filename*.1, and so on, until there are 3 trace files. Then the oldest trace file (*filename*.2) is overwritten.

You can configure the limits on the number and size of trace files by including the following statement at the [edit system processes general-authentication-service traceoptions] hierarchy level:

```
[edit system processes general-authentication-service traceoptions]
file files number size size;
```

For example, 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 renamed *filename*.0, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename*.0 is renamed *filename*.1 and *filename* is renamed *filename*.0. This process repeats until there are 20 trace files. Then the oldest file (*filename*.19) is overwritten by the newest file (*filename*.0).

The number of files can be from 2 through 1000 files. The file size of each file can be from 10 KB through 1 gigabyte (GB).

Configuring Access to the Log File

By default, log files can be accessed only by the user who configures the tracing operation.

To specify that any user can read all log files, include the file world-readable statement at the [edit system processes general-authentication-service traceoptions] hierarchy level:

```
[edit system processes general-authentication-service traceoptions]
file world-readable;
```

To explicitly set the default behavior, include the file no-world-readable statement at the [edit system processes general-authentication-service traceoptions] hierarchy level:

```
[edit system processes general-authentication-service traceoptions]
file no-world-readable;
```

Configuring a Regular Expression for Lines to Be Logged

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

You can refine the output by including the match statement at the [edit system processes general-authentication-service file *filename*] hierarchy level and specifying a regular expression (regex) to be matched:

```
[edit system processes general-authentication-service traceoptions]
file filename match regex;
```

Configuring the Trace Operation

By default, only important events are logged. You can configure the trace operations to be logged by including the following statements at the [edit system processes general-authentication-service traceoptions] hierarchy level:

```
[edit system processes general-authentication-service traceoptions]
flag {
    address-assignment;
    all;
    configuration;
    framework;
    ldap;
    local-authentication;
    radius;
}
```

You can specify the following access tracing flags:

- address-assignment—All address-assignment events
- all—All tracing operations
- configuration—Configuration events
- framework—Authentication framework events

- ldap—LDAP authentication events local-authentication
- local-authentication—Local authentication events
- radius—RADIUS authentication events

Chapter 5

Configuring DHCP Local Server for Subscriber Access

Extended DHCP Local Server Overview

You can enable the router to function as an extended DHCP local server and configure the extended DHCP local server options on the router. The extended DHCP local server provides an IP address and other configuration information in response to a client request.

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients. See “Configuring Address-Assignment Pools” on page 37 for details about creating and using address-assignment pools.

NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

You cannot configure the extended DHCP local server and extended DHCP relay on the same interface.

To configure the extended DHCP local server on the router, you include the dhcp-local-server statement at the [edit system services] hierarchy level. See the “[edit system services dhcp-local-server] Hierarchy Level” on page 392 for the complete DHCP local server syntax.

You can also include the dhcp-local-server statement at the following hierarchy levels:

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

This overview covers:

Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools

In a typical carrier edge network configuration, the DHCP client is on the subscriber's computer, and the DHCP local server is configured on the router. The following steps provide a high-level description of the interaction among the DHCP local server, DHCP client, and address-assignment pools:

1. The DHCP client sends a discover packet to one or more DHCP local servers in the network to obtain configuration parameters and an IP address for the subscriber.
2. Each DHCP local server that receives the discover packet then searches its address-assignment pool for the client address and configuration options. Each local server creates an entry in its internal client table to keep track of the client state, then sends a DHCP offer packet to the client.
3. On receipt of the offer packet, the DHCP client selects the DHCP local server from which to obtain configuration information and sends a request packet indicating the DHCP local server that will grant the address and configuration information.
4. The selected DHCP local server sends an acknowledgement packet to the client that contains the client address lease and configuration parameters. The server also installs the host route and ARP entry, and then monitors the lease state.

Providing DHCP Client Configuration Information

When the extended DHCP application receives a response from an external authentication server, the response might include information in addition to the IP address and subnet mask. The extended DHCP application uses the information from the authentication grant for the response the DHCP application sends to the DHCP client. The DHCP application can either send the information in its original form or the application might merge the information with local configuration specifications. For example, if the authentication grant includes an address pool name and a local configuration specifies DHCP attributes for that pool, the extended DHCP application merges the authentication results and the attributes in the reply that the server sends to the client.

A local configuration is optional — a client can be fully configured by the external authentication service. However, if the external authentication service does not provide client configuration, you must configure the local address-assignment pool to provide the configuration for the client. When a local configuration specifies options, the extended DHCP application adds the local configuration options to the offer PDU the server sends to the client. If the two sets of options overlap, the options in the authentication response from the external service take precedence.

When you use RADIUS to provide the authentication, the additional information might be in the form of RADIUS attributes and Juniper Networks VSAs. The following table shows the information that RADIUS might include in the authentication grant. See “RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework” on page 28 for a complete list of RADIUS attributes and Juniper Networks VSAs that the extended DHCP applications supports for subscriber access management.

Attribute Number	Attribute Name	Description
RADIUS attribute 8	Framed-IP-Address	Client IP address
RADIUS attribute 9	Framed-IP-Netmask	Subnet mask for client IP address (DHCP option 1)
Juniper Networks VSA 26-4	Primary-DNS	Primary domain server (DHCP option 6)
Juniper Networks VSA 26-5	Secondary-DNS	Secondary domain server (DHCP option 6)
Juniper Networks VSA 26-6	Primary-WINS	Primary WINS server (DHCP option 44)
Juniper Networks VSA 26-7	Secondary-WINS	Secondary WINS server (DHCP option 44)
RADIUS attribute 88	Framed-Pool	Address assignment pool name
RADIUS attribute 27	Session-Timeout	Lease time
Juniper Networks VSA 26-109	DHCP-Guided-Relay-Server	DHCP relay server

Minimal Configuration for Clients

The extended DHCP local server provides a minimal configuration to the DHCP client if the client does not have DHCP option 55 configured. The server provides the subnet mask of the address-assignment pool that is selected for the client. In addition to the subnet mask, the server provides the following values to the client if the information is configured in the selected address-assignment pool:

- router—A router located on the client’s subnet. This statement is the equivalent of DHCP option 3.
- domain name—The name of the domain in which the client searches for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified. This is equivalent to DHCP option 15.
- domain name server—A Domain Name System (DNS) name server that is available to the client to resolve hostname-to-client mappings. This is equivalent to DHCP option 6.

DHCP Local Server and Address-Assignment Pools

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients.

NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

Related Topics

- Configuring Address-Assignment Pools on page 37
- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 52
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 50
- Using External AAA Authentication Services with DHCP on page 51
- Tracing Extended DHCP Operations on page 61
- Verifying and Managing DHCP Local Server Configuration on page 61
- Example: Minimum Extended DHCP Local Server Configuration on page 98
- Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 98

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

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

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

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

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

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

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

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

The router merges the software components for multiple subscribers as follows:

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

NOTE: You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the aggregate-clients option when attaching a dynamic profile to a demux interface for DHCP.

Primary Dynamic Profile

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

This feature can conserve logical interfaces in a network where dynamic demux interfaces are used to represent subscribers. To conserve interfaces, the primary profile that you specify should not be a profile that creates a demux interface but one that provides the initial policies for the primary interface subscriber.

Related Topics
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

Using External AAA Authentication Services with DHCP

Both the extended DHCP local server and the extended DHCP relay agent support the use of external AAA authentication services, such as RADIUS, to authenticate DHCP clients. When the extended DHCP local server or relay agent receives a discover PDU from a client, the extended DHCP application contacts the AAA server to authenticate the DHCP client. The extended DHCP application can obtain client addresses and DHCP configuration options from the external AAA authentication server.

NOTE: This section uses the term extended DHCP application to refer to both the extended DHCP local server and the extended DHCP relay agent.

The external authentication feature also supports AAA directed logout. If the external AAA service supports a user logout directive, the extended DHCP application honors the logout and views it as if it was requested by a CLI management command. All of the client state information and allocated resources are deleted at logout. The extended DHCP application supports directed logout using the list of configured authentication servers you specify with the authentication-server statement at the [edit access profile *profile-name*] hierarchy level.

You can configure either global authentication support or group-specific support.

You must configure the username-include statement to enable the use of authentication. The password statement is not required and does not cause DHCP to use authentication if the username-include statement is not included.

To configure DHCP local server and DHCP relay agent authentication support:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

- For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
user@host# edit authentication
```

2. (Optional) Configure a password that authenticates the username to the external authentication service.

   See "Configuring Passwords for Usernames" on page 58.

3. (Optional) Configure optional features to create a unique username.

   See "Creating Unique Usernames for DHCP Clients" on page 59.

Related Topics

- Extended DHCP Local Server Overview on page 46
- Extended DHCP Relay Agent Overview on page 68

Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use

You can specify the method that the extended DHCP local server uses to determine which address-assignment pool provides the IP address and configuration for a DHCP client.

By default, the server selects the address-assignment pool to use by matching the IP address in the client DHCP request with the network address of the address-assignment pool. If the client request contains the gateway IP address (giaddr), the local server matches the giaddr to the address-assignment pool's address. If there is no giaddr in the request, then the DHCP local server matches the IP address of the receiving interface to the address of the address-assignment pool.

You can optionally configure the extended DHCP local server to match the DHCP relay agent information option (option 82) in the client DHCP packets to a named range in the address-assignment pool used for the client. Named ranges are subsets within the overall address-assignment pool address range, and are configured when you create the address-assignment pool.

NOTE: To use the DHCP local server option 82 matching feature, you must ensure that the option-82 statement is included in the dhcp-attributes statement for the address-assignment pool.

To configure the extended DHCP local server to match the DHCP relay agent information option (option 82) in the client DHCP packets to a named range in the address-assignment pool used for the client:

1. Access the pool-match-order configuration.

```
[edit system services dhcp-local-server]
user@host# edit pool-match-order
```

2. Specify the default pool matching method. You must configure the default method before configuring the optional Option 82 matching method.

   ```
   [edit system services dhcp-local-server pool-match-order]
   user@host# set ip-address-first
   ```

3. Specify the Option 82 matching method.

   ```
   [edit system services dhcp-local-server pool-match-order]
   user@host# set option-82
   ```

Related Topics

- Configuring Address-Assignment Pools on page 37
- Extended DHCP Local Server Overview on page 46
- Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 98

Grouping Interfaces with Common DHCP Configurations

You use the group feature to group together a set of interfaces and then apply a common DHCP configuration to the named interface group. The extended DHCP local server and DHCP relay agent both support interface groups.

To configure an interface group:

1. Access the [edit system services dhcp-local-server] hierarchy (for DHCP local server) or the [edit forwarding-options dhcp-relay] hierarchy (for DHCP relay agent), depending on the extended DHCP access method you want to configure. The following steps create a DHCP local server group; the steps are the same for DHCP relay agent.
2. Create the group and assign a name.

   ```
   [edit system services dhcp-local-server]
   user@host# edit group boston
   ```

3. Specify the names of one or more interfaces on which the extended DHCP application is enabled. You can repeat the interface *interface-name* statement to specify multiple interfaces within the group, but you cannot use the same interface in more than one group.

   ```
   [edit system services dhcp-local-server group boston]
   user@host# set interface fe-1/0/1.1
   user@host# set interface fe-1/0/1.2
   ```

4. (Optional) You can use the *upto* option to specify a range of interfaces for a group.

   ```
   [edit system services dhcp-local-server group boston]
   user@host# set interface fe-1/0/1.3 upto fe-1/0/1.9
   ```

5. (Optional) You can use the exclude option to exclude a specific interface or a specified range of interfaces from the group. For example:

   ```
   [edit system services dhcp-local-server group boston]
   ```

```
user@host# interface fe-1/0/1.1 upto fe-1/0/1.102
user@host# interface fe-1/0/1.6 exclude
user@host# interface fe-1/0/1.70 upto fe-1/0/1.80 exclude
```

Related Topics

- Extended DHCP Local Server Overview on page 46
- Extended DHCP Relay Agent Overview on page 68
- Group-Specific DHCP Relay Options on page 74

Overriding Default DHCP Local Server Configuration Settings

You can override certain default DHCP local server configuration settings. You can override the settings at the global level and for a named group of interfaces.

To override global default DHCP local server configuration options, include the overrides statement and its subordinate statements at the [edit system services dhcp-local-server] hierarchy level. To override DHCP local server configuration options for a named group of interfaces, include the statements at the [edit system services dhcp-local-server group *group-name*] hierarchy level.

To remove all DHCP local server configuration overrides at a particular hierarchy level, include the overrides statement without any subordinate statements.

To override default DHCP local server configuration settings:

1. Specify that you want to configure override options.

   ```
   [edit system services dhcp-local-server]
   user@host# edit overrides
   ```

2. (Optional) Override the maximum number of DHCP clients allowed per interface.

   See "Specifying the Maximum Number of DHCP Clients Per Interface" on page 54.

3. (Optional) Override ARP table population in distrusted environments.

   See "Disabling ARP Table Population" on page 55.

This topic contains the following sections:

- Specifying the Maximum Number of DHCP Clients Per Interface on page 54
- Disabling ARP Table Population on page 55

Specifying the Maximum Number of DHCP Clients Per Interface

By default, there is no limit to the number of DHCP local server or DHCP relay clients allowed on an interface. However, you can override the default setting and specify the maximum number of clients allowed per interface, in the range 1 to 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.

NOTE: The maximum number of DHCP local server clients or DHCP relay clients can also be specified by Juniper Networks VSA 26-143 during client login. The VSA-specified value always takes precedence if the interface-client-limit number statement specifies a different number.

If the VSA-specified value differs with each client login, DHCP uses the largest limit set by the VSA until there are no clients on the interface.

To configure the maximum number of DHCP clients allowed per interface:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Configure the maximum number of clients allowed per interface. (DHCP local server and DHCP relay agent both support the interface-client-limit statement.)

   ```
   [edit system services dhcp-local-server overrides]
   user@host# set interface-client-limit number
   ```

Disabling ARP Table Population

By default, DHCP populates the ARP table with the MAC address of a client when the client binding is established. However, you may choose to use the DHCP no-arp statement to hide the subscriber MAC address information, as it appears in ARP table entries.

When running in a trusted environment (that is, when not using the no-arp statement), DHCP populates the ARP table with unique MAC addresses contained within the DHCP PDU for each DHCP client:

Table 12: ARP Table in Trusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *A*
Client 2 IP Address	MAC *B*
Client 3 IP Address	MAC *C*

In distrusted environments, you can specify the no-arp statement to hide the MAC addresses of clients. When you specify the no-arp statement, DHCP does not automatically populate the ARP table with MAC address information from the DHCP PDU for each client. Instead, the system performs an ARP to obtain the MAC address of each client and obtains the MAC address of the immediately-attached device (for example, a DSLAM). DHCP populates the ARP table with the same interface MAC address (for example, MAC *X* from a DSLAM interface) for each client:

Table 13: ARP Table in Distrusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *X*
Client 2 IP Address	MAC *X*
Client 3 IP Address	MAC *X*

To disable ARP table population:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Disable ARP table population with client-specific information. (DHCP local server and DHCP relay agent both support the no-arp statement.)
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server overrides]
     user@host# set no-arp
     ```

   - For DHCP relay:

     ```
     [edit forwarding-options dhcp-relay overrides]
     user@host# set no-arp
     ```

Attaching Dynamic Profiles to DHCP Subscriber Interfaces

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

This topic contains the following sections:

Attaching a Dynamic Profile to All DHCP Subscriber Interfaces

To attach a dynamic profile to all DHCP subscriber interfaces:

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

   - For DHCP local server:

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

   - For DHCP relay agent:

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

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the aggregate-clients option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the use-primary option to specify that the primary dynamic profile is used. The two options are mutually exclusive.

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

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

   - To use the primary dynamic profile:

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

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

To attach a dynamic profile to a group of interfaces:

Before you begin:

- Configure the interface group.

  See "Grouping Interfaces with Common DHCP Configurations" on page 53.

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

   - For DHCP local server:

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

   - For DHCP relay agent:

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

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the aggregate-clients option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the use-primary option to specify that the primary dynamic profile is used. The two options are mutually exclusive.

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

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

   - To use the primary dynamic profile:

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

Related Topics

- Dynamic Profiles Overview on page 245
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 50
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 288

Configuring Passwords for Usernames

You can configure an optional password that the extended DHCP application presents to the external AAA authentication service to authenticate the specified username.

To configure a password that authenticates the username:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit authentication
     ```

2. Configure the password. (DHCP local server and DHCP relay agent both support the password statement.)

   ```
   [edit system services dhcp-local-server authentication]
   user@host# set password myPassworD1234
   ```

Related Topics

- Extended DHCP Local Server Overview on page 46
- Configuring the Extended DHCP Relay Agent
- Using External AAA Authentication Services with DHCP on page 51
- For information about supported characters in passwords, see "Configuring Special Requirements for Plain-Text Passwords" in the *JUNOS System Basics Configuration Guide*

Creating Unique Usernames for DHCP Clients

You can configure the extended DHCP application to include additional information in the username that is passed to the external AAA authentication service when the DHCP client logs in. This additional information enables you to construct usernames that uniquely identify subscribers.

NOTE: If you do not include a username in the authentication configuration, the router does not perform authentication; however, the IP address is provided by the local pool if it is configured.

The following list describes the optional information that you can include as part of the username:

- circuit-type—The circuit type used by the DHCP client, for example enet.
- delimiter—The delimiter character that separates components that make up the concatenated username. The default delimiter is a period (.). The semicolon (;) is not supported as a delimiter character.
- domain-name—The client domain name as string. The router adds the @ delimiter to the username.

- logical-system-name—The name of the logical system, if the receiving interface is in a logical system.
- mac-address—The client MAC address, in a string of the format xxxx.xxxx.xxxx.
- option-60—The portion of the option 60 payload that follows the length field.
- option-82 <circuit-id> <remote-id>; —The specified contents of the option 82 payload.
  - circuit-id—The payload of the Agent Circuit ID suboption.
  - remote-id—The payload of the Agent Remote ID suboption.
  - Both circuit-id and remote-id—The payloads of both suboptions, in the format: circuit-id[delimiter]remote-id.
  - Neither circuit-id or remote-id—The raw payload of the option 82 from the PDU is concatenated to the username.
- routing-instance-name—The name of the routing instance, if the receiving interface is in a routing instance.
- user-prefix—A string indicating the user prefix.

The router creates the unique username by including the specified additional information in the following order, with the fields separated by a delimiter.

```
user-prefix[delimiter]mac-address[delimiter]logical-system-name[delimiter]
routing-instance-name[delimiter]circuit-type[delimiter]option-82[delimiter]
option-60@domain-name
```

To configure a unique username:

1. Specify that you want to configure authentication.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit authentication
     ```

2. Specify that you want to include optional information in the username. (DHCP local server and DHCP relay agent both support the username-include statement.)

   ```
   [edit system services dhcp-local-server authentication]
   user@host# set username-include
   ```

3. (Optional) Specify the optional information you want to include in the username.

   ```
   [edit system services dhcp-local-server authentication username-include]
   user@host# set username-include circuit-type
   user@host# set username-include domain-name isp55.com
   user@host# set username-include mac-address
   ```

```
user@host# set username-include user-prefix wallybrown
```

The previous username-include configuration produces this unique username:

wallybrown.0090.1a01.1234.enet@isp55.com

Related Topics

- Extended DHCP Local Server Overview on page 46
- Configuring the Extended DHCP Relay Agent
- Using External AAA Authentication Services with DHCP on page 51

Verifying and Managing DHCP Local Server Configuration

Purpose View or clear information about client address bindings and statistics for the extended DHCP local server.

Action

- To display the address bindings in the client table on the extended DHCP local server:

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

- To display extended DHCP local server statistics:

  ```
  user@host> show dhcp server statistics
  ```

- To clear the binding state of a DHCP client from the client table on the extended DHCP local server:

  ```
  user@host> clear dhcp server binding
  ```

- To clear all extended DHCP local server statistics:

  ```
  user@host> clear dhcp server statistics
  ```

Related Topics

- For more information, see the *JUNOS System Basics and Services Command Reference*

Tracing Extended DHCP Operations

Both the extended DHCP local server and the extended DHCP relay agent support tracing operations. DHCP tracing operations track extended DHCP operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

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

- Important events are logged in a file called jdhcpd located in the /var/log directory. You cannot change the directory (/var/log) in which trace files are located.

- When the file jdhcpd reaches 128 kilobytes (KB), it is renamed jdhcpd.0, then jdhcpd.1, and so on, until there are three trace files. Then the oldest trace file (jdhcpd.2) 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 *JUNOS System Log Messages Reference*.)

- Log files can be accessed only by the user who configures the tracing operation.

To configure DHCP local server and DHCP relay agent tracing operations:

1. Specify that you want to configure tracing options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit traceoptions
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit traceoptions
     ```

2. (Optional) Configure the name for the file used for the trace output.

   See “Configuring the Extended DHCP Log Filename” on page 63.

3. (Optional) Configure the number and size of the log files.

   See “Configuring the Number and Size of Extended DHCP Log Files” on page 63.

4. (Optional) Configure access to the log file.

   See “Configuring Access to the Extended DHCP Log File” on page 63.

5. (Optional) Configure a regular expression to filter logging events.

   See “Configuring a Regular Expression for Extended DHCP Lines to Be Logged” on page 64.

6. (Optional) Configure flags to filter the operations to be logged.

   See “Configuring the Extended DHCP Tracing Flags” on page 64.

The extended DHCP traceoptions operations are described in the following sections:

Configuring the Extended DHCP Log Filename

By default, the name of the file that records trace output is jdhcpd. You can specify a different name by including the file option:

To configure the filename for DHCP local server and DHCP relay agent tracing operations:

- Specify the name of the file used for the trace output. (DHCP local server and DHCP relay agent both support the file option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1
```

Configuring the Number and Size of Extended DHCP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed *filename*.0, then *filename*.1, and so on, until there are three trace files. Then the oldest trace file (*filename*.2) 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 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 renamed *filename*.0, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename*.0 is renamed *filename*.1 and *filename* is renamed *filename*.0. This process repeats until there are 20 trace files. Then the oldest file (*filename*.19) is overwritten by the newest file (*filename*.0).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output. (DHCP local server and DHCP relay agent both support the files and size options for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 files 20 size 2097152
```

Configuring Access to the Extended DHCP Log File

By default, log files can be accessed only by the user who configures the tracing operation. 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. (DHCP local server and DHCP relay agent both support the world-readable option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
```

```
user@host# set file dhcp_logfile_1 world-readable
```

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

- Configure the log file to be no-world-readable. (DHCP local server and DHCP relay agent both support the no-world-readable option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 no-world-readable
```

Configuring a Regular Expression for Extended DHCP Lines to Be Logged

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

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

To configure regular expressions to be matched:

- Configure the regular expression. (DHCP local server and DHCP relay agent both support the match option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 match regex
```

Configuring the Extended DHCP Tracing Flags

By default, only important events are logged. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

Flag	Description
all	Trace all events
auth	Trace authentication events
database	Trace database events
fwd	Trace firewall process events
general	Trace miscellaneous events
ha	Trace high availability-related events
interface	Trace interface operations
io	Trace I/O operations
packet	Trace packet decoding operations
packet-option	Trace DHCP option decoding operations

Flag	Description
rpd	Trace routing protocol process events
rtstock	Trace routing socket operations
session-db	Trace session database events
state	Trace changes in state
ui	Trace user interface operations

To configure the flags for the events to be logged:

- Configure the flags. (DHCP local server and DHCP relay agent both support the flag option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set flag packet-option
```

Chapter 6

Configuring DHCP Relay for Subscriber Access

Extended DHCP Relay Agent Overview

You can configure extended DHCP relay options on the router and enable the router to function as a DHCP relay agent. A DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server. You can use DHCP relay in carrier edge applications such as video/IPTV to obtain configuration parameters, including an IP address, for your subscribers.

For more information about how to use the DHCP relay agent in a video/IPTV application, see the *JUNOS Feature Guide*.

NOTE: The extended DHCP relay agent options configured with the dhcp-relay statement are incompatible with the DHCP/BOOTP relay agent options configured with the bootp statement. As a result, you cannot enable both the extended DHCP relay agent and the DHCP/BOOTP relay agent on the router at the same time.

For information about the DHCP/BOOTP relay agent, see the *JUNOS Policy Framework Configuration Guide*.

To configure the extended DHCP relay agent on the router, include the dhcp-relay statement at the [edit forwarding-options] hierarchy level. See the "[edit forwarding-options dhcp-relay] Hierarchy Level" on page 390 for the complete DHCP relay agent syntax.

You can also include the dhcp-relay statement at the following hierarchy levels:

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

This overview covers:

Interaction Among the DHCP Relay Agent, DHCP Client, and DHCP Servers

In a typical carrier edge network configuration, the DHCP client is on the subscriber's computer, and the DHCP relay agent is configured on the router between the DHCP client and one or more DHCP servers.

The following steps describe, at a high level, how the DHCP client, DHCP relay agent, and DHCP server interact in a configuration that includes two DHCP servers.

1. The DHCP client sends a discover packet to find a DHCP server in the network from which to obtain configuration parameters for the subscriber, including an IP address.
2. The DHCP relay agent receives the discover packet and forwards copies to each of the two DHCP servers. The DHCP relay agent then creates an entry in its internal client table to keep track of the client's state.
3. In response to receiving the discover packet, each DHCP server sends an offer packet to the client. The DHCP relay agent receives the offer packets and forwards them to the DHCP client.
4. On receipt of the offer packets, the DHCP client selects the DHCP server from which to obtain configuration information. Typically, the client selects the server that offers the longest lease time on the IP address.
5. The DHCP client sends a request packet that specifies the DHCP server from which to obtain configuration information.
6. The DHCP relay agent receives the request packet and forwards copies to each of the two DHCP servers.
7. The DHCP server requested by the client sends an acknowledgement (ACK) packet that contains the client's configuration parameters.
8. The DHCP relay agent receives the ACK packet and forwards it to the client.
9. The DHCP client receives the ACK packet and stores the configuration information.
10. If configured to do so, the DHCP relay agent installs a host route and Address Resolution Protocol (ARP) entry for this client.
11. After establishing the initial lease on the IP address, the DHCP client and the DHCP server use unicast transmission to negotiate lease renewal or release. The DHCP relay agent "snoops" on all of the packets unicast between the client and the server that pass through the router to determine when the lease for this client has expired or been released. This process is referred to as lease shadowing or passive snooping.

Access and Access-Internal Routes

The DHCP application on a video services router uses both access routes and access-internal routes to represent either the end users or the networks behind the attached router. An access route represents a network behind an attached video services router, and is set to a preference of 13. An access-internal route is a /32 route that represents a directly attached end user, and is set to a preference of 12.

To configure import and export of access routes and access-internal routes in a routing policy, include the access and access-internal keywords as match conditions at the [edit policy-options policy-statement *policy-name* term *term-name* from protocol] hierarchy level. For information, see the *JUNOS Policy Framework Configuration Guide*.

To display configuration information for access routes and access-internal routes, use the show route extensive, show route protocol access, and show route protocol

access-internal operational commands. For command syntax and examples, see the *JUNOS Routing Protocols and Policies Command Reference*.

DHCP State Persistence

The extended DHCP relay agent maintains the state of active DHCP client leases in persistent storage on the router. It can recover this state if the DHCP relay agent process fails or is manually restarted, or if you manually reboot (gracefully shut down) the router. DHCP state persistence prevents the loss of active DHCP clients in either of these circumstances. If a power failure occurs or if the kernel stops operating on a single Routing Engine, however, the state of active DHCP client leases is lost.

DHCP state persistence is automatically enabled when you configure the extended DHCP relay agent on the router by including the dhcp-relay statement.

The DHCP relay agent records in persistent storage only those DHCP clients that are fully bound, which means that they currently have an active lease on an IP address from a DHCP server. DHCP clients in a renewal or rebind state are considered to be fully bound, and their state is also maintained in persistent storage. When a DHCP client lease expires or the client is released, the DHCP relay agent removes the client state from persistent storage.

Graceful Routing Engine Switchover

The extended DHCP relay agent supports graceful Routing Engine switchover on all routing platforms that contain dual Routing Engines. To support graceful Routing Engine switchover, the DHCP relay agent automatically mirrors (replicates) information about the state of bound DHCP clients from the master Routing Engine to the backup Routing Engine.

To enable graceful Routing Engine switchover support for the extended DHCP relay agent, include the graceful-switchover statement at the [edit chassis redundancy] hierarchy level. You cannot disable graceful Routing Engine switchover support for the extended DHCP relay agent when the router is configured to support graceful Routing Engine switchover.

For more information about using graceful Routing Engine switchover, see the *JUNOS High Availability Configuration Guide*.

Related Topics

- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 50
- Using External AAA Authentication Services with DHCP on page 51
- Verifying and Managing DHCP Relay Configuration on page 89
- Tracing Extended DHCP Operations on page 61
- Example: Minimum DHCP Relay Agent Configuration on page 98
- Example: DHCP Relay Agent Configuration with Multiple Clients and Servers on page 99
- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 100
- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 101

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

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

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

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

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

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

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

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

The router merges the software components for multiple subscribers as follows:

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

NOTE: You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the aggregate-clients option when attaching a dynamic profile to a demux interface for DHCP.

Primary Dynamic Profile

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

This feature can conserve logical interfaces in a network where dynamic demux interfaces are used to represent subscribers. To conserve interfaces, the primary profile that you specify should not be a profile that creates a demux interface but one that provides the initial policies for the primary interface subscriber.

Related Topics ■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

Using External AAA Authentication Services with DHCP

Both the extended DHCP local server and the extended DHCP relay agent support the use of external AAA authentication services, such as RADIUS, to authenticate DHCP clients. When the extended DHCP local server or relay agent receives a discover PDU from a client, the extended DHCP application contacts the AAA server to authenticate the DHCP client. The extended DHCP application can obtain client addresses and DHCP configuration options from the external AAA authentication server.

NOTE: This section uses the term extended DHCP application to refer to both the extended DHCP local server and the extended DHCP relay agent.

The external authentication feature also supports AAA directed logout. If the external AAA service supports a user logout directive, the extended DHCP application honors the logout and views it as if it was requested by a CLI management command. All of the client state information and allocated resources are deleted at logout. The extended DHCP application supports directed logout using the list of configured authentication servers you specify with the authentication-server statement at the [edit access profile *profile-name*] hierarchy level.

You can configure either global authentication support or group-specific support.

You must configure the username-include statement to enable the use of authentication. The password statement is not required and does not cause DHCP to use authentication if the username-include statement is not included.

To configure DHCP local server and DHCP relay agent authentication support:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

- For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
user@host# edit authentication
```

2. (Optional) Configure a password that authenticates the username to the external authentication service.

   See "Configuring Passwords for Usernames" on page 58.

3. (Optional) Configure optional features to create a unique username.

   See "Creating Unique Usernames for DHCP Clients" on page 59.

Related Topics

- Extended DHCP Local Server Overview on page 46
- Extended DHCP Relay Agent Overview on page 68

Grouping Interfaces with Common DHCP Configurations

You use the group feature to group together a set of interfaces and then apply a common DHCP configuration to the named interface group. The extended DHCP local server and DHCP relay agent both support interface groups.

To configure an interface group:

1. Access the [edit system services dhcp-local-server] hierarchy (for DHCP local server) or the [edit forwarding-options dhcp-relay] hierarchy (for DHCP relay agent), depending on the extended DHCP access method you want to configure. The following steps create a DHCP local server group; the steps are the same for DHCP relay agent.
2. Create the group and assign a name.

```
[edit system services dhcp-local-server]
user@host# edit group boston
```

3. Specify the names of one or more interfaces on which the extended DHCP application is enabled. You can repeat the interface *interface-name* statement to specify multiple interfaces within the group, but you cannot use the same interface in more than one group.

```
[edit system services dhcp-local-server group boston]
user@host# set interface fe-1/0/1.1
user@host# set interface fe-1/0/1.2
```

4. (Optional) You can use the *upto* option to specify a range of interfaces for a group.

```
[edit system services dhcp-local-server group boston]
user@host# set interface fe-1/0/1.3 upto fe-1/0/1.9
```

5. (Optional) You can use the exclude option to exclude a specific interface or a specified range of interfaces from the group. For example:

```
[edit system services dhcp-local-server group boston]
```

```
user@host# interface fe-1/0/1.1 upto fe-1/0/1.102
user@host# interface fe-1/0/1.6 exclude
user@host# interface fe-1/0/1.70 upto fe-1/0/1.80 exclude
```

Related Topics

- Extended DHCP Local Server Overview on page 46
- Extended DHCP Relay Agent Overview on page 68
- Group-Specific DHCP Relay Options on page 74

Group-Specific DHCP Relay Options

You can include the following statements at both the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level to set group-specific DHCP relay agent configuration options, and at the [edit forwarding-options dhcp-relay] hierarchy level to set global DHCP relay agent configuration options:

- active-server-group—Configure an active server group to apply a common DHCP relay agent configuration to a named group of DHCP server addresses. For information, see "Configuring Active Server Groups" on page 87.
- authentication—Configure the parameters the router sends to the external AAA server.
- overrides—Override the default configuration settings for the extended DHCP relay agent. For information, see "Overriding the Default DHCP Relay Configuration" on page 74.
- relay-option-60—Use the DHCP vendor class identifier option (option 60) in DHCP client packets to select a DHCP server to which to forward packets. For more information, see "Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers" on page 79.
- relay-option-82—Enable or disable the insertion of option 82 information in packets destined for a DHCP server. For information, see "Enabling and Disabling Insertion of Option 82 Information" on page 83.

The statements configured at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level apply only to the named group of interfaces, and override any global DHCP relay agent settings configured with the same statements at the [edit forwarding-options dhcp-relay] hierarchy level.

Related Topics

- Grouping Interfaces with Common DHCP Configurations on page 53

Overriding the Default DHCP Relay Configuration

You can override certain default DHCP relay agent configuration settings. You can override the settings at the global level and for a named group of interfaces.

To override global default DHCP relay agent configuration options, include the overrides statement and its subordinate statements at the [edit forwarding-options dhcp-relay] hierarchy level. To override DHCP local server configuration options for

a named group of interfaces, include the statements at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level.

To remove all DHCP relay agent configuration overrides at a particular hierarchy level, include the overrides statement without any subordinate statements.

To override default DHCP relay agent configuration settings:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. (Optional) Overwrite the giaddr in DHCP packets the DHCP relay agent forwards.

   See "Overwriting giaddr Information" on page 76.

3. (Optional) Override the DHCP relay agent information option (option 82) in DHCP packets.

   See "Overriding Option 82 Information" on page 76.

4. (Optional) Override the setting of the broadcast bit in DHCP request packets and use the layer 2 unicast transmission method.

   See "Using Layer 2 Unicast Transmission for DHCP Packets" on page 76.

5. (Optional) Trust DHCP client packets that have a giaddr of 0 and that contain option 82 information.

   See "Trusting Option 82 Information" on page 77.

6. (Optional) Override ARP table population in distrusted environments.

   See "Disabling ARP Table Population" on page 55.

7. (Optional) Override the maximum number of DHCP clients allowed per interface.

   See "Specifying the Maximum Number of DHCP Clients Per Interface" on page 54.

8. (Optional) Disable DHCP relay agent on specific interfaces.

   See "Disabling DHCP Relay" on page 79.

This topic contains the following sections:

Overwriting giaddr Information

You can configure the DHCP relay agent to change the gateway IP address (giaddr) field in packets that it forwards between a DHCP client and a DHCP server.

To overwrite the giaddr of every DHCP packet with the giaddr of the DHCP relay agent before forwarding the packet to the DHCP server:

1. Specify that you want to configure override options.

```
[edit forwarding-options dhcp-relay]
user@host# edit overrides
```

2. Specify that the giaddr of DHCP packets is overwritten.

```
[edit forwarding-options dhcp-relay overrides]
user@host# set always-write-giaddr
```

Overriding Option 82 Information

You can configure the DHCP relay agent to add or remove the DHCP relay agent information option (option 82) in DHCP packets.

This feature causes the DHCP relay agent to perform one of the following actions, depending on the configuration:

- If the DHCP relay agent is configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the DHCP packets and inserts the new values before forwarding the packets to the DHCP server.
- If the DHCP relay agent is not configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the packets, but does not add any new values before forwarding the packets to the DHCP server.

To override the default option 82 information in DHCP packets destined for a DHCP server:

1. Specify that you want to configure override options.

```
[edit forwarding-options dhcp-relay]
user@host# edit overrides
```

2. Specify that the option 82 information in DHCP packets is overwritten.

```
[edit forwarding-options dhcp-relay overrides]
user@host# set always-write-option-82
```

Using Layer 2 Unicast Transmission for DHCP Packets

You can configure the DHCP relay agent to override the setting of the broadcast bit in DHCP request packets. DHCP relay agent then instead uses the layer 2 unicast transmission method to send DHCP Offer reply packets and DHCP ACK reply packets from the DHCP server to DHCP clients during the discovery process.

To override the default setting of the broadcast bit in DHCP request packets:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the DHCP relay agent uses the layer 2 unicast transmission method.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set "Using Layer 2 Unicast Transmission for DHCP Packets"
   ```

Trusting Option 82 Information

By default, the DHCP relay agent treats client packets with a giaddr of 0 (zero) and option 82 information as if the packets originated at an untrusted source, and drops them without further processing. You can override this behavior and specify that the DHCP relay agent process DHCP client packets that have a giaddr of 0 (zero) and contain option 82 information.

To configure DHCP relay agent to trust option 82 information:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the DHCP relay agent process DHCP client packets with a giaddr of 0 and that contain option 82 information.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set "Trusting Option 82 Information"
   ```

Disabling ARP Table Population

By default, DHCP populates the ARP table with the MAC address of a client when the client binding is established. However, you may choose to use the DHCP no-arp statement to hide the subscriber MAC address information, as it appears in ARP table entries.

When running in a trusted environment (that is, when not using the no-arp statement), DHCP populates the ARP table with unique MAC addresses contained within the DHCP PDU for each DHCP client:

Table 14: ARP Table in Trusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *A*
Client 2 IP Address	MAC *B*
Client 3 IP Address	MAC *C*

In distrusted environments, you can specify the no-arp statement to hide the MAC addresses of clients. When you specify the no-arp statement, DHCP does not automatically populate the ARP table with MAC address information from the DHCP PDU for each client. Instead, the system performs an ARP to obtain the MAC address of each client and obtains the MAC address of the immediately-attached device (for example, a DSLAM). DHCP populates the ARP table with the same interface MAC address (for example, MAC *X* from a DSLAM interface) for each client:

Table 15: ARP Table in Distrusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *X*
Client 2 IP Address	MAC *X*
Client 3 IP Address	MAC *X*

To disable ARP table population:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Disable ARP table population with client-specific information. (DHCP local server and DHCP relay agent both support the no-arp statement.)
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server overrides]
     user@host# set no-arp
     ```

   - For DHCP relay:

     ```
     [edit forwarding-options dhcp-relay overrides]
     user@host# set no-arp
     ```

Specifying the Maximum Number of DHCP Clients Per Interface

By default, there is no limit to the number of DHCP local server or DHCP relay clients allowed on an interface. However, you can override the default setting and specify the maximum number of clients allowed per interface, in the range 1 to 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.

NOTE: The maximum number of DHCP local server clients or DHCP relay clients can also be specified by Juniper Networks VSA 26-143 during client login. The VSA-specified value always takes precedence if the interface-client-limit number statement specifies a different number.

If the VSA-specified value differs with each client login, DHCP uses the largest limit set by the VSA until there are no clients on the interface.

To configure the maximum number of DHCP clients allowed per interface:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Configure the maximum number of clients allowed per interface. (DHCP local server and DHCP relay agent both support the interface-client-limit statement.)

   ```
   [edit system services dhcp-local-server overrides]
   user@host# set interface-client-limit number
   ```

Disabling DHCP Relay

You can disable DHCP relay on all interfaces or a group of interfaces.

To disable DHCP relay agent:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Disable the DHCP relay agent.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set "Disabling DHCP Relay"
   ```

Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers

You can configure the extended DHCP relay agent to use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers. This feature is useful in network environments where DHCP clients access services provided by multiple vendors and DHCP servers. For example, a

DHCP client might gain Internet access from a particular DHCP server provided by one vendor, and access IPTV service from a different DHCP server provided by another vendor. The option 60 string enables vendors to include vendor-specific information in DHCP client packets.

You can configure option 60 support globally or for a named group of interfaces. You can also configure option 60 support for the extended DHCP relay agent on a per logical system and per routing instance basis.

To configure the DHCP relay agent to use option 60 vendor-specific information to select a DHCP server to which to forward the client packets:

1. Specify that you want to configure option 60 support.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit relay-option-60
   ```

2. (Optional) Configure the DHCP relay to use matching option 60 strings to process client traffic.

   See "Using Matching Option 60 Strings to Process DHCP Client Traffic" on page 80.

3. (Optional) Configure the DHCP relay to use nonmatching option 60 strings to process client traffic.

   See "Using Nonmatching Option 60 Strings to Process DHCP Client Traffic" on page 83.

This topic includes the following sections:

Using Matching Option 60 Strings to Process DHCP Client Traffic

Configuring option 60 support helps you manage multivendor networks by enabling the extended DHCP relay agent to compare option 60 vendor-specific strings received in DHCP client packets against a list of ASCII or hexadecimal strings that you configure on the router.

You can configure exact match or partial match criteria for option 60 string-to-DHCP server mapping and specify either the ascii statement (to define a nonempty ASCII match string of 1 through 255 alphanumeric characters) or the hexadecimal statement (to define a hexadecimal match string of 1 through 255 hexadecimal characters [0 through 9, a through f, A through F]).

When you configure a partial match, the option 60 string can contain a superset of the configured ASCII or hexadecimal string, provided that the leftmost characters of the option 60 string entirely match the characters in the configured match string.

For a partial match, the longest match rule applies. For example, the extended DHCP relay agent matches the string “test123” before it matches the string “test”.

If the option 60 string received in the DHCP client packet matches the configured ASCII or hexadecimal string, you can define one of the following actions for the associated DHCP client packets:

- Relay client traffic to a group of specific DHCP relay servers that provide the requested client service.

  The DHCP client packet is relayed to all of the servers in the specified group that map to the vendor class identifier information provided in the option 60 string. To configure the named group of DHCP relay servers, which are also referred to as vendor-option servers, include the server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level, as described in “Configuring Server Groups” on page 86.

  The following additional considerations apply when you configure an ASCII or hexadecimal match string:

  - You can configure the same ASCII or hexadecimal match string as both an exact (equals) match and as a partial (starts-with) match. In that case, the exact string match configured with the equals statement takes precedence over the partial string match configured with the starts-with statement.
  - A server group can contain multiple server addresses and can map to more than one match string.
  - You can configure an unlimited number of match strings.
  - The use of wildcard attributes in match strings is not supported.
- Forward client traffic to a specific extended DHCP local server.
- Drop (discard) the packets. Specifying that certain DHCP client packets be dropped can be useful when DHCP clients request services that are invalid or no longer supported.

1. To configure match criteria:
   - To specify an exact, left-to-right match of the configured match string with the option 60 string, use the **vendor-option equals** statement:
     - To specify a nonempty ASCII match string.

       ```
       [edit forwarding-options dhcp-relay relay-option-60]
       user@host# set vendor-option equals ascii video55
       ```

     - To specify a hexadecimal match string.

       ```
       [edit forwarding-options dhcp-relay relay-option-60]
       user@host# set vendor-option equals hexadecimal ff
       ```

   - To specify a partial match of the configured match string with the option 60 string, use the **vendor-option starts-with** statement:
     - To specify a partial ASCII match string.

       ```
       [edit forwarding-options dhcp-relay relay-option-60]
       ```

```
user@host# set vendor-option starts-with ascii video
```

- To specify a partial hexadecimal match string.

```
[edit forwarding-options dhcp-relay relay-option-60]
user@host# set vendor-option starts-with hexadecimal ff
```

2. To configure the action to take when the DHCP client packet matches the configured ASCII or hexadecimal string:

   - To relay client traffic to a group of specific DHCP relay servers that provide the requested client service.

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set relay-server-group
     ```

     The DHCP client packet is relayed to all of the servers specified in the **server-group** statement at the [edit forwarding-options dhcp-relay] hierarchy level that map to the vendor class identifier information provided in the option 60 string.

   - To forward client traffic to a specific extended DHCP local server.

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set local-server-group
     ```

     To configure an extended DHCP local server, include the dhcp-local-server statement at the [edit system services] hierarchy level. For information about configuring and using the extended DHCP local server, see Configuring the Extended DHCP Local Server .

   - To drop (discard) the packets:

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set drop
     ```

For configuration examples that illustrate how to use matching option 60 strings to forward or drop DHCP client traffic, see “Example: Using Option 60 Strings to Forward DHCP Client Traffic” on page 100 and “Example: Using Option 60 Strings to Drop DHCP Client Traffic” on page 101.

Using Nonmatching Option 60 Strings to Process DHCP Client Traffic

If the option 60 string received in the DHCP client packet does not match the configured ASCII or hexadecimal string, you can specify the default action that the DHCP relay agent uses for the associated DHCP client packets.

In rare instances, the extended DHCP relay agent might receive a DHCP client packet with an option 60 string of zero (0) length. In this case, there is nothing in the option 60 string against which to match. As a result, such packets are treated as if they contained nonmatching option 60 strings; that is, they can be relayed to a default DHCP relay server, forwarded to a default DHCP extended local server, or dropped.

- To relay client traffic to a default extended DHCP relay server that you specify:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set default-relay-server-group relayServer16
  ```

- To forward client traffic to a default extended DHCP local server that you specify:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set default-local-server-group localServer25
  ```

- To drop (discard) the non-matching packets:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set drop
  ```

For configuration examples that illustrate how to use nonmatching option 60 strings to forward or drop DHCP client traffic, see “Example: Using Option 60 Strings to Forward DHCP Client Traffic” on page 100 and “Example: Using Option 60 Strings to Drop DHCP Client Traffic” on page 101.

Displaying a Count of Discarded DHCP Packets with Option 60 Information

To display the number of discarded DHCP client packets containing option 60 vendor-specific information, use the following operational command:

- show dhcp relay statistics

For information about using this command, see the *JUNOS Routing Protocols and Policies Command Reference*.

Enabling and Disabling Insertion of Option 82 Information

You can enable or disable support for the DHCP relay agent information option (option 82) in packets destined for a DHCP server. To enable support for the DHCP relay agent information option you use the relay-option-82 statement.

You can configure option 82 support globally or for a named group of interfaces.

To enable support for DHCP relay agent information option 82:

1. Specify that you want to configure option 82 support.

```
[edit forwarding-options dhcp-relay]
user@host# edit relay-option-82
```

2. Insert the option 82 information in DHCP packets.

   See “Configuring Agent-Circuit-Id Information” on page 84.

3. (Optional) Include an option 82 prefix with the base option 82 information.

   See “Configuring an Option 82 Prefix” on page 85.

4. (Optional) To restore the default behavior (option 82 information is not inserted into DHCP packets), do not include any subordinate statements.

```
[edit forwarding-options dhcp-relay]
user@host# set relay-option-82
```

This topic includes the following sections:

Configuring Agent-Circuit-Id Information

You use the relay-option-82 statement to enable insertion of option 82 information in DHCP packets. You must also specify at least the circuit-id statement to include the agent-circuit-id suboption (suboption 1) of the DHCP relay agent information option.

If you specify the circuit-id statement, the format of the agent-circuit id information for Fast Ethernet (fe) or Gigabit Ethernet (ge) interfaces is one of the following, depending on your network configuration:

- For Fast Ethernet or Gigabit Ethernet interfaces that do not use virtual local area networks (VLANs) or stacked VLANs (S-VLANs):

  (fe | ge)-*fpc*/*pic*/*port*

- For Fast Ethernet or Gigabit Ethernet interfaces that use VLANs:

  (fe | ge)-*fpc*/*pic*/*port*:*vlan-id*

- For Fast Ethernet or Gigabit Ethernet interfaces that use S-VLANs:

  (fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*

To enable insertion of option 82 information:

1. Specify that you want to configure option 82 support.

```
[edit forwarding-options dhcp-relay]
user@host# edit relay-option-82
```

2. Specify insertion of the agent-circuit id.

```
[edit forwarding-options dhcp-relay relay-option-82]
user@host# set circuit-id
```

Configuring an Option 82 Prefix

You can include an optional prefix to the base option 82 information in DHCP packets destined for a DHCP server.

The prefix is separated from the option 82 agent-circuit-id information by a colon (:), and can include any combination of the host-name, logical-system-name, and routing-instance-name options. The DHCP relay agent obtains the values for the host-name, logical-system-name, and routing-instance-name as follows:

- If you include the host-name option, the DHCP relay agent uses the hostname of the router configured with the host-name statement at the [edit system] hierarchy level.
- If you include the logical-system-name option, the DHCP relay agent uses the logical system name configured with the logical-system statement at the [edit logical-system] hierarchy level.
- If you include the routing-instance-name option, the DHCP relay agent uses the routing instance name configured with the routing-instance statement at the [edit routing-instances] hierarchy level or at the [edit logical-system *logical-system-name* routing-instances] hierarchy level.

If you include the hostname and either or both of the logical system name and the routing instance name in the prefix, the hostname is followed by a forward slash (/). If you include both the logical system name and the routing instance name in the prefix, these values are separated by a semicolon (;).

The following examples show several possible formats for the agent-circuit-id information when you specify the prefix statement for Fast Ethernet (fe) or Gigabit Ethernet (ge) interfaces with S-VLANs.

- If you include only the hostname in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  hostname:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

- If you include only the logical system name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  logical-system-name:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

- If you include only the routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  routing-instance-name:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

- If you include both the hostname and the logical system name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  host-name/logical-system-name:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

- If you include both the logical system name and the routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

- If you include the hostname, logical system name, and routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  host-name/logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:s*vlan-id-vlan-id*

For Fast Ethernet or Gigabit Ethernet interfaces that use VLANs but not S-VLANs, only the *vlan-id* value appears in the agent-circuit-id format. For Fast Ethernet or Gigabit Ethernet interfaces that do not use VLANs or S-VLANs, neither the *vlan-id* value nor the *svlan-id* value appears.

To configure an optional prefix with the option 82 information:

1. Specify that you want to configure option 82 support.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit relay-option-82
   ```

2. Specify insertion of the agent-circuit id.

   ```
   [edit forwarding-options dhcp-relay relay-option-82]
   user@host# set circuit-id
   ```

3. Specify that the prefix is included in the option 82 information. In this example, the prefix includes the hostname and logical system name

   ```
   [edit forwarding-options dhcp-relay relay-option-82]
   user@host# set circuit-id prefix host-name logical-system-name
   ```

Configuring Server Groups

You can configure a named group of DHCP servers for use by the extended DHCP relay agent on the router.

You specify the name of the DHCP server group and the IP addresses of one or more DHCP servers that belong to this group. You can configure a maximum of five IP addresses per named server group.

To configure a named server group:

1. Specify the name of the server group.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# set server-group myServerGroup
   ```

2. Add the IP addresses of the DHCP servers belonging to the group.

   ```
   [edit forwarding-options dhcp-relay server-group myServerGroup]
   user@host# set 192.168.100.50
   ```

```
user@host# set 192.168.100.75
```

Configuring Active Server Groups

You can configure an active server group. Using an active server group enables you to apply a common DHCP relay agent configuration to a named group of DHCP server addresses.

To configure an active server group:

- Specify the name of the active server group.

```
[edit forwarding-options dhcp-relay]
user@host# set active-server-group myServerGroup
```

To create an active server group as a global DHCP relay agent configuration option, include the active-server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level. To have the group apply only to a named group of interfaces, include the active-server-group statement at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level.

Including the active-server-group statement at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level (as a group-specific option) overrides the effect of including the active-server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level as a global option.

Attaching Dynamic Profiles to DHCP Subscriber Interfaces

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

This topic contains the following sections:

- Attaching a Dynamic Profile to All DHCP Subscriber Interfaces on page 87
- Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces on page 88

Attaching a Dynamic Profile to All DHCP Subscriber Interfaces

To attach a dynamic profile to all DHCP subscriber interfaces:

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

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

   - For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
```

```
user@host# set dynamic-profile vod-profile-west
```

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the aggregate-clients option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the use-primary option to specify that the primary dynamic profile is used. The two options are mutually exclusive.

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

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

   - To use the primary dynamic profile:

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

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

To attach a dynamic profile to a group of interfaces:

Before you begin:

- Configure the interface group.

  See “Grouping Interfaces with Common DHCP Configurations” on page 53.

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

   - For DHCP local server:

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

   - For DHCP relay agent:

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

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the aggregate-clients option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the use-primary option to specify that the primary dynamic profile is used. The two options are mutually exclusive.

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

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

- To use the primary dynamic profile:

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

Related Topics

- Dynamic Profiles Overview on page 245
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 50
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 288

Verifying and Managing DHCP Relay Configuration

Purpose View or clear address bindings or statistics for extended DHCP relay agent clients:

Action

- To display the address bindings for extended DHCP relay agent clients:

```
user@host> show dhcp relay binding
```

- To display extended DHCP relay agent statistics:

```
user@host> show dhcp relay statistics
```

- To clear the binding state of DHCP relay agent clients:

```
user@host> clear dhcp relay binding
```

- To clear all extended DHCP relay agent statistics:

```
user@host> clear dhcp relay statistics
```

Related Topics

- For more information, see the *JUNOS System Basics and Services Command Reference*

Tracing Extended DHCP Operations

Both the extended DHCP local server and the extended DHCP relay agent support tracing operations. DHCP tracing operations track extended DHCP operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

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

- Important events are logged in a file called jdhcpd located in the /var/log directory. You cannot change the directory (/var/log) in which trace files are located.
- When the file jdhcpd reaches 128 kilobytes (KB), it is renamed jdhcpd.0, then jdhcpd.1, and so on, until there are three trace files. Then the oldest trace file (jdhcpd.2) 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 *JUNOS System Log Messages Reference*.)

- Log files can be accessed only by the user who configures the tracing operation.

To configure DHCP local server and DHCP relay agent tracing operations:

1. Specify that you want to configure tracing options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit traceoptions
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit traceoptions
     ```

2. (Optional) Configure the name for the file used for the trace output.

   See "Configuring the Extended DHCP Log Filename" on page 63.

3. (Optional) Configure the number and size of the log files.

   See "Configuring the Number and Size of Extended DHCP Log Files" on page 63.

4. (Optional) Configure access to the log file.

   See "Configuring Access to the Extended DHCP Log File" on page 63.

5. (Optional) Configure a regular expression to filter logging events.

   See "Configuring a Regular Expression for Extended DHCP Lines to Be Logged" on page 64.

6. (Optional) Configure flags to filter the operations to be logged.

   See "Configuring the Extended DHCP Tracing Flags" on page 64.

The extended DHCP traceoptions operations are described in the following sections:

Configuring the Extended DHCP Log Filename

By default, the name of the file that records trace output is jdhcpd. You can specify a different name by including the file option:

To configure the filename for DHCP local server and DHCP relay agent tracing operations:

- Specify the name of the file used for the trace output. (DHCP local server and DHCP relay agent both support the file option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1
```

Configuring the Number and Size of Extended DHCP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed *filename*.0, then *filename*.1, and so on, until there are three trace files. Then the oldest trace file (*filename*.2) 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 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 renamed *filename*.0, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename*.0 is renamed *filename*.1 and *filename* is renamed *filename*.0. This process repeats until there are 20 trace files. Then the oldest file (*filename*.19) is overwritten by the newest file (*filename*.0).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output. (DHCP local server and DHCP relay agent both support the files and size options for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 files 20 size 2097152
```

Configuring Access to the Extended DHCP Log File

By default, log files can be accessed only by the user who configures the tracing operation. 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. (DHCP local server and DHCP relay agent both support the world-readable option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 world-readable
```

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

- Configure the log file to be no-world-readable. (DHCP local server and DHCP relay agent both support the no-world-readable option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 no-world-readable
```

Configuring a Regular Expression for Extended DHCP Lines to Be Logged

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

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

To configure regular expressions to be matched:

- Configure the regular expression. (DHCP local server and DHCP relay agent both support the match option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file dhcp_logfile_1 match regex
```

Configuring the Extended DHCP Tracing Flags

By default, only important events are logged. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

Flag	Description
all	Trace all events
auth	Trace authentication events
database	Trace database events
fwd	Trace firewall process events
general	Trace miscellaneous events
ha	Trace high availability-related events
interface	Trace interface operations
io	Trace I/O operations
packet	Trace packet decoding operations
packet-option	Trace DHCP option decoding operations
rpd	Trace routing protocol process events

Flag	Description
rtstock	Trace routing socket operations
session-db	Trace session database events
state	Trace changes in state
ui	Trace user interface operations

To configure the flags for the events to be logged:

- Configure the flags. (DHCP local server and DHCP relay agent both support the flag option for the traceoptions statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set flag packet-option
```

Chapter 7

AAA and Remote Subscriber Access Configuration Examples

Example: Configuring RADIUS-Based Subscriber Authentication and Accounting

This section shows an example RADIUS-based authentication and accounting configuration.

```
[edit access]
radius-server {
    192.168.1.250 {
        port 1812;
        accounting-port 1813;
        retry 3;
        secret &tIUEI*7688+;
        source-address 192.168.1.100;
        timeout 45;
    }
    192.168.1.251 {
        port 1812;
        accounting-port 1813;
        retry 3;
        secret $Dyu*UY(877-;
        source-address 192.168.1.100;
        timeout 30;
    }
    192.168.1.252 {
```

```
        port 1812;
        secret $Dyu*UY(877-;
    }
}
profile isp-bos-metro-fiber-basic {
    authentication {
        order radius none;
    }
    accounting {
        order radius;
        accounting-stop-on-access-deny;
        accounting-stop-on-failure;
        immediate-update;
        statistics time;
        update-interval 12;
    }
    radius {
        authentication-server 192.168.1.251 192.168.1.252;
        accounting-server 192.168.1.250 192.168.1.251;
        options {
            accounting-session-id-format decimal;
            nas-identifier 56;
            override-nas-information;
        }
        attributes {
            ignore {
                framed-ip-netmask;
            }
            exclude {
                accounting-delay-time [accounting-start accounting-stop];
                accounting-session-id [access-request accounting-on accounting-off
                accounting-start accounting-stop];
                dhcp-gi-address [access-request accounting-start accounting-stop];
                dhcp-mac-address [access-request accounting-start accounting-stop];
                nas-identifier [access-request accounting-start accounting-stop];
                nas-port [accounting-start accounting-stop];
                nas-port-id [accounting-start accounting-stop];
                nas-port-type [access-request accounting-start accounting-stop];
            }
        }
    }
}
[edit logical-systems isp-bos-metro-12 routing-instances isp-cmbrg-12-32]
interfaces {
    lo0 {
        unit 0 {
            family inet {
                address 192.168.1.100/24;
            }
        }
    }
    ge-0/0/0 {
        vlan-tagging;
        unit 0 {
            vlan-id 200;
            family inet {
```

```
            unnumbered-address lo0.0;
          }
        }
      }
    }
```

Example: Configuring an Address-Assignment Pool

This section shows an example address-assignment pool configuration. The configuration includes the **dhcp-attributes** statement, indicating that the pool is used for DHCP clients.

```
[edit access]
address-assignment {
  pool isp_1 family inet {
    network 192.168.0.0/16;
    range southeast {
      low 192.168.102.2 high 192.168.102.254;
    }
    range northeast {
      low 192.168.119.2 high 192.168.119.250;
    }
    host svale6.boston.net {
    hardware-address 90:00:00:01:00:01;
    ip-address 192.168.44.12;
  }
  dhcp-attributes {
    option-match {
      option-82 {
        circuit-id fiber range northeast;
      }
      option-82 {
        circuit-id cable_net range southeast;
      }
    }
    boot-file boot.client;
    boot-server 192.168.200.100;
    grace-period 3600;
    maximum-lease-time 18000;
    netbios-node-type p-node;
  }
  router 192.168.44.44 192.168.44.45;
  }
}
```

This example creates address-assignment pool **isp-1**, which contains two named address ranges, **southeast** and **northeast**. The address-assignment pool also contains a static binding for client **host sval6.boston.net**. If the option 82 circuit-id entry matches the string **fiber**, then DHCP assigns the client an address from the **northeast** range. If the option 82 circuit-id matches the string **cable_net**, DHCP assigns an address from the **southeast** range.

Example: Minimum Extended DHCP Local Server Configuration

The following example shows the minimum configuration you need to use the extended DHCP local server on the router:

```
[edit system services]
dhcp-local-server {
    group group_one {
        interface fe-0/0/2.0;
    }
}
```

This example creates the server group named group_one, and specifies that the DHCP local server is enabled on interface fe-0/0/2.0 within the group. The DHCP local server uses the default pool match configuration of ip-address-first.

Example: Extended DHCP Local Server Configuration with Optional Pool Matching

The following example shows an extended DHCP local server configuration that includes optional pool matching and interface groups. This configuration specifies that the DHCP local server uses option 82 information to match the named address range for client IP address assignment. The option 82 matching must also be included in the address-assignment pool configuration.

```
[edit system services]
dhcp-local-server {
    group group_one {
        interface fe-0/0/2.0;
        interface fe-0/0/2.1;
    }
    group group_two {
        interface fe-0/0/3.0;
        interface fe-0/0/3.1;
    }
    pool-match-order {
        ip-address-first;
        option-82;
    }
}
```

Example: Minimum DHCP Relay Agent Configuration

The following example shows the minimum configuration you need to use the extended DHCP relay agent on the router:

```
[edit forwarding-options]
dhcp-relay {
    server-group {
        test 10.0.2.1;
    }
    active-server-group test;
    group all {
        interface fe-0/0/2.0;
```

```
    }
}
```

This example creates a server group and an active server group named test with IP address 10.0.2.1. The DHCP relay agent configuration is applied to a group named all. Within this group, the DHCP relay agent is enabled on interface fe-0/0/2.0.

Example: DHCP Relay Agent Configuration with Multiple Clients and Servers

The following example shows a more complex extended DHCP relay agent configuration for a network that includes multiple DHCP clients and DHCP servers. A more detailed explanation follows the example.

```
[edit forwarding-options]
dhcp-relay {
    server-group {
        sp-1 {
            10.0.2.1;
            10.0.2.2;
        }
        sp-2 {
            10.33.2.1;
            10.33.2.2;
            10.33.2.3;
        }
    }
    active-server-group sp-1;
    overrides layer2-unicast-replies;
    group clients_a {
        relay-option-82 circuit-id;
        interface fe-1/0/1.1;
        interface fe-1/0/1.2;
        interface fe-1/0/1.3;
    }
    group clients_b {
        relay-option-82 {
            circuit-id {
                prefix routing-instance-name;
            }
        }
        interface fe-1/0/1.4;
        interface fe-1/0/1.5;
        interface fe-1/0/1.6;
    }
    group eth_dslam_relay {
        active-server-group sp-2;
        overrides {
            trust-option-82;
            layer2-unicast-replies;
        }
        interface fe-1/0/1.7;
        interface fe-1/0/1.8;
        interface fe-1/0/1.9;
    }
}
```

This example creates two server-groups: sp-1, which includes DHCP server addresses 10.0.2.1 and 10.0.2.2, and sp-2, which includes DHCP server addresses 10.33.2.1, 10.33.2.2, and 10.33.2.3. The active server group to which the DHCP relay agent configuration applies is sp-1. A global override is set that causes the DHCP relay agent to use layer 2 unicast transmission to send DHCP reply packets from the DHCP server to DHCP clients during the discovery process.

The example also creates three groups of subscribers and their associated Fast Ethernet interfaces: clients_a, clients_b, and eth_dslam_relay. These groups are configured to meet different needs, as follows:

- The clients_a and clients_b groups consist of basic subscribers. The service provider for these groups inserts option 82 information in the DHCP packets that are destined for the DHCP server.
- The subscribers in eth_dslam_relay are connected to an Ethernet digital subscriber line access multiplexer (DSLAM) that functions as a layer 2 DHCP relay agent. The active server group for eth_dslam_relay is sp-2. Overrides are set for the eth_dslam_relay group that enable the DHCP relay agent to trust option 82 information and to use layer 2 unicast transmission to send DHCP reply packets to DHCP clients during discovery.

Example: Using Option 60 Strings to Forward DHCP Client Traffic

The following extended DHCP relay agent configuration shows how to use the option 60 vendor-specific information in DHCP client packets to forward client traffic to specific DHCP servers. A more detailed explanation follows the example.

```
[edit forwarding-options]
dhcp-relay {
    server-group {
        sp-1 {
            10.0.2.1;
        }
        sp-2 {
            10.33.2.1;
        }
        sp-3 {
            10.22.2.1;
        }
        sp-4 {
            10.10.2.1;
        }
    }
    active-server-group sp-1;
    relay-option-60 {
        vendor-option {
            equals {
                ascii motorola {
                    relay-server-group sp-2;
                }
            }
            starts-with {
                hexadecimal ff {
```

```
                relay-server-group sp-3;
            }
          }
          default-relay-server-group sp-4;
        }
      }
      group all {
        interface fe-0/0/2.0;
      }
    }
```

This example defines the following actions for DHCP client packets containing option 60 information:

- All packets that contain an exact match with the ASCII string “motorola” are relayed to server group sp-2.
- All packets that start with the hexadecimal string “ff” are relayed to server group sp-3.
- All packets that do not either exactly match the ASCII string “motorola” or start with the hexadecimal string “ff” are relayed to the default relay server group, sp-4.

DHCP client packets that do not contain option 60 information are relayed to the currently configured active server group, sp-1.

Server groups sp-1, sp-2, sp-3, and sp-4 in this example are configured with the server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level.

Example: Using Option 60 Strings to Drop DHCP Client Traffic

The following extended DHCP relay agent configuration shows how to use the option 60 vendor-specific information in DHCP client packets to drop client traffic. Specifying that certain DHCP client packets be dropped can be useful when DHCP clients request services that are invalid or no longer supported.

```
[edit forwarding-options]
dhcp-relay {
  server-group {
    sp-1 {
      10.0.2.1;
    }
  }
  active-server-group sp-1;
  relay-option-60 {
    vendor-option {
      drop;
    }
  }
  group all {
    interface fe-0/0/2.0;
  }
}
```

In this example, all DHCP client packets containing option 60 information are discarded (dropped), and all packets that do not contain option 60 information are relayed to the currently configured active server group, sp-1.

Chapter 8

Summary of AAA and Remote Subscriber Access Statements

accounting

Syntax

```
accounting {
    accounting-stop-on-access-deny;
    accounting-stop-on-failure;
    order [ accounting-method ];
    statistics (time);
    update-interval minutes;
}
```

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure RADIUS accounting parameters and enable RADIUS accounting for an access profile.

The remaining statements are explained separately.

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

Related Topics

- RADIUS Authentication and Accounting for Subscriber Access Management

accounting-port

Syntax accounting-port *port-number*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure the port number on which to contact the accounting server.

Options *port-number*—The port number on which to contact the accounting server. Most RADIUS servers use port number 1813 (as specified in RFC 2866).

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

Related Topics
- Router Interaction with RADIUS Servers Overview on page 18
- RADIUS Authentication and Accounting for Subscriber Access Management

accounting-server

Syntax accounting-server [*ip-address*];

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify a list of the RADIUS accounting servers used to for accounting for DHCP, L2TP, and PPP clients.

Options *ip-address*—The IP version 4 (IPv4) address.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

accounting-session-id-format

Syntax accounting-session-id-format (decimal | description);

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the format the router uses to identify the accounting session.

Options decimal—Use the decimal format.

description—Use the generic format, in the form: jnpr *interface-specifier*:*subscriber-session-id*.
Default: decimal

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

accounting-stop-on-access-deny

Syntax accounting-stop-on-access-deny;

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure RADIUS accounting to send an Acct-Stop message when the AAA server denies a client access.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

accounting-stop-on-failure

Syntax accounting-stop-on-failure;

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure RADIUS accounting to send an Acct-Stop message when client access fails AAA but the AAA server grants access.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

active-server-group

Syntax active-server-group *server-group-name*;

Hierarchy Level [edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information Statement introduced in JUNOS Release 8.3.

Description Apply a DHCP relay agent configuration to the named group of DHCP server addresses.

You can include the active-server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level as a global DHCP relay agent configuration option, or at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level as a DHCP relay agent configuration option that applies only to a named group of interfaces.

Including the active-server-group statement at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level as a group-specific option overrides use of the active-server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level as a global option.

Options *server-group-name*—Name of the group of DHCP server addresses to which the DHCP relay agent configuration applies.

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

Related Topics
- Configuring the Extended DHCP Relay Agent

address-assignment

Syntax

```
address-assignment {
    pool pool-name family inet {
        network address-or-prefix</subnet-mask>;
        range range-name {
            low lower-limit high upper-limit;
        }
        host hostname {
            hardware-address mac-address;
            ip-address ip-address;
        }
        dhcp-attributes {
            [protocol-specific attributes]
        }
    }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure address-assignment pools that can be used by different client applications.

Options *pool-name*—Name assigned to an address-assignment pool.

The remaining statements are explained separately.

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

Related Topics

- Configuring Address-Assignment Pools on page 37

always-write-giaddr

Syntax always-write-giaddr;

Hierarchy Level
[edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 8.3.

Description Overwrite the gateway IP address (giaddr) of every DHCP packet with the giaddr of the DHCP relay agent before forwarding the packet to the DHCP server.

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

Related Topics
- Extended DHCP Local Server Overview on page 46

always-write-option-82

Syntax always-write-option-82;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 8.3.

Description Override the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server. The use of this option causes the DHCP relay agent to perform one of the following actions, depending on how it is configured:

- If the DHCP relay agent is configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the DHCP packets and inserts the new values before forwarding the packets to the DHCP server.
- If the DHCP relay agent is not configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the packets, but does not add any new values before forwarding the packets to the DHCP server.

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

Related Topics
- Extended DHCP Local Server Overview on page 46

attributes

Syntax

```
attributes {
    ignore {
        framed-ip-netmask;
        input-filter;
        logical-system:routing-instance;
        output-filter;
    }
    exclude {
        accounting-authentic [ accounting-on | accounting-off ];
        accounting-delay-time [ accounting-on | accounting-off ];
        accounting-session-id [ access-request | accounting-on | accounting-off |
            accounting-stop ];
        accounting-terminate-cause [ accounting-off ];
        called-station-id [ access-request | accounting-start | accounting-stop ];
        calling-station-id [ access-request | accounting-start | accounting-stop ];
        class [ accounting-start | accounting-stop ];
        dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
        dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
        output-filter [ accounting-start | accounting-stop ];
        event-timestamp [ accounting-on | accounting-off | accounting-start | accounting-stop
            ];
        framed-ip-address [ accounting-start | accounting-stop ];
        framed-ip-netmask [ accounting-start | accounting-stop ];
        input-filter [ accounting-start | accounting-stop ];
        input-gigapackets [ accounting-stop ];
        input-gigawords [ accounting-stop ];
        interface-description [ access-request | accounting-start | accounting-stop ];
        nas-identifier [ access-request | accounting-on | accounting-off | accounting-start |
            accounting-stop ];
        nas-port [ access-request | accounting-start | accounting-stop ];
        nas-port-id [ access-request | accounting-start | accounting-stop ];
        nas-port-type [ access-request | accounting-start | accounting-stop ];
        output-gigapackets [ accounting-stop ];
        output-gigawords [ accounting-stop ];
    }
}
```

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify how the router processes RADIUS attributes.

The statements are explained separately.

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

Related Topics

- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 22

authentication

Syntax

```
authentication {
    password password-string;
    username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 <circuit-id> <remote-id>;
        routing-instance-name;
        user-prefix user-prefix-string;
    }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit system services dhcp-local-server],
[edit system services dhcp-local-server group *group-name*]

Release Information

Statement introduced in JUNOS Release 9.1.

Description

Configure the parameters the router sends to the external AAA server. A group configuration takes precedence over a global DHCP relay or DHCP local server configuration.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Using External AAA Authentication Services with DHCP on page 51

authentication

Syntax

```
authentication {
    password password-string;
    username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 [circuit-id] [remote-id];
        routing-instance-name;
        user-prefix user-prefix-string;
    }
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information

Statement introduced in JUNOS Release 9.1.

Description

Configure the parameters the router sends to the external AAA server. A group configuration takes precedence over a global DHCP relay or DHCP local server configuration.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Using External AAA Authentication Services with DHCP on page 51

authentication-order

Syntax authentication-order [*authentication-methods*];

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Set the order in which the JUNOS software tries different authentication methods when verifying that a client can access the router. For each login attempt, the software tries the authentication methods in order, from first to last.

Options radius—Verify the client using RADIUS authentication services.

password—Verify the client using the information configured at the [edit access profile *profile-name* client *client-name*] hierarchy level.

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

Related Topics
- Specifying the Authentication and Accounting Methods for Subscriber Access on page 19

authentication-server

Syntax authentication-server [*ip-address*];

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify a list of the RADIUS authentication servers used to authenticate DHCP, L2TP, and PPP clients. The servers in the list are also used as RADIUS dynamic-request servers, from which the router accepts and processes RADIUS disconnect requests, CoA requests, and dynamic service activations and deactivations.

Options *ip-address*—The IPv4 address.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

boot-file

Syntax boot-file *filename*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Set the boot file advertised to DHCP clients. After the client receives an IP address and the boot file location from the DHCP server, the client uses the boot image stored in the boot file to complete DHCP setup. This is equivalent to DHCP option 67.

Options *filename*—The location of the boot file on the boot server. The filename can include a pathname.

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

Related Topics
- Configuring Address-Assignment Pools on page 37
- boot-server

boot-server

Syntax boot-server (*address* | *hostname*);

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the name of the boot server advertised to DHCP clients. The client uses a boot file located on the boot server to complete DHCP setup. This is equivalent to DHCP option 66.

Options
- *address*—The IPv4 address of a boot server.
- *hostname*—The fully qualified hostname of a boot server.

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

Related Topics
- Configuring Address-Assignment Pools on page 37
- boot-file

circuit-id

Syntax circuit-id *value* range *named-range*;

Hierarchy Level [edit access address-assignment pool *pool-name* dhcp-attributes option-match option-82]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the address-assignment pool named-range to use for a particular option 82 Agent Circuit ID value.

Options
- circuit-id *value*—The string for the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option (option 82) in DHCP packets.
- range *named-range*—The name of the address-assignment pool range to use.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

circuit-id

Syntax

```
circuit-id {
    prefix host-name logical-system-name routing-instance-name;
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay relay-option-82],
[edit forwarding-options dhcp-relay group *group-name* relay-option-82],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-82],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-82],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82]

Release Information

Statement introduced in JUNOS Release 8.3.

Description

Include the agent-circuit-id suboption (suboption 1) of the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server.

The format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces that do not use virtual local area networks (VLANs) or stacked VLANs (S-VLANs) is as follows:

(fe | ge)-*fpc*/*pic*/*port*

The format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces that use VLANs is as follows:

(fe | ge)-*fpc*/*pic*/*port*:*vlan-id*

The format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces that use S-VLANs is as follows:

(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id-vlan-id*

The remaining statement is explained separately.

Required Privilege Level

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

Related Topics

- Extended DHCP Local Server Overview on page 46

circuit-type

Syntax circuit-type;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the circuit type is concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

circuit-type

Syntax circuit-type;

Hierarchy Level [edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the circuit type is concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

default-local-server-group

Syntax default-local-server-group *local-server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option]

Release Information Statement introduced in JUNOS Release 9.0.

Description Forward DHCP client packets to a default extended DHCP local server when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet does not match the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent forwards the client packets to the specified default DHCP local server group configured with the dhcp-local-server statement at the [edit system services] hierarchy level.

Options *local-server-group-name*—Name of the default extended DHCP local server group.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

default-relay-server-group

Syntax default-relay-server-group *server-group-name*;

Hierarchy Level [edit forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option]

Release Information Statement introduced in JUNOS Release 9.0.

Description Relay DHCP client packets to a default group of extended DHCP relay servers when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet does not match the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent relays the client packets to the specified default group of servers configured with the server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level.

Options *server-group-name*—Name of the default DHCP relay server group.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

delimiter

Syntax delimiter *delimiter-character*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the character used as the delimiter between the concatenated components of the username. The semicolon (;) cannot be used as a delimiter.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

delimiter

Syntax delimiter *delimiter-character*;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances a*routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the character used as the delimiter between the concatenated components of the username. You cannot use the semicolon (;) as a delimiter.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

dhcp-attributes

Syntax

```
dhcp-attributes {
   option-match {
      option-82 {
         circuit-id value range named-range;
         remote-id value range named-range;
      }
   }
   boot-file filename;
   boot-server (address | hostname);
   domain-name domain-name;
   grace-period seconds;
   maximum-lease-time seconds;
   name-server [ server-list ];
   netbios-node-type node-type;
   option {
      [ (id-number option-type option-value)
      (id-number array option-type option-value) ];
   }
   router [ router-list ];
   tftp-server address;
   wins-server [ server-list ];
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure address pools that can be used by different client applications.

The remaining statements are explained separately.

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

Related Topics

- Configuring Address-Assignment Pools on page 37

dhcp-local-server

Syntax

```
dhcp-local-server {
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            mac-address;
            option-60;
            option-82 <circuit-id> <remote-id>;
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
    group group-name {
        authentication {
        password password-string;
            username-include {
                circuit-type;
                delimiter delimiter-character;
                domain-name domain-name-string;
                logical-system-name;
                mac-address;
                option-60;
                option-82 <circuit-id> <remote-id>;
                routing-instance-name;
                user-prefix user-prefix-string;
            }
        dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
        }
        interface interface-name [upto upto-interface-name] [exclude];
        overrides {
            interface-client-limit number;
            no-arp;
            }
        }
    }
    overrides {
        interface-client-limit number;
        no-arp;
    }
    pool-match-order {
        ip-address-first;
        option-82;
    }
    traceoptions {
        file filename <files number> <size size> <world-readable | no-world-readable>
        <match regex>;
        flag flag;
```

```
    }
}
```

Hierarchy Level

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

Release Information

Statement introduced in JUNOS Release 9.0.

Description

Configure Dynamic Host Configuration Protocol (DHCP) local server options on the router and enable the router to function as an extended DHCP local server. The DHCP local server receives DHCP request and reply packets from DHCP clients and then responds with an IP address and other optional configuration information to the client.

The DHCP local server supports the attachment of dynamic profiles and also interacts with the local AAA Service Framework to use back-end authentication servers, such as RADIUS, to provide subscriber authentication. You can configure dynamic profile and authentication support on a global basis or for a specific group of interfaces.

The DHCP local server also supports the use of JUNOS software address-assignment pools or external authorities, such as RADIUS, to provide the client address and configuration information.

The extended DHCP local server is incompatible with the J-series DHCP server and is not supported on the J-series Services Router. Also, the DHCP local server and the DHCP/BOOTP relay, which are configured under the [edit forwarding-options helpers] hierarchy level, cannot both be enabled on the router at the same time. The extended DHCP local server is fully compatible with the extended DHCP relay feature.

NOTE: When you configure the dhcp-local-server statement at the routing instance hierarchy level, you must use a routing instance type of virtual-router.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Extended DHCP Local Server Overview on page 46
- address-assignment
- dhcp-attributes

dhcp-relay

Syntax

```
dhcp-relay {
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            mac-address;
            option-60;
            option-82 [circuit-id] [remote-id];
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
    }
    overrides {
        always-write-giaddr;
        always-write-option-82;
        interface-client-limit number;
        no-arp;
        layer2-unicast-replies;
        trust-option-82;
        disable-relay;
    }
    relay-option-60 {
        vendor-option {
            (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
                (default-relay-server-group server-group-name |
                default-local-server-group local-server-group-name |
                drop);
            }
            (default-relay-server-group server-group-name |
            default-local-server-group local-server-group-name |
            drop);
        }
    }
    relay-option-82 {
        circuit-id {
            prefix host-name logical-system-name routing-instance-name;
        }
    }
    server-group {
        server-group-name {
            server-ip-address;
        }
    }
    active-server-group server-group-name;
    group group-name {
        active-server-group server-group-name;
```

```
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            mac-address;
            option-60;
            option-82 [circuit-id] [remote-id];
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
    overrides {
        always-write-giaddr;
        always-write-option-82;
        interface-client-limit number;
        layer2-unicast-replies;
        no-arp;
        trust-option-82;
        disable-relay;
    }
    relay-option-60 {
        vendor-option {
            (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
                (default-relay-server-group server-group-name |
                default-local-server-group local-server-group-name |
                drop);
            }
            (default-relay-server-group server-group-name |
            default-local-server-group local-server-group-name |
            drop);
        }
    }
    relay-option-82 {
        circuit-id {
            prefix host-name logical-system-name routing-instance-name;
        }
    }
    interface interface-name [upto upto-interface-name] [exclude];
}
traceoptions {
    flag all;
    flag database;
    flag state;
    flag interface;
    flag rtsock;
    flag packet;
    flag packet-option;
    flag io;
    flag ha;
    flag ui;
    flag general;
    flag fwd;
```

```
        flag rpd;
        file file-name {
            <files number>;
            <size maximum-file-size>;
            <match regex>;
            <world-readable | no-world-readable>;
        }
    }
}
```

Hierarchy Level

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

Release Information

Statement introduced in JUNOS Release 8.3.
traceoptions option introduced in JUNOS Release 8.5.
relay-option-60 option introduced in JUNOS Release 9.0.
authentication option introduced in JUNOS Release 9.1.

Description

Configure extended Dynamic Host Configuration Protocol (DHCP) relay options on the router and enable the router to function as a DHCP relay agent. A DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server.

The DHCP relay supports the attachment of dynamic profiles and also interacts with the local AAA Service Framework to use back-end authentication servers, such as RADIUS, to provide subscriber authentication. You can attach dynamic profiles and configure authentication support on a global basis or for a specific group of interfaces.

The extended DHCP relay agent options configured with the dhcp-relay statement are incompatible with the DHCP/BOOTP relay agent options configured with the bootp statement. As a result, the extended DHCP relay agent and the DHCP/BOOTP relay agent cannot both be enabled on the router at the same time.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Extended DHCP Local Server Overview on page 46
- Using External AAA Authentication Services with DHCP on page 51

disable-relay

Syntax disable-relay;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 8.3.

Description Disable DHCP relay on specific interfaces in a group.

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

Related Topics
- Configuring the Extended DHCP Relay Agent

domain-name

Syntax domain-name *domain-name*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the name of the domain in which clients search for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified. This is equivalent to DHCP option 15.

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

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

Related Topics
- Configuring Address-Assignment Pools on page 37

domain-name

Syntax domain-name *domain-name-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the domain name that is concatenated with the username during the subscriber authentication process.

Options *domain-name-string*—The domain name formatted string.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

domain-name

Syntax domain-name *domain-name-string*;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances a*routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the domain name that is concatenated with the username during the subscriber authentication process.

Options *domain-name-string*—The domain name formatted string.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

drop

Syntax drop;

Hierarchy Level [edit forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in JUNOS Release 9.0.

Description Drop (discard) DHCP client packets when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

To drop DHCP client packets that contain an option 60 string that matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, include the drop statement at the [edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)] hierarchy level.

To drop DHCP client packets that contain an option 60 string that does *not* match the ASCII or hexadecimal match string and match criteria (exact match or partial

match) that you specify, include the drop statement at the [edit forwarding-options dhcp-relay relay-option-60 vendor-option] hierarchy level.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

dynamic-profile

Syntax dynamic-profile *profile-name* (aggregate-clients | use-primary *primary-profile-name*);

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit system services dhcp-local-server],
[edit system services dhcp-local-server group *group-name*]

Release Information Statement introduced in JUNOS Release 9.2.
aggregate-clients and use-primary options introduced in JUNOS Release 9.3.

Description Specify the dynamic profile that is attached to a group of interfaces or to all interfaces.

The remaining statements are explained separately.

Options
aggregate-clients—Enable multiple DHCP subscribers to share the same VLAN logical interface.

profile-name—Name of the dynamic profile.

use-primary *primary-profile-name*—Name of the dynamic profile to configure as the primary dynamic profile. The primary dynamic profile is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

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

Related Topics
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

dynamic-profile

Syntax dynamic-profile *profile-name* (aggregate-clients | use-primary *primary-profile-name*);

Hierarchy Level [edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information Statement introduced in JUNOS Release 9.2.
aggregate-clients and use-primary options introduced in JUNOS Release 9.3.

Description Specify the dynamic profile that is attached to a group of interfaces or to all interfaces.

The remaining statements are explained separately.

Options aggregate-clients—Enable multiple DHCP subscribers to share the same VLAN logical interface.

profile-name—Name of the dynamic profile.

use-primary *primary-profile-name*—Name of the dynamic profile to configure as the primary dynamic profile. The primary dynamic profile is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

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

Related Topics
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

ethernet-port-type-virtual

Syntax ethernet-port-type-virtual;

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the physical port type the router uses to authenticate clients. The port type is passed in RADIUS attribute 61 (NAS-Port-Type). This statement specifies a port type of virtual; by default the router passes a port type of ethernet in RADIUS attribute 61.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

exclude

Syntax

```
exclude {
    accounting-authentic [ accounting-on | accounting-off ];
    accounting-delay-time [ accounting-on | accounting-off ];
    accounting-session-id [ access-request | accounting-on | accounting-off | accounting-stop
        ];
    accounting-terminate-cause [ accounting-off ];
    called-station-id [ access-request | accounting-start | accounting-stop ];
    calling-station-id [ access-request | accounting-start | accounting-stop ];
    class [ accounting-start | accounting-stop ];
    dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
    dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
    output-filter [ accounting-start | accounting-stop ];
    event-timestamp [ accounting-on | accounting-off | accounting-start | accounting-stop
        ];
    framed-ip-address [ accounting-start | accounting-stop ];
    framed-ip-netmask [ accounting-start | accounting-stop ];
    input-filter [ accounting-start | accounting-stop ];
    input-gigapackets [ accounting-stop ];
    input-gigawords [ accounting-stop ];
    interface-description [ access-request | accounting-start | accounting-stop ];
    nas-identifier [ access-request | accounting-on | accounting-off | accounting-start |
        accounting-stop ];
    nas-port [ access-request | accounting-start | accounting-stop ];
    nas-port-id [ access-request | accounting-start | accounting-stop ];
    nas-port-type [ access-request | accounting-start | accounting-stop ];
    output-gigapackets [ accounting-stop ];
    output-gigawords [ accounting-stop ];
}
```

Hierarchy Level [edit access profile *profile-name* radius attributes]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the router to exclude the specified attributes from the specified type of RADIUS message.

Not all attributes are available in all types of RADIUS messages. By default, the router includes the specified attributes in RADIUS Access-Request, Acct-On, Acct-Off, Acct-Start, and Acct-Stop messages.

Options RADIUS attribute type—RADIUS attribute or Juniper Networks VSA number and name.

- accounting-authentic—RADIUS attribute 45, Acct-Authentic.
- accounting-delay-time—RADIUS attribute 41, Acct-Delay-Time.
- accounting-session-id—RADIUS attribute 44, Acct-Session-Id.
- accounting-terminate-cause—RADIUS attribute 49, Acct-Terminate-Cause.
- called-station-id—RADIUS attribute 30, Called-Station-Id.

- calling-station-id—RADIUS attribute 31, Calling-Station-Id.
- class—RADIUS attribute 25, Class.
- dhcp-gi-address—Juniper VSA 26-57, DHCP-GI-Address.
- dhcp-mac-address—Juniper VSA 26-56, DHCP-MAC-Address.
- event-timestamp—RADIUS attribute 55, Event-Timestamp.
- framed-ip-address—RADIUS attribute 8, Framed-IP-Address.
- framed-ip-netmask—RADIUS attribute 9, Framed-IP-Netmask.
- input-filter—Juniper VSA 26-10, Ingress-Policy-Name.
- input-gigapackets—Juniper VSA 26-42, Acct-Input-Gigapackets.
- input-gigawords—RADIUS attribute 52, Acct-Input-Gigawords.
- interface-description—Juniper VSA 26-53, Interface-Desc.
- nas-identifier—RADIUS attribute 32, NAS-Identifier.
- nas-port—RADIUS attribute 5, NAS-Port.
- nas-port-id—RADIUS attribute 87, NAS-Port-Id.
- nas-port-type—RADIUS attribute 61, NAS-Port-Type.
- output-filter—Juniper VSA 26-11, Egress-Policy-Name.
- output-gigapackets—Juniper VSA 25-43, Acct-Output-Gigapackets.
- output-gigawords—RADIUS attribute 53, Acct-Output-Gigawords.

RADIUS message type

- access-request—RADIUS Access-Accept messages.
- accounting-off—RADIUS Accounting-Off messages.
- accounting-on—RADIUS Accounting-On messages.
- accounting-start—RADIUS Accounting-Start messages.
- accounting-stop—RADIUS Accounting-Stop messages.

Required Privilege Level

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

Related Topics ■ Configuring RADIUS Server Parameters for Subscriber Access on page 21

grace-period

Syntax grace-period *seconds*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the amount of time that the client retains the address lease after the lease expires. The address cannot be reassigned to another client during the grace period.

Options *seconds*—Number of seconds the lease is retained.
Range: 0 through 4,294,967,295 seconds
Default: 0 (no grace period)

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

Related Topics ■ Configuring Address-Assignment Pools on page 37

group

Syntax

```
group group-name {
    authentication {
        option-60 password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            mac-address;
            option-60;
            option-82 <circuit-id> <remote-id>;
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
    interface interface-name [upto upto-interface-name] [exclude];
    overrides {
        interface-client-limit number;
        no-arp;
    }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit system services dhcp-local-server]

Release Information

Statement introduced in JUNOS Release 9.0.

Description

Configure a group of interfaces that have a common configuration, such as authentication parameters. A group must contain at least one interface.

Options

group-name—Name of the group.

Required Privilege Level

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

Related Topics

- Extended DHCP Local Server Overview on page 46
- Using External AAA Authentication Services with DHCP on page 51
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

group

Syntax

```
group group-name {
    active-server-group server-group-name;
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            mac-address;
            option-60;
            option-82 [circuit-id] [remote-id];
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
    overrides {
        always-write-giaddr;
        always-write-option-82;
        interface-client-limit number;
        layer2-unicast-replies;
        no-arp;
        trust-option-82;
        disable-relay;
    }
    relay-option-60 {
        vendor-option {
            (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
                (default-relay-server-group server-group-name |
                default-local-server-group local-server-group-name |
                drop);
            }
            (default-relay-server-group server-group-name |
            default-local-server-group local-server-group-name |
            drop);
        }
    }
    relay-option-82 {
        circuit-id {
            prefix host-name logical-system-name routing-instance-name;
        }
    }
    interface interface-name [upto upto-interface-name] [exclude];
}
```

Hierarchy Level

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

Release Information Statement introduced in JUNOS Release 8.3.

Description Specify the name of a group of interfaces that have a common DHCP relay agent configuration. A group must contain at least one interface.

The statements configured at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level apply only to the named group of interfaces, and override any global DHCP relay agent settings configured with the same statements at the [edit forwarding-options dhcp-relay] hierarchy level.

Options *group-name*—Name of a group of interfaces that have a common DHCP relay agent configuration.

The remaining statements are explained separately.

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

Related Topics

- Configuring the Extended DHCP Relay Agent
- Using External AAA Authentication Services with DHCP on page 51
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

hardware-address

Syntax hardware-address *mac-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet host *hostname*]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the MAC address of the client. This is the hardware address that identifies the client on the network.

Options *mac-address*—The MAC address of the client.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

host

Syntax
```
host hostname {
   hardware-address  mac-address;
   ip-address ip-address;
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure a static binding for the specified client.

Options *hostname*—Name of the client.

The remaining statements are explained separately.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

ignore

Syntax
```
ignore {
    framed-ip-netmask;
    input-filter;
    logical-system:routing-instance;
    output-filter;
}
```

Hierarchy Level [edit access profile *profile-name* radius attributes]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the router to ignore the specified attributes in RADIUS Access-Accept messages. By default, the router processes the attributes it receives from the external server.

Options framed-ip-netmask—Framed-IP-Netmask (RADIUS attribute 9).

input-filter—Ingress-Policy-Name (VSA 26-10).

logical-system:routing-instance—Virtual-Router (VSA 26-1).

output-filter—Egress-Policy-Name (VSA 26-11).

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

immediate-update

Syntax
```
immediate-update;
```

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the router to send an Acct-Update message to the RADIUS accounting server on receipt of a response (for example, an ACK or timeout) to the Acct-Start message.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

interface

Syntax interface *interface-name* [upto *upto-interface-name*] [exclude];

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit system services dhcp-local-server group *group-name*]

Release Information Statement introduced in JUNOS Release 9.0.
upto and exclude options introduced in JUNOS Release 9.1.

Description Specify one or more interfaces, or a range of interfaces, that are within a specified group on which the DHCP local server is enabled. You can repeat the interface *interface-name* statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. Also, you cannot use an interface that is being used by the DHCP relay agent.

Options exclude—Exclude an interface or a range of interfaces from the group.

inteface-name—The name of the interface. You can repeat this keyword multiple times.

upto-interface-name—The upper end of the range of interfaces; the lower end of the range is the interface-name entry. The interface device name of the *upto-interface-name* must be the same as the device name of the *interface-name*.

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

Related Topics
- Extended DHCP Local Server Overview on page 46
- Using External AAA Authentication Services with DHCP on page 51

interface

Syntax interface *interface-name* [upto *upto-interface-name*] [exclude];

Hierarchy Level [edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information Statement introduced in JUNOS Release 8.3.
upto and exclude options introduced in JUNOS Release 9.1.

Description Specify one or more interfaces, or a range of interfaces, that are within a specified group on which the DHCP local server is enabled. You can repeat the interface *interface-name* statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. Also, you cannot use an interface that is being used by the DHCP relay agent.

Options exclude—Exclude an interface or a range of interfaces from the group.

inteface-name—The name of the interface. You can repeat this keyword multiple times.

upto-interface-name—The upper end of the range of interfaces; the lower end of the range is the interface-name entry. The interface device name of the *upto-interface-name* must be the same as the device name of the *interface-name*.

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

Related Topics
- Configuring the Extended DHCP Relay Agent
- Using External AAA Authentication Services with DHCP on page 51

interface-client-limit

Syntax interface-client-limit *number*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit logical-systems *logical-system-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit system services dhcp-local-server overrides],
[edit system services dhcp-local-server group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 9.2.

Description Sets the maximum number of DHCP subscribers per interface allowed for a specific group or for all groups. A group specification takes precedence over a global specification for the members of that group.

Options *number*—Maximum number of clients allowed.
Values: 1 through 500,000
Default: No limit

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

Related Topics
- Extended DHCP Local Server Overview on page 46
- Overriding Default DHCP Local Server Configuration Settings on page 54

interface-client-limit

Syntax interface-client-limit *number*;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 9.2.

Description Sets the maximum number of DHCP subscribers per interface allowed for a specific group or for all groups. A group specification takes precedence over a global specification for the members of that group.

Options *number*—Maximum number of clients allowed.
Values: 1 through 500,000
Default: No limit

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

Related Topics
- Configuring the Extended DHCP Relay Agent
- Overriding the Default DHCP Relay Configuration on page 74

interface-description-format

Syntax interface-description-format [sub-interface | adapter];

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specifies the information that is included in or omitted from the interface description that the router passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the router includes both the subinterface and the adapter in the interface description.

Options sub-interface—Specifies the subinterface.

adapter—Specifies the adapter.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

ip-address

Syntax ip-address *ip-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet host *hostname*]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the reserved IP address assigned to the client.

Options *ip-address*—The IP version 4 (IPv4) address.

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

Related Topics
- Configuring Address-Assignment Pools on page 37
- Configuring Static Address Assignment on page 39

ip-address-first

Syntax ip-address-first;

Hierarchy Level [edit logical-systems *logical-system-name* system services dhcp-local-server pool-match-order],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server pool-match-order],
[edit routing-instances *routing-instance-name* system services dhcp-local-server pool-match-order],
[edit system services dhcp-local-server pool-match-order]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the extended DHCP local server to use the IP address method to determine which address-assignment pool to use. The local server uses the IP address in the giaddr if one is present in the DHCP client PDU. If no giaddr is present, the local server uses the IP address of the receiving interface to find the address-assignment pool. The DHCP local server uses this method by default when no method is explicitly specified.

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

Related Topics
- Extended DHCP Local Server Overview on page 46

layer2-unicast-replies

Syntax layer2-unicast-replies;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 8.3.

Description Override the setting of the broadcast bit in DHCP request packets and instead use the Layer 2 unicast transmission method to transmit DHCP Offer reply packets and DHCP ACK reply packets from the DHCP server to DHCP clients during the discovery process.

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

Related Topics
- Configuring the Extended DHCP Relay Agent

local-server-group

Syntax local-server-group *local-server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in JUNOS Release 9.0.

Description Forward DHCP client packets to a specific extended DHCP local server when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent forwards the client packets to the specified extended DHCP local server group configured with the dhcp-local-server statement at the [edit system services] hierarchy level.

Options *local-server-group-name*—Name of the extended DHCP local server group.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

logical-system-name

Syntax logical-system-name;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the logical system name is concatenated with the username during the subscriber authentication process. No logical system name is concatenated if the configuration is in the default logical system.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

logical-system-name

Syntax logical-system-name;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authenticationusername-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the logical system name is concatenated with the username during the subscriber authentication process. No logical system name is concatenated if the configuration is in the default logical system.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

mac-address

Syntax mac-address;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the MAC address from the client PDU is concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

mac-address

Syntax mac-address;

Hierarchy Level [edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the MAC address from the client PDU be concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

maximum-lease-time

Syntax maximum-lease-time *seconds*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the maximum length of time, in seconds, that the lease is held for a client if the client does not renew the lease. This is equivalent to DHCP option 51.

Options *seconds*—The maximum number of seconds the lease can be held.
Range: 30 through 4,294,967,295 seconds
Default: 86,400 (24 hours)

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

Related Topics
- Configuring Address-Assignment Pools on page 37

name-server

Syntax name-server [*server-list*];

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure one or more Domain Name System (DNS) name servers available to the client to resolve hostname-to-client mappings. This is equivalent to DHCP option 6.

Options *server-list*—IP addresses of the domain name servers, listed in order of preference.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

nas-identifier

Syntax nas-identifier *identifier-value*;

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the value for the client RADIUS attribute 32 (NAS-Identifier). This attribute is used for authentication and accounting requests.

Options *identifier-value*—A string in the range from 1 through 64 characters.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

nas-port-extended-format

Syntax

```
nas-port-extended-format {
    adapter-width width;
    port-width width;
    slot-width width;
    stacked-vlan-width width;
    vlan-width width;
}
```

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.

Options

adapter-width *width*—Number of bits in the adapter field.

port-width *width*—Number of bits in the port field.

slot-width *width*—Number of bits in the slot field.

stacked-vlan-width *width*—Number of bits in the SVLAN ID field.

vlan-width *width*—Number of bits in the VLAN ID field.

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

Related Topics

- Configuring RADIUS Server Parameters for Subscriber Access on page 21

netbios-node-type

Syntax netbios-node-type *node-type*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the NetBIOS node type. This is equivalent to DHCP option 46.

Options *node-type*—You can specify one of the following node types:

- b-node—Broadcast node
- h-node—Hybrid node
- m-node—Mixed node
- p-node—Peer-to-peer node

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

Related Topics
- Configuring Address-Assignment Pools on page 37

network

Syntax network *address-or-prefix</subnet-mask>*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure subnet information for an address-assignment pool.

Options
- *address-or-prefix*—IP version 4 address or prefix value.
- *subnet-mask*—Subnet mask.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

no-arp

Syntax no-arp;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit logical-systems *logical-system-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit routing-instances *routing-instance-name* system services dhcp-local-server overrides],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* overrides],
[edit system services dhcp-local-server overrides],
[edit system services dhcp-local-server group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 9.3.

Description Turn off ARP table population in a distrusted environment.

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

no-arp

Syntax no-arp;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 9.3.

Description Turn off ARP table population in a distrusted environment.

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

option

Syntax

```
option {
   [ (id-number option-type option-value)
   (id-number array option-type option-value) ];
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify user-defined options that are added to client packets.

Options

id-number—Any whole number. The ID number is used to index the option and must be unique across a DHCP server.

option-type—Any of the following types: flag, byte, string, short, unsigned-short, integer, unsigned-integer, or ip-address.

array—An option can include an array of values.

option-value—Value associated with an option. The option value must be compatible with the option type (for example, an On or Off value for a flag type).

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

Related Topics

- Configuring Address-Assignment Pools on page 37

option-60

Syntax option-60;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the payload of Option 60 (Vendor Class Identifier) from the client PDU is concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

option-60

Syntax option-60;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the payload of the Option 60 (Vendor Class Identifier) from the client PDU is concatenated with the username during the subscriber authentication process.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

option-82

Syntax

```
option-82 {
    circuit-id value range named-range;
    remote-id value range named-range;
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes option-match]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the list of option 82 suboption match criteria used to select the named address range used for the client. The server matches the option 82 value in the user PDU to the specified option 82 match criteria and uses the named address range associated with the string.

The remaining statements are explained separately.

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

Related Topics

- Configuring Address-Assignment Pools on page 37

option-82

Syntax option-82 <circuit-id> <remote-id>;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the type of Option 82 information from the client PDU that is concatenated with the username during the subscriber authentication process. You can specify either, both, or neither of the Agent Circuit ID and Agent Remote ID suboptions. If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If you specify that neither suboption is supplied, the raw payload of Option 82 from the PDU is concatenated to the username.

Options circuit-id—The string for the Agent Circuit ID suboption (suboption 1).

remote-id—The string for the Agent Remote ID suboption (suboption 2).

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

option-82

Syntax option-82;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server pool-match-order],
[edit logical-systems *logical-system-name* system services dhcp-local-server pool-match-order],
[edit routing-instances *routing-instance-name* system services dhcp-local-server pool-match-order],
[edit system services dhcp-local-server pool-match-order]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the extended DHCP local server to use the option 82 value in the DHCP client DHCP PDU together with the ip-address-first method to determine which address-assignment pool to use. You must configure the ip-address-first statement before configuring the option-82 statement. The DHCP local server first determines which address-assignment pool to use based on the ip-address-first method. Then, the local server matches the option 82 value in the client PDU with the option 82 configuration in the address-assignment pool.

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

Related Topics
- Extended DHCP Local Server Overview on page 46

option-82

Syntax option-82 <circuit-id> <remote-id>;

Hierarchy Level [edit forwarding-options dhp-relay authentication username-include],
[edit forwarding-options dhp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the type of option 82 information from the client PDU that is concatenated with the username during the subscriber authentication process. You can specify either, both, or neither the agent circuit ID nor the agent remote ID suboptions. If you specify both, the agent circuit ID is supplied first, followed by a delimiter, and then the agent remote ID. If you specify that neither suboption is supplied, the raw payload of option 82 from the PDU is concatenated to the username.

Options circuit-id—The string for the agent circuit ID suboption (suboption 1).

remote-id—The string for the agent remote ID suboption (suboption 2).

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

option-match

Syntax

```
option-match {
    option-82 {
        circuit-id value range named-range;
        remote-id value range named-range;
    }
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify a list of match criteria used to determine which named address range in the address-assignment pool to use. The extended DHCP local server matches this information to the match criteria specified in the client PDUs. For example, for option 82 match criteria, the server matches the option 82 value in the user PDU to the specified option 82 string and uses the named range associated with the string.

The remaining statements are explained separately.

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

Related Topics

- Configuring Address-Assignment Pools on page 37

options

Syntax

```
options {
    accounting-session-id-format (decimal | description);
    ethernet-port-type-virtual;
    interface-description-format [sub-interface | adapter];
    nas-identifier  identifier-value;
    nas-port-extended-format {
        adapter-width width;
        port-width width;
        slot-width width;
        stacked-vlan-width width;
        vlan-width width;
    }
    override-nas-information;
    revert-interval  interval;
    vlan-nas-port-stacked-format;
}
```

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the options used by RADIUS authentication and accounting servers.

The statements are explained separately.

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

Related Topics

- Configuring RADIUS Server Parameters for Subscriber Access on page 21

order

Syntax order [*accounting-method*]

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Set the order in which the JUNOS software tries different accounting methods for client activity. When a client logs in, the software tries the accounting methods in the specified order. RADIUS is the only method available at this release.

Options *accounting-method*—One or more accounting methods. When a client logs in, the software tries the accounting methods in the following order, from first to last.

- radius—Use RADIUS accounting.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

override-nas-information

Syntax override-nas-information;

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the information that the RADIUS client includes in broadcast accounting packets. By default, AAA broadcast accounting packets include the NAS-IP-Address and NAS-Identifier attributes of the logical-system:routing-instance that generates the accounting information. This statement configures the RADIUS client to override the default behavior and include RADIUS attribute 4 (NAS-IP-Address) and RADIUS attribute 32 (NAS-Identifier) of the logical-system:routing-instance that authenticates the client.

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

Related Topics
- Configuring RADIUS Server Parameters for Subscriber Access on page 21

overrides

Syntax

```
overrides {
    interface-client-limit number;
    no-arp;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
[edit system services dhcp-local-server],
[edit system services dhcp-local-server group *group-name*]

Release Information

Statement introduced in JUNOS Release 9.2.

Description

Override the default configuration settings for the extended DHCP local server. Specifying the **overrides** statement with no subordinate statements removes all DHCP local server overrides at that hierarchy level.

To override global DHCP local server configuration options, include the **overrides** statement and its subordinate statements at the **[edit system services dhcp-local-server]** hierarchy level. To override DHCP relay agent configuration options for a named group of interfaces, include the statements at the **[edit system services dhcp-local-server group group-name]** hierarchy level.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Extended DHCP Local Server Overview on page 46
- Overriding Default DHCP Local Server Configuration Settings on page 54

overrides

Syntax

```
overrides {
    always-write-giaddr;
    always-write-option-82;
    interface-client-limit number;
    no-arp;
    layer2-unicast-replies;
    trust-option-82;
    disable-relay;
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information

Statement introduced in JUNOS Release 8.3.

Description

Override the default configuration settings for the extended DHCP relay agent. Specifying the overrides statement with no subordinate statements removes all DHCP relay agent overrides at that hierarchy level.

To override global DHCP relay agent configuration options, include the overrides statement and its subordinate statements at the [edit forwarding-options dhcp-relay] hierarchy level. To override DHCP relay agent configuration options for a named group of interfaces, include the statements at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Configuring the Extended DHCP Relay Agent

password

Syntax password *password-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit system services dhcp-local-server authentication],
[edit system services dhcp-local-server group *group-name* authentication]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the password that is sent to the external AAA authentication server for subscriber authentication.

Options *password-string*—Authentication password.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

password

Syntax password *password-string*;

Hierarchy Level [edit forwarding-options dhcp-relay authentication],
[edit forwarding-options dhcp-relay group *group-name* authentication],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the password that is sent to the external AAA authentication server for subscriber authentication.

Options *password-string*—Authentication password.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

pool

Syntax pool *pool-name*;

Hierarchy Level [edit access address-assignment]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the name of an address-assignment pool.

Options *pool-name*—The name assigned to the address-assignment pool.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

pool-match-order

Syntax
```
pool-match-order {
    ip-address-first;
    option-82;
}
```

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit system services dhcp-local-server]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the order in which the DHCP local server uses information in the DHCP client PDU to determine how to obtain an address for the client. By default, the DHCP local server uses the ip-address-first method to determine which address pool to use.

The statements are explained separately.

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

Related Topics
- Extended DHCP Local Server Overview on page 46

port

Syntax port *port-number*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure the port number on which to contact the RADIUS server.

Options *port-number*—Port number on which to contact the RADIUS server.
Default: 1812 (as specified in RFC 2865)

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

Related Topics
- Router Interaction with RADIUS Servers Overview on page 18
- RADIUS Authentication and Accounting for Subscriber Access Management

prefix

Syntax prefix host-name logical-system-name routing-instance-name;

Hierarchy Level [edit forwarding-options dhcp-relay relay-option-82 circuit-id],
[edit forwarding-options dhcp-relay group *group-name* relay-option-82 circuit-id],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-82 circuit-id],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-82 circuit-id],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 circuit-id],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 circuit-id],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 circuit-id],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 circuit-id]

Release Information Statement introduced in JUNOS Release 8.3.

Description Add a prefix to the base option 82 agent-circuit-id information in DHCP packets destined for a DHCP server. The prefix can consist of any combination of the hostname, logical system name, and routing instance name.

If you include only the hostname, only the logical system name, or only the routing instance name in the prefix, the format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces with stacked virtual LANs (S-VLANs) is one of the following:

host-name:(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*
logical-system-name:(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*
routing-instance-name:(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*

If you include both the logical system name and the routing instance name in the prefix, the format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs is as follows:

logical-system-name;*routing-instance-name*:(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*

If you include the hostname, logical system name, and routing instance name in the prefix, the format of the agent-circuit-id information for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs is as follows:

host-name/*logical-system-name*;*routing-instance-name*:(fe | ge)-*fpc*/*pic*/*port*:s*vlan-id*-*vlan-id*

For Fast Ethernet or Gigabit Ethernet interfaces that use virtual LANs (VLANs) but not S-VLANs, only the *vlan-id* value appears in the agent-circuit-id format. For Fast Ethernet or Gigabit Ethernet interfaces that do not use VLANs or S-VLANs, neither the *vlan-id* value nor the *svlan-id* value appears.

Options

host-name—Prepend the hostname of the router configured with the host-name statement at the [edit system] hierarchy level to the agent-circuit-id information.

logical-system-name—Prepend the name of the logical system to the agent-circuit-id information.

routing-instance-name—Prepend the name of the routing instance to the agent-circuit-id information.

Required Privilege Level

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

Related Topics ■ Configuring the Extended DHCP Relay Agent

profile

Syntax

```
profile profile-name {
    authentication-order [ authentication-methods ];
    accounting {
        accounting-stop-on-access-deny;
        accounting-stop-on-failure;
        order [ accounting-method ];
        statistics (time);
        update-interval minutes;
    }
    radius {
        authentication-server [ ip-address ];
        accounting-server [ ip-address ];
        options {
            accounting-session-id-format (decimal | description);
            ethernet-port-type-virtual;
            interface-description-format [sub-interface | adapter];
            nas-identifier identifier-value;
            nas-port-extended-format {
                adapter-width width;
                port-width width;
                slot-width width;
                stacked-vlan-width width;
                vlan-width width;
            }
            override-nas-information;
            revert-interval interval;
            vlan-nas-port-stacked-format;
        }
        attributes {
            ignore {
                framed-ip-netmask;
                input-filter;
                logical-system:routing-instance;
                output-filter;
            }
            exclude
                accounting-authentic [ accounting-on | accounting-off ];
                accounting-delay-time [ accounting-on | accounting-off ];
                accounting-session-id [ access-request | accounting-on | accounting-off |
                    accounting-stop ];
                accounting-terminate-cause [ accounting-off ];
                called-station-id [ access-request | accounting-start | accounting-stop ];
                calling-station-id [ access-request | accounting-start | accounting-stop ];
                class [ accounting-start | accounting-stop ];
                dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
                dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
                output-filter [ accounting-start | accounting-stop ];
                event-timestamp [ accounting-on | accounting-off | accounting-start |
                    accounting-stop ];
                framed-ip-address [ accounting-start | accounting-stop ];
                framed-ip-netmask [ accounting-start | accounting-stop ];
```

```
            input-filter [ accounting-start | accounting-stop ];
            input-gigapackets [ accounting-stop ];
            input-gigawords [ accounting-stop ];
            interface-description [ access-request | accounting-start | accounting-stop ];
            nas-identifier [ access-request | accounting-on | accounting-off | accounting-start
              | accounting-stop ];
            nas-port [ access-request | accounting-start | accounting-stop ];
            nas-port-id [ access-request | accounting-start | accounting-stop ];
            nas-port-type [ access-request | accounting-start | accounting-stop ];
            output-gigapackets [ accounting-stop ];
            output-gigawords [ accounting-stop ];
        }
      }
    }
    radius-server server-address {
      accounting-port port-number;
      port port-number;
      retry attempts;
      routing-instance routing-instance-name;
      secret password;
      timeout source-address;
      timeout seconds;
    }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure an access profile and its subscriber access properties.

The remaining statements are explained separately.

NOTE: This topic describes the profile statement options for subscriber access management. See the *JUNOS System Basics Configuration Guide* for a complete description of the profile statement.

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

Related Topics ■ AAA Service Framework Overview on page 17

radius

Syntax

```
radius {
    authentication-server [ ip-address ];
    accounting-server [ ip-address ];
    options {
        accounting-session-id-format (decimal | description);
        ethernet-port-type-virtual;
        interface-description-format [sub-interface | adapter];
        nas-identifier identifier-value;
        nas-port-extended-format {
            adapter-width width;
            port-width width;
            slot-width width;
            stacked-vlan-width width;
            vlan-width width;
        }
        override-nas-information;
        revert-interval interval;
        vlan-nas-port-stacked-format;
    }
    attributes {
        ignore {
            framed-ip-netmask;
            input-filter;
            logical-system:routing-instance;
            output-filter;
        }
        exclude
            accounting-authentic [ accounting-on | accounting-off ];
            accounting-delay-time [ accounting-on | accounting-off ];
            accounting-session-id [ access-request | accounting-on | accounting-off |
                accounting-stop ];
            accounting-terminate-cause [ accounting-off ];
            called-station-id [ access-request | accounting-start | accounting-stop ];
            calling-station-id [ access-request | accounting-start | accounting-stop ];
            class [ accounting-start | accounting-stop ];
            dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
            dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
            output-filter [ accounting-start | accounting-stop ];
            event-timestamp [ accounting-on | accounting-off | accounting-start |
                accounting-stop ];
            framed-ip-address [ accounting-start | accounting-stop ];
            framed-ip-netmask [ accounting-start | accounting-stop ];
            input-filter [ accounting-start | accounting-stop ];
            input-gigapackets [ accounting-stop ];
            input-gigawords [ accounting-stop ];
            interface-description [ access-request | accounting-start | accounting-stop ];
            nas-identifier [ access-request | accounting-on | accounting-off | accounting-start
                | accounting-stop ];
            nas-port [ access-request | accounting-start | accounting-stop ];
            nas-port-id [ access-request | accounting-start | accounting-stop ];
            nas-port-type [ access-request | accounting-start | accounting-stop ];
```

```
            output-gigapackets [ accounting-stop ];
            output-gigawords [ accounting-stop ];
        }
    }
}
```

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the RADIUS parameters that the router uses for AAA authentication and accounting for subscribers.

The statements are explained separately.

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

Related Topics ■ Configuring RADIUS Server Parameters for Subscriber Access on page 21

radius-server

Syntax

```
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
    routing-instance routing-instance-name;
    secret password;
    timeout seconds ;
}
```

Hierarchy Level [edit access],
[edit access profile *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure RADIUS for subscriber access management, L2TP, or PPP.

To configure multiple RADIUS servers, include multiple radius-server statements. The servers are tried in order and in a round-robin fashion until a valid response is received from one of the servers or until all the configured retry limits are reached.

NOTE: This topic describes the radius-server statement options for subscriber access management. See the *JUNOS System Basics Configuration Guide* for a complete description of the radius-server statement.

Options *server-address*—Address of the RADIUS authentication server.

The remaining statements are explained separately.

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

Related Topics ■ RADIUS Authentication and Accounting for Subscriber Access Management

range

Syntax

```
range range-name {
    low lower-limit high upper-limit;
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure a named address range used within an address-assignment pool.

Options *range-name*—The name assigned to the range of addresses.

low *lower-limit*—The lower limit of an address range.

high *upper-limit*—The upper limit of an address range.

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

Related Topics

- Configuring Address-Assignment Pools on page 37

relay-option-60

Syntax

```
relay-option-60 {
    vendor-option {
        (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
            (relay-server-group server-group-name |
            local-server-group local-server-group-name |
            drop);
        }
        (default-relay-server-group server-group-name |
        default-local-server-group local-server-group-name |
        drop);
    }
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information

Statement introduced in JUNOS Release 9.0.

Description

Configure the extended DHCP relay agent to use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers, or to drop selected DHCP client packets. This feature is useful in network environments where DHCP clients access services provided by multiple vendors and DHCP servers.

You can use the relay-option-60 statement and its subordinate statements at the [edit forwarding-options dhcp-relay] hierarchy level to configure option 60 support globally, or at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level to configure option 60 support for a named group of interfaces. You can also configure option 60 support for the extended DHCP relay agent on a per logical system and per routing instance basis.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

relay-option-82

Syntax

```
relay-option-82 {
    circuit-id {
        prefix host-name logical-system-name routing-instance-name;
    }
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay],
[edit forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

Release Information

Statement introduced in JUNOS Release 8.3.

Description

Enable or disable the insertion of the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server.

If you enable insertion of option 82 information in DHCP packets, you must specify at least the circuit-id statement to include the agent-circuit-id suboption (suboption 1) of the DHCP relay agent information option. Optionally, you can also specify the prefix statement to add a prefix to the base option 82 information that consists of any combination of the hostname, logical system name, and routing instance name. Specifying the relay-option-82 statement with no subordinate statements disables insertion of option 82 information in DHCP packets, which is the default behavior.

You can use the relay-option-82 statement and its subordinate statements at the [edit forwarding-options dhcp-relay] hierarchy level to control insertion of option 82 information globally, or at the [edit forwarding-options dhcp-relay group *group-name*] hierarchy level to control insertion of option 82 information for a named group of interfaces.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Enabling and Disabling Insertion of Option 82 Information on page 83

relay-server-group

Syntax relay-server-group *server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in JUNOS Release 9.0.

Description Relay DHCP client packets to the specified group of extended DHCP relay servers when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent relays the client packets to the specified group of servers configured with the server-group statement at the [edit forwarding-options dhcp-relay] hierarchy level. A server group can contain multiple server addresses and can map to more than one ASCII or hexadecimal match string.

Options *server-group-name*—Name of the extended DHCP relay server group.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

remote-id

Syntax remote-id *value* range *named-range*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes option-match option-82]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the address-assignment pool named range to use based on the particular option 82 Agent Remote ID value.

Options remote-id *value*—The string for Agent Remote ID suboption (suboption 2) of the DHCP relay agent information option (option 82) in DHCP packets.

range *named-range*—Name of the address-assignment pool range to use.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

retry

Syntax retry *attempts*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Number of times that the router is allowed to attempt to contact a RADIUS authentication or accounting server.

Options *attempts*—Number of times that the router is allowed to attempt to contact a RADIUS server.
Range: 1 through 10
Default: 3

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management
- Router Interaction with RADIUS Servers Overview on page 18
- timeout

revert-interval

Syntax revert-interval *interval*;

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the amount of time the router waits after a server has become unreachable. The router rechecks the connection to the server when the revert-interval expires. If the server is then reachable, it is used in accordance with the order of the server list.

Options *interval*—Amount of time to wait.
Range: 60 through 4294967295 seconds
Default: 3 seconds

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

router

Syntax router [*hostnames*];

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify a list of the routers located on the client's subnet. This statement is the equivalent of DHCP option 3.

Options *router-list*—IP addresses of the routers.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

routing-instance

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure the routing instance used to send RADIUS packets to the RADIUS server.

Options *routing-instance-name*—Routing instance name.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

routing-instance-name

Syntax routing-instance-name;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authenticationusername-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the routing instance name is concatenated with the username during the subscriber authentication process. No routing instance name is concatenated if the configuration is in the default routing instance.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

routing-instance-name

Syntax routing-instance-name;

Hierarchy Level [edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify that the routing instance name is concatenated with the username during the subscriber authentication process. No routing instance name is concatenated if the configuration is in the default routing instance.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

secret

Syntax secret *password*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure the password to use with the RADIUS server. The secret password used by the local router must match that used by the server.

Options *password*—Password to use; can include spaces.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management
- Router Interaction with RADIUS Servers Overview on page 18

server-group

Syntax

```
server-group {
    server-group-name {
        server-ip-address;
    }
}
```

Hierarchy Level

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

Release Information

Statement introduced in JUNOS Release 8.3.

Description

Specify the name of a group of DHCP server addresses for use by the extended DHCP relay agent.

Options

server-group-name—Name of the group of DHCP server addresses.

server-ip-address—IP address of the DHCP server belonging to this named server group. You can configure a maximum of five IP addresses per named server group.

Required Privilege Level

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

Related Topics

- Configuring the Extended DHCP Relay Agent

source-address

Syntax source-address *source-address*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure a source address for each configured RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address.

Options *source-address*—A valid IPv4 address configured on one of the router interfaces. On M-series routers only, the source address can be an IPv6 address and the UDP source port is 514.

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

Related Topics
- Router Interaction with RADIUS Servers Overview on page 18
- RADIUS Authentication and Accounting for Subscriber Access Management

statistics

Syntax statistics (time);

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the router to collect time statistics for the sessions being managed by AAA.

Options time—Collect uptime statistics only.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

tftp-server

Syntax tftp-server *ip-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify the Trivial File Transfer Protocol (TFTP) server that the client uses to obtain the client configuration file. This is equivalent to DHCP option 150.

Options *ip-address*—IP address of the TFTP server.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

timeout

Syntax timeout *seconds*;

Hierarchy Level [edit access radius-server *server-address*],
[edit access profile *profile-name* radius-server *server-address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure the amount of time that the local router waits to receive a response from a RADIUS server.

Options *seconds*—Amount of time to wait.
Range: 1 through 90 seconds
Default: 3 seconds

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

Related Topics
- Router Interaction with RADIUS Servers Overview on page 18
- RADIUS Authentication and Accounting for Subscriber Access Management

traceoptions

Syntax

```
traceoptions {
    file filename{
        files number;
        size maximum-file-size;
        match regex;
        world-readable | no-world-readable
    }
    flag address-assignment;
    flag all;
    flag configuration;
    flag framework;
    flag ldap;
    flag local-authentication;
    flag radius;
}
```

Hierarchy Level [edit system processes general-authentication-service]

Release Information Flag for tracing address-assignment pool operations introduced in JUNOS Release 9.0.
option-name option introduced in JUNOS Release 8.3.

Description Configure tracing options.

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. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.
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:

- address-assignment—All address-assignment events
- all—All tracing operations
- configuration—Configuration events
- framework—Authentication framework events
- ldap—LDAP authentication events
- local-authentication—Local authentication events

- radius—RADIUS authentication events

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

size *size*—(Optional) Maximum size of each trace file, in 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 and filename.
Syntax: xk to specify KB, xm to specify MB, or xg to specify GB
Range: 10 KB through 1 GB
Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level

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

Related Topics ■ Tracing Address-Assignment Pool Processes on page 41

traceoptions

Syntax

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

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server],
[edit logical-systems *logical-system-name* system services dhcp-local-server],
[edit routing-instances *routing-instance-name* system services dhcp-local-server],
[edit system services dhcp-local-server]

Release Information

Statement introduced in JUNOS Release 9.0.

Description

Define tracing operations for DHCP 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. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.
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.
- auth—Trace authentication operations.
- database—Trace database events.
- fwd—Trace firewall process events.
- general—Trace miscellaneous events.
- ha—Trace high availability-related events.
- interface—Trace interface operations.
- io—Trace I/O operations.
- packet—Trace packet decoding operations.
- packet-option—Trace DHCP option decoding operations.
- rpd—Trace routing protocol process events.

- rtsock—Trace routing socket operations.
- session-db—Trace session database operations.
- state—Trace changes in state.
- ui—Trace user interface operations.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum file size, you also must specify a maximum number of trace files with the files option and filename.
Syntax: xk to specify KB, xm to specify MB, or xg to specify GB
Range: 10 KB through 1 GB
Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

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

Related Topics ■ Tracing Extended DHCP Operations on page 61

traceoptions

Syntax

```
traceoptions {
    file file-name <files number> <size size> <world-readable | no-world-readable>
    <match regex>;
    flag flag;
}
```

Hierarchy Level

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

Release Information

Statement introduced in JUNOS Release 8.5.

Description

Configure tracing operations for extended DHCP relay agent processes.

Default

If you do not include this statement, no tracing operations are performed.

Options

file-name—Name of the file to receive the output of the tracing operation. Enclose the name in quotation marks (" "). All files are placed in a file named jdhcpd in the directory /var/log. If you include the file statement, you must specify a filename.

files *number*—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.
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 events
- auth—Trace authentication events
- database—Trace database events
- fwd—Trace firewall process events
- general—Trace miscellaneous events
- ha—Trace high availability-related events
- interface—Trace interface operations
- io—Trace I/O operations
- packet—Trace packet decoding operations

- packet-option—Trace DHCP option decoding operations
- rpd—Trace routing protocol process events
- rtsock—Trace routing socket operations
- session-db—Trace session database operations
- state—Trace changes in state
- ui—Trace user interface operations

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the files option and filename.
Syntax: *x*k to specify KB, *x*m to specify MB, or *x*g to specify GB
Range: 0 bytes through 4,294,967,295 KB
Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

The remaining statements are explained separately.

Required Privilege Level

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

Related Topics ■ Tracing Extended DHCP Operations on page 61

trust-option-82

Syntax trust-option-82;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]

Release Information Statement introduced in JUNOS Release 8.3.

Description Enable processing of DHCP client packets that have a gateway IP address (giaddr) of 0 (zero) and contain option 82 information. By default, the DHCP relay agent treats such packets as if they originated at an untrusted source, and drops them without further processing.

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

Related Topics ■ Configuring the Extended DHCP Relay Agent

update-interval

Syntax update-interval *minutes*;

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure the amount of time, in minutes, that the router waits before sending a new accounting update.

Options *minutes*—Amount of time between updates, in minutes.
Range: 15 through 1440 minutes
Default: no updates

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

Related Topics ■ RADIUS Authentication and Accounting for Subscriber Access Management

username-include

Syntax

```
username-include {
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 <circuit-id> <remote-id>;
    routing-instance-name;
    user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication],
[edit system services dhcp-local-server authentication],
[edit system services dhcp-local-server group *group-name* authentication]

Release Information

Statement introduced in JUNOS Release 9.1.

Description

Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Using External AAA Authentication Services with DHCP on page 51

username-include

Syntax

```
username-include {
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 <circuit-id> <remote-id>;
    routing-instance-name;
    user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay authentication],
[edit forwarding-options dhcp-relay group *group-name* authentication],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication]

Release Information

Statement introduced in JUNOS Release 9.1.

Description

Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The statements are explained separately.

Required Privilege Level

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

Related Topics

- Using External AAA Authentication Services with DHCP on page 51

user-prefix

Syntax user-prefix *user-prefix-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication username-include],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication username-include],
[edit system services dhcp-local-server authentication username-include],
[edit system services dhcp-local-server group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the user prefix that is concatenated with the username during the subscriber authentication process.

Options *user-prefix-string*—The user prefix string.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

user-prefix

Syntax user-prefix *user-prefix-string*;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication username-include],
[edit forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication username-include],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.1.

Description Specify the user prefix that is concatenated with the username during the subscriber authentication process.

Options *user-prefix-string*—The user prefix string.

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

Related Topics
- Using External AAA Authentication Services with DHCP on page 51

vendor-option

Syntax

```
vendor-option {
    (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
        (relay-server-group server-group-name |
        local-server-group local-server-group-name |
        drop);
    }
    (default-relay-server-group server-group-name |
    default-local-server-group local-server-group-name |
    drop);
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay relay-option-60],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60]

Release Information

Statement introduced in JUNOS Release 9.0.

Description

Configure the match criteria when you use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers. The extended DHCP relay agent compares the option 60 vendor-specific strings received in DHCP client packets against the match criteria that you specify. If there is a match, you can define certain actions for the associated DHCP client packets.

The vendor-option statement enables you to specify either an exact, left-to-right match (with the equals statement) or a partial match (with the starts-with statement), and configure either an ASCII match string (with the ascii statement) or a hexadecimal match string (with the hexadecimal statement).

You can configure an unlimited number of match strings. Match strings do not support the use of wildcard attributes.

Options

equals—Exact, left-to-right match of the ASCII or hexadecimal match string with the option 60 string.

starts-with—Partial match of the ASCII or hexadecimal match string with the option 60 string. The option 60 string can contain a superset of the ASCII or hexadecimal match string, provided that the leftmost characters of the option 60 string entirely match the characters in the configured match string. When you use the starts-with statement, the longest match rule applies; that is, the router matches the string "test123" before it matches the string "test".

ascii *match-string*—ASCII match string of 1 through 255 alphanumeric characters.

hexadecimal *match-hex*—Hexadecimal match string of 1 through 255 hexadecimal characters (0 through 9, a through f, A through F).

The remaining statements are explained separately.

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

Related Topics
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 79

vlan-nas-port-stacked-format

Syntax vlan-nas-port-stacked-format;

Hierarchy Level [edit access profile *profile-name* radius options]

Release Information Statement introduced in JUNOS Release 9.1.

Description Configure RADIUS attribute 5 (NAS-Port) to include the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

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

Related Topics
- RADIUS Authentication and Accounting for Subscriber Access Management

wins-server

Syntax wins-server [*hostnames*];

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in JUNOS Release 9.0.

Description Specify one or more NetBIOS name servers (NBNS) that the client uses to resolve NetBIOS names. This is equivalent to DHCP option 44.

Options *server-list*—IP addresses of the NetBIOS name servers, listed in order of preference.

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

Related Topics
- Configuring Address-Assignment Pools on page 37

Part 3
Mobile IP Access

Chapter 9

Mobile IP Overview

This chapter describes the Mobile IP home agent, and contains the following sections:

Mobile IP Home Agent Overview

Mobile IP Home Agent Overview

Mobile IP is a tunneling-based solution that enhances the utility of JUNOS routing platforms at the edge of the network between fixed wire and wireless network domains. This tunneling-based solution enables a router on a user's home subnet to intercept and forward IP packets to users who roam beyond traditional network boundaries. Mobile IP is useful in environments where mobility is desired and the traditional land line dial-in model does not provide an adequate solution, and in environments where a wireless technology is used.

NOTE: Currently, JUNOS software does not support configuration of the Mobile IP foreign agent.

Traditionally, IP addresses are associated with a fixed network location. To achieve mobility, the mobile node assumes a secondary IP address that matches the new network and redirects the traffic bound to the primary or home address to the mobile node's new network. In the Mobile IP architecture, the two agents that accomplish this task are the home agent and the foreign agent.

When a mobile node roams into a new, foreign network, it negotiates with the foreign agent to get a secondary IP address, which is referred to as the care-of address (CoA). The mobile node registers this CoA with the home agent. The home agent then establishes a tunnel to the CoA if the tunnel is not established earlier.

NOTE: You need to establish only one tunnel between the home agent and the CoA. Demultiplexing of the traffic is done through IP address inspection.

Packets sent to the home address of the mobile node are redirected by the home agent through the tunnel to the CoA at the foreign agent. The foreign agent routes the packets to the mobile node's home address. If the mobile node's home address

is a private address or if the foreign agent implements ingress filtering, a reverse tunnel from the CoA to the home agent is required.

Mobile nodes typically belong to a virtual network, which is an address range or subnet that is not directly served by any physical, routed interface on the home network. These mobile nodes never return home to attach to a physical interface on the home agent. Traffic destined for the mobile node can be forward over any interface.

You can use the Mobile IP home agent feature to configure the home agent within the default router context. The home agent handles the following tasks:

- Registration
- Routing and forwarding

Mobile IP Registration

The home agent receives the registration requests (RRQs) on UDP port 434. The registration request contains the the home agent IP address. The home agent can support static home address allocation and dynamic home address allocation.

Home Address Assignment

The mobile node's home address can either be preconfigured, or dynamically allocated by the Mobile IP home agent. If a nonzero home address is preconfigured, the home agent processes the registration request using the home address and NAI (if the NAI is present).

If the home address is dynamically allocated, the mobile node submits a zero home address and requests the home agent to assign an IP address. The mobile node then uses the address provided by the home agent for subsequent registration requests, until the mobile node is rebooted or the registration expires.

Home address allocation is done by one of the existing authentication, authorization, and accounting (AAA) server back-end address mechanisms, such as:

- By RADIUS, in the Framed-IP-Address attribute
- From a local address pool returned by RADIUS in the Framed-Pool attribute

Authentication

The home agent authenticates the requests based on RFC 3344—IP Mobility Support for IPv4 (August 2002). By default, a AAA server is used for authentication; alternatively, you can configure local authentication parameters on the home agent. The mobile node authentication is verified and the authentication algorithm and key are retrieved by checking the security association indexed by the security parameter index (SPI) value. This verification results in the key and the authentication algorithm with which to compute an MD-5 message digest over the registration request. The Mobile IP home agent supports both HMAC-MD5 and keyed-MD5 authentication algorithms. When the result of this computation matches the authenticator, the mobile-home extension is authenticated. For local authentication, the key is limited

to a maximum of 128 bits. For AAA authentication, the key can be longer depending on the maximum length configured on the AAA server.

When HA receives the access accept from the AAA, it extracts the MN-HA key from the response. The home agent does the MN-HA authentication extension processing based on the MN-HA key by running authentication algorithm [HMAC-MD5 or Keyed-MD5] on the message to compute a hash (authenticator), which is compared with the hash value in the MN-HA extension. If the hash value matches the RRQ is considered authenticated.

If a security association is configured for the foreign agent, the foreign-home authentication extension is verified; otherwise, authentication success is based only on the mobile-home authenticator.

The home agent checks the identification (ID) field to verify that a registration message has been freshly generated by the mobile node, and is not simply being replayed by an attacker from some previous registration. The ID field represents a 64-bit Network Time Protocol (NTP)-formatted time value. The configured replay timestamp defines the tolerance time window in seconds by which a registration request timestamp and the local time of the HA can differ. By default, the timestamp must be within 7 seconds of the replay tolerance configured for the mobile node or, if that is configured, the timestamp tolerance of the home agent itself.

Re-authentication

Re-authentication is not currently supported by the authentication process. Mobile IP caches a security association for each mobile node helps overcome this limitation. When a mobile node requests re-registration or de-registration, Mobile IP refers to the cached security association for that mobile node and performs MD5 message authentication.

When the security association for the mobile node changes after the node is authenticated, the cache entry is not invalidated. Consequently, the mobile node's RRQ is rejected. In this case you must clear the binding with the mobile node so that it can de-register and then log in.

RADIUS server configuration changes relating to the subscriber do not propagate to the cache. In this case you must clear the binding with the mobile node so that it can de-register and then log in.

AAA Authentication

You can store the security associations and configuration information remotely on a RADIUS server. The home agent applies the authentication algorithm and security key to the mobile node's message. The AAA server uses Juniper Networks vendor-specific attributes (VSAs) listed in Table 16 on page 220. These VSAs are mandatory in the reply to provide the appropriate authentication algorithm and the secure key for the authentication request. If the security parameters are not retrieved, then the request for mobility service is rejected, a security violation error is logged, and no registration reply is generated.

Table 16: Juniper VSAs used by Mobile IP

Attribute Number	Attribute Name	Description	Value
26–84	Mobile-IP-Algorithm	Authentication algorithm used for Mobile-IP registration	integer: 4–octet
26–85	Mobile-IP-SPI	Security parameter index for Mobile IP registration	integer: 4–octet
26–86	Mobile-IP-Key	Security association MD5 key for Mobile IP registration	string: key
26–87	Mobile-IP-Replay	Replay timestamp for Mobile IP registration	integer: 4–octet
26–89	Mobile-IP-Lifetime	Registration lifetime for Mobile IP registration	integer: 4–octet

AAA authentication is accomplished by generating a AAA access-request to a AAA server. This is the default authentication mode, but you can include the **authenticate order aaa** statement at the [edit services mobile-ip] hierarchy level to explicitly configure AAA authentication. You cannot configure a fallback mechanism for AAA authentication. If the AAA request times out, the home agent does not fall back on the local router to determine the authentication parameters. The registration request is rejected. When the message is authenticated, the AAA server always returns either the Framed-IP-Address or Framed-Pool attribute for the user.

The presence of the mobile node's NAI and home IP address in the authentication request that the home agent sends to the AAA server is determined by their presence in the mobile node RRQ received by the home agent:

- When both the NAI and home IP address of the mobile node are present in the registration request, then the authentication request from Mobile IP to AAA has the NAI as the user name.
- When only the NAI is present in the registration request, then the NAI is used as the user name.
- When only the IP address (home address) is present in the registration request, then the IP address is used as the user name.
- When both the NAI address and the IP address are missing from the registration request, then the registration request is rejected.

Local Authentication

As an alternative to the default authentication by AAA server, you can store the security associations and configuration information locally on the router hosting the home agent. Local authentication is accomplished by querying the locally configured security parameters for the mobile node. The home agent applies the authentication algorithm and security key to the mobile node's message. If the security parameters are not available or do not match the RRQ, then the request for mobility service is rejected, a security violation error is logged, and no registration reply is generated.

For local authentication, include the **authenticate order local** statement at the [edit services mobile-ip] hierarchy level. You cannot configure a fallback mechanism for local authentication. If the local authentication fails, the home agent does not fall back on the AAA server to determine the authentication parameters. The registration request is rejected. Use the **peer** statement at the [edit services mobile-ip] hierarchy level to configure the authentication attributes on the home agent for a user identified by IP address or network address identifier (NAI). This user can be a mobile node or a foreign agent.

The authentication attributes include a security parameter index (SPI) to identify a particular security context between the home agent and the mobile node or foreign agent among the contexts available in the mobility security association. Associated with each SPI is the MD5 algorithm and key used to authenticate messages from the mobile node or foreign agent. You can also configure the replay timestamp tolerance for the mobile node or foreign agent.

Mobile IP Routing and Forwarding

The mobile node acquires a care-of address (CoA) from the foreign agent. The CoA is reachable from the mobile node, and routable from the home agent. The mobile node includes the CoA in its registration request to the home agent. After AAA or local authentication successfully processes and authenticates the RRQ and provides both the authorization parameters for the mobile node and an IP address, the home agent then sets up the data path for the mobile node and sends back a registration reply (RRP) confirming successful registration of the mobile node.

When the foreign agent receives the successful RRP from the home agent, the FA sets up the data path for the mobile node. Then it sends the RRP to the mobile node to acknowledge that the mobile node is now successfully registered and the data path between the home agent and the mobile node is in place.

The home agent supports generic routing encapsulation (GRE) and IP-in-IP tunnel encapsulation for forward and reverse tunneling. The tunnels must be statically configured. When packets destined for the mobile node reach a home agent, the home agent encapsulates the packets and tunnels them to the CoA. Packets that exceed the maximum transmission unit (MTU) value of the tunnel are dropped and an ICMP error message is sent to the source IP address. Packets without an access route are returned to the source with an ICMP destination unreachable error message. For reverse tunnels, packets are de-tunneled and forwarded towards the next hop to the destination address.

Related Topics

- For information about the specific Juniper Networks VSAs used for Mobile IP RADIUS-based authentication, see Juniper Networks VSAs Supported by the AAA Service Framework on page 32

Chapter 10
Configuring Mobile IP

Configuring Mobile IP

You can configure Mobile IP to provide mobility for subscribers in IP networks. The Mobile IP home agent authenticates registration requests from mobile users and forward traffic to them at their care-of address without having to advertise that address to the wider network.

To configure Mobile IP for mobile subscriber access:

1. Configure trace options for troubleshooting the configuration.

   See “Tracing Mobile IP Operations” on page 224.

2. Configure the authentication method for registration requests, local or AAA.

   See “Configuring the Mobile IP Authentication Method” on page 227.

3. Configure the Mobile IP home agent.

   See “Configuring the Mobile IP Home Agent” on page 227.

4. Configure the authentication attributes for the mobile node.

   See “Configuring the Authentication Attributes for the Mobile Node” on page 228.

5. Configure the dynamic reassignment of the mobile node to another home agent.

   See “Configuring Dynamic Home Assignment for the Mobile Node” on page 228.

Tracing Mobile IP Operations

Mobile IP supports tracing operations. Mobile IP tracing operations track Mobile IP operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

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 called mipd located in the /var/log directory. You cannot change the directory (/var/log) in which trace files are located.
2. When the file mipd reaches 128 kilobytes (KB), it is renamed mipd.0, then mipd.1, and so on, until there are three trace files. Then the oldest trace file (mippd.2) 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 *JUNOS System Log Messages Reference*.)

Log files can be accessed only by the user who configures the tracing operation.

To configure Mobile IP tracing operations:

1. Specify that you want to configure tracing options.

   ```
   [edit services mobile-ip]
   user@host# edit traceoptions
   ```

2. (Optional) Configure the name for the file used for the trace output.

   See “Configuring the Mobile IP Trace Log Filename” on page 225.

3. (Optional) Configure the number and size of the log files.

   See “Configuring the Number and Size of Mobile IP Log Files” on page 225.

4. (Optional) Configure access to the log file.

   See “Configuring Access to the Mobile IP Log File” on page 225.

5. (Optional) Configure a regular expression to filter logging events.

   See “Configuring a Regular Expression for Mobile IP Lines to Be Logged” on page 226.

6. (Optional) Configure flags to filter the operations to be logged.

   See “Configuring the Mobile IP Tracing Flags” on page 226.

The Mobile IP traceoptions operations are described in the following sections:

Configuring the Mobile IP Trace Log Filename

By default, the name of the file that records trace output for Mobile IP is**mipd**. You can specify a different name with the **file** option:

To configure the filename for Mobile IP tracing operations:

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

```
[edit services mobile-ip traceoptions]
user@host# set file mip_1
```

Configuring the Number and Size of Mobile IP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed *filename*.0, then *filename*.1, and so on, until there are three trace files. Then the oldest trace file (*filename*.2) 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 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 renamed *filename*.0, and a new file called *filename* is created. When the new *filename* reaches 2 MB, *filename*.0 is renamed *filename*.1 and *filename* is renamed *filename*.0. This process repeats until there are 20 trace files. Then the oldest file (*filename*.19) is overwritten by the newest file (*filename*.0).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output. (DHCP local server and DHCP relay agent both support the **files** and **size** options for the **traceoptions** statement.)

```
[edit system services mobile-ip traceoptions]
user@host# set file mip_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the Mobile IP Log File

By default, log files can be accessed only by the user who configures the tracing operation. 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 mobile-ip traceoptions]
```

```
user@host# set file mip_1 _logfile_1 world-readable
```

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

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

```
[edit system services mobile-ip traceoptions]
user@host# set file mip_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for Mobile IP Lines to Be Logged

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

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

To configure regular expressions to be matched:

- Configure the regular expression.

```
[edit system services mobile-ip traceoptions]
user@host# set file mip_1 _logfile_1 match regex
```

Configuring the Mobile IP Tracing Flags

By default, only important events are logged. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

Flag	Description
all	Trace all operations
authentication	Trace authentication operations
binding	Trace bindings
event	Trace events
home-agent	Trace home agent operations
interface-database	Trace interface database operations
packet	Trace packet decoding operations
protocol	Trace protocol operations
rtstock	Trace routing socket operations
signal	Trace signal operations

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit system services mobile-ip traceoptions]
user@host# set flag home-agent
```

Related Topics

- Configuring Mobile IP on page 223

Configuring the Mobile IP Authentication Method

You can configure Mobile IP to authenticate registration requests from mobile nodes by either the locally configured attributes or a AAA server.

To configure the Mobile IP authentication method:

- Specify either local or AAA authentication.

```
[edit services mobile-ip]
user@host# set authenticate order local
```

Configuring the Mobile IP Home Agent

To configure the home agent for a Mobile IP virtual network:

1. Configure the loopback IP address that is used as the home agent IP address.

```
[edit services mobile-ip home-agent virtual-network]
user@host# set home-agent-address 10.5.5.0
```

2. Configure the maximum lifetime that the home agent accepts in any registration request from a mobile node.

```
[edit services mobile-ip home-agent virtual-network]
user@host# set home-agent-address 10.5.5.0 registration-lifetime 100
```

3. Configure a timestamp tolerance for registration replay protection.

```
[edit services mobile-ip home-agent virtual-network]
user@host# set home-agent-address 10.5.5.0 timestamp-tolerance 200
```

4. Configure whether the home agent can revoke a mobile node's registration to deactivate the node.

```
[edit services mobile-ip home-agent virtual-network]
user@host# set home-agent-address 10.5.5.0 registration-revocation required
```

5. Specify the interfaces on which the home agent accepts registration requests.

```
[edit services mobile-ip home-agent]
user@host# set enable-service ge-0/0/1.0
user@host# set enable-service ge-0/0/2.0
```

```
user@host# set enable-service ge-0/0/3.0
user@host# set enable-service ge-0/0/4.0
```

Configuring the Authentication Attributes for the Mobile Node

You specify for each mobile node several attirbutes that enable authentication of registration requests from the node. These attributes include security association context for the peering relationship, the entity type of the node, the encryption algorithm and key used to authenticate the request, and replay protection.

To configure authentication attributes for the mobile node:

1. Configure the peer entity for the security parameter.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 entity-type mobility-agent
   ```

2. Configure the algorithm used for authenticating Mobile IP messages. By default, the hmac-md5 algorithm is used.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 algorithm md5
   ```

3. Configure the authentication key for the security association, in either HEX or ASCII format.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 key ascii xf125j9m
   ```

4. Configure a timestamp tolerance for registration replay protection or specify that the timestamp tolerance be taken from the value configured on the home agent.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 replay-method timestamp
     tolerance 250
   ```

Configuring Dynamic Home Assignment for the Mobile Node

The mobile node can request that the home agent dynamically assign an IP address for the home agent. The mobile node uses this address for the home agent in all subsequent registration requests until the registration expires or the mobile node is rebooted.

To configure the IP address to be used by the mobile node for the home agent:

- Configure the IP address for the specified mobile node.

  ```
  [edit services mobile–ip]
  user@host# set dynamic-home-assignment home-agent nai bws@example.com
    home-agent 192.168.4.5
  ```

Chapter 11

Summary of Mobile IP Statements

algorithm

Syntax algorithm (hmac-md5 | md5);

Hierarchy Level [edit services mobile-ip peer ip-address *address* spi *hexval*],
[edit services mobile-ip peer nai *user@domain* spi *hexval*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the algorithm used for authenticating Mobile IP messages. By default, the hmac-md5 algorithm is used.

Options hmac-md5—Specifies algorithm hmac-md5

md5—Specifies algorithm md5

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

authenticate

Syntax
```
authenticate {
   order (aaa | local);
}
```

Hierarchy Level [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the authentication method performed for Mobile IP.

The remaining statement is described separately.

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

dynamic-home-assignment

Syntax

```
dynamic-home-assignment {
    home-agent {
        nai (name@domain.com | @domain.com) {
            home-agent ip-address;
        }
    }
}
```

Hierarchy Level [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the dynamic assignment rule for the home agent.

The remaining statements are explained separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

enable-service

Syntax

```
enable-service {
    [list-of-interfaces];
}
```

Hierarchy Level [edit services mobile-ip home-agent]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the list of interfaces on which the home agent service can be enabled. The system accepts registration requests only if it is on one of these interfaces.

Options *list-of-interfaces*—List of interfaces on which the home agent can be enabled.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

entity-type

Syntax entity-type (host | mobility-agent);

Hierarchy Level [edit services mobile-ip peer spi *hexval*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the security parameter for the peer entity, either a mobile node or the home agent.

Options host—Mobile node in home agent

mobility-agent—Home agent

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

home-agent

Syntax
```
home-agent {
   enable-service {
      [list-of-interfaces];
   }
   virtual-network {
      home-agent-address ip-address {
         registration-lifetime value;
         timestamp-tolerance value;
         registration-revocation (supported | required);
      }
   }
}
```

Hierarchy Level [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the virtual networks and non-virtual networks for the Mobile IP home agent.

The remaining statements are described separately.

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

home-agent

Syntax

```
home-agent {
    nai (name@domain | @domain) {
        home-agent ip-address;
    }
}
```

Hierarchy Level [edit services mobile-ip dynamic-home-assignment]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the IP address to which registration requests are sent as part of the home agent's dynamic assignment rule.

The remaining statements are explained separately.

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

home-agent

Syntax

```
home-agent ip-address;
}
```

Hierarchy Level [edit services mobile-ip dynamic-home-assignment home-agent nai *host@domain*], [edit services mobile-ip dynamic-home-assignment home-agent nai *@domain*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the IP address to which registration requests are sent as part of the home agent's dynamic assignment rule.

Options *ip-address*—IP address of the home agent

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

home-agent-address

Syntax

```
home-agent-address ip-address {
    registration-lifetime value;
    timestamp-tolerance value;
    range starting-ip-address ending-ip-address; # available for non-virtual networks only
    registration-revocation (supported | required);
}
```

Hierarchy Level [edit services mobile-ip home-agent virtual-network],
[edit services mobile-ip home-agent interface *interface-name*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define addressing for the virtual network or non-virtual network of the Mobile IP home agent.

Options *ip-address*—For virtual networks, the loopback IP address for the virtual network. For non-virtual networks, a public address.

registration-lifetime *value*—Maximum lifetime that the home agent accepts in any registration request.
Range: 7 through 65535 seconds
Default: 3600 seconds

timestamp-tolerance *value*—Time period in which a registration request timestamp and the local time of the home agent can differ.
Range: 1 through 255 seconds
Default: 7 seconds

The remaining statements are described separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

key

Syntax key (hex | ascii) *string*;

Hierarchy Level [edit services mobile-ip peer ip-address *address* spi *hexval*],
[edit services mobile-ip peer nai *user@domain* spi *hexval*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the authentication key for the security association, in either HEX or ASCII format. The resulting 128–bit key is specified as a hexadecimal number with each character in the range 0x0–0xF.

Options hex *string*—Key specified in HEX format

ascii *string*—Key specified in ASCII format

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

mobile-ip

Syntax

```
mobile-ip {
    authenticate {
        order (aaa | local);
    }
    dynamic-home-assignment {
        home-agent {
            nai (host@domain.com | @domain.com) {
                home-agent ip-address;
            }
        }
    }
    home-agent {
        enable-service {
            [list-of-interfaces];
        }
        virtual-network {
            home-agent-address ip-address {
                registration-lifetime value;
                timestamp-tolerance value;
                registration-revocation (supported | required);
            }
        }
    peer {
        (ip-address address | nai user@domain.com) {
            spi hexval {
                algorithm (hmac-md5 | md5);
                entity-type (host | mobility-agent);
                key (hex | ascii) string;
                replay-method (timestamp tolerance seconds | none);
            }
        }
    }
    traceoptions {
        file name;
        flag flag;
        level (all | error | info | notice | verbose | warning);
    }
}
```

Hierarchy Level [edit services]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure JUNOS Mobile IP features.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

nai

Syntax

```
nai (name@domain.com | @domain.com) {
    home-agent ip-address;
}
```

Hierarchy Level [edit services mobile-ip dynamic-home-assignment home-agent]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the network address identifiers (NAI) to which registration requests are sent as part of the home agent's dynamic assignment rule .

Options *name@domain*—User at a specified domain

@domain—All users at a specified domain

NOTE: The *name* can include only alphanumeric characters, dots, hyphens, or underscores. The *name* cannot end in @; @ must be used to separate *name* and *domain*. The *domain* can include only alphanumeric characters, dots, or hyphens The *domain* must be in the format *domain.suffix*, where the *suffix* is com, org, net, and so on. The *suffix* must consist of at least two alphanumeric characters.

The remaining statement is explained separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

order

Syntax order (aaa | local);

Hierarchy Level [edit services mobile-ip authenticate]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the authentication method performed for Mobile IP.

Options aaa—Authentication is performed by AAA.

local—Authentication is performed using parameters defined in the local database.
Default: aaa

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

peer

Syntax

```
peer {
   (ip-address address | nai user@domain) {
      spi hexval {
         algorithm (hmac-md5 | md5);
         entity-type (host | mobility-agent);
         key (hex | ascii) string;
         replay-method (timestamp tolerance seconds | none);
      }
   }
}
```

Hierarchy Level [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the authentication configurations for a home agent mobile node. An authentication enables the registration message as acceptable to the final recipient of the registration message.

Options ip-address *address*—IP address of the peer.

nai *name@domain*—Network address identifier (NAI) of the peer. The *name* can include only alphanumeric characters, dots, hyphens, or underscores. The *name* cannot end in @; @ must be used to separate *name* and *domain*. The *domain* can include only alphanumeric characters, dots, or hyphens The *domain* must be in the format *domain.suffix*, where the *suffix* is com, org, net, and so on. The *suffix* must consist of at least two alphanumeric characters.

The remaining statements are explained separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

registration-revocation

Syntax registration-revocation (supported | required);

Hierarchy Level [edit services mobile-ip home-agent virtual-network home-agent-address *ip-address*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure registration revocation support for the Mobile IP home agent.

Options required—Registration revocation is required. Setting this option also enables the supported option.

supported—Registration revocation is supported.

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

replay-method

Syntax replay-method (timestamp *tolerance-seconds* | none);

Hierarchy Level [edit services mobile-ip peer ip-address *address* spi *hexval*],
[edit services mobile-ip peer nai *user@domain* spi *hexval*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the replay protection method. The Identification field enables the home agent to verify that a registration message has been recently generated by the mobile node, rather than replayed by an attacker from a previous registration. You can specify a timestamp tolerance for the mobile node, which causes the request to be rejected if the tolerance is exceeded, or you can specify that the tolerance be taken from the value configured on the home agent. If you do not configure the replay protection method, then the timestamp tolerance is taken from the home agent by default.

Options timestamp *tolerance-seconds*—Tolerance time in which a registration request timestamp and the local time of the home agent can differ.
Range: 1 through 255 seconds

none—Timestamp tolerance is obtained from the setting configured for the home agent

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

Related Topics
- Configuring the Mobile IP Home Agent on page 227

spi

Syntax

```
spi hexval {
    algorithm (hmac-md5 | md5);
    entity-type (host | mobility-agent);
    key (hex | ascii) string;
    replay-method (timestamp tolerance seconds | none);
}
```

Hierarchy Level [edit services mobile-ip peerip-address *address*],
[edit services mobile-ip peer nai *user@domain*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the security parameter index for identifying a security context between a pair of nodes among the contexts available in the Mobility Security Association. The index selects the authentication algorithm and key.

Options *hexval*—Security parameter index identifier.

The remaining statements are explained separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

traceoptions

Syntax

```
traceoptions {
   file name;
   flag flag;
   level (all | error | info | notice | verbose | warning);
}
```

Hierarchy Level [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define tracing operations for Mobile IP 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.

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.
- authentication—Trace authentication operations.
- binding—Trace bindings.
- event—Trace events.
- home-agent—Trace home agent operations.
- interface-database—Trace interface database operations.
- packet—Trace packet decoding operations.
- protocol—Trace protocol operations.
- rtsock—Trace routing socket operations.
- signal—Trace signal operations.
- trace—Trace changes in tracing.
- tunnel—Trace tunneling operations.

level—Level of tracing to perform.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

virtual-network

Syntax

```
virtual-network {
    home-agent-address ip-address {
        registration-lifetime value;
        timestamp-tolerance value;
        registration-revocation (supported | required);
    }
}
```

Hierarchy Level [edit services mobile-ip home-agent]

Release Information Statement introduced in JUNOS Release 9.3.

Description Define the virtual network for the Mobile IP home agent. Only one virtual network is supported.

The remaining statements are described separately.

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

Related Topics

- Configuring the Mobile IP Home Agent on page 227

Part 4
Dynamic Profiles for Access and Services

Chapter 12

Dynamic Profiles Overview

Dynamic Profiles Overview

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. The dynamic-profiles hierarchy appears at the top level of the CLI hierarchy and contains many Juniper Networks configuration statements that you normally define statically.

Dynamic profile statements appear in the following CLI sub-categories within the dynamic-profiles hierarchy:

- Interfaces (supporting static VLAN and LAG on Ethernet interfaces and static IP demux interfaces)
- Protocols (supporting IGMP interface configuration)
- Class of service (supporting traffic classification and scheduling)
- Variables (supporting user-defined variable configuration)

You can now use dynamic profiles to provide dynamic subscriber services for broadband access applications. A new dynamic-profile hierarchy appears at the top level of the JUNOS CLI structure and contains many Juniper Networks configuration statements that you normally define statically.

This topic covers:

Dynamic Profile Interface Support

This release supports identifying subscribers statically or dynamically. To identify subscribers statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you create variables for IP demux interfaces that are dynamically created when subscribers log in.

What Dynamic Profiles Do

A dynamic profile acts as a kind of template that enables you to create, update, or remove a configuration that includes client access (for example, interface or protocol) or service (for example, CoS) attributes. Using these profiles enables you to consolidate all of the common attributes of a client (and eventually a group of clients) and apply the attributes simultaneously.

How Dynamic Profiles Work

After they are created, profiles reside on the router in a profile library. These profiles can contain various configurations. For example, you can create a client network access configuration, a services activation configuration, or both. When a router interface receives a join message from a DHCP client, the router applies the values configured in the specified dynamic profile to that router interface. In this release, the profile can contain interface, class of service (CoS), and protocol (IGMP) values that are applied directly to the interface. In addition, the dynamic profile can call input or output firewall filters that reside outside of the dynamic profiles hierarchy.

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Configuring a Dynamic Profile for Client Access on page 255
- Configuring a Dynamic Profile for Various Levels of Services on page 256
- Dynamic Variables Overview on page 246
- Subscriber Interface Overview on page 273

Dynamic Variables Overview

Variables constitute the dynamic component of a dynamic profile. You use variables in dynamic profiles as placeholders for dynamically obtained information that the dynamic profiles use to configure subscriber interfaces.

- How Dynamic Variables Work on page 246
- JUNOS Predefined Internal Variables on page 247
- User-Defined Variables on page 248

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 possible sources—the interface receiving an incoming client data packet, an externally configured server (for example, RADIUS), an internal default value associated with each user-configurable variable.

For your convenience, JUNOS provides several 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 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 call 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 default value in the variables stanza. When an event occurs on an interface to trigger the instantiation of a dynamic profile for the interface, the JUNOS router software obtains values for each variable from an external server (for example, from RADIUS authentication and authorization VSAs) during the subscriber authentication process or from the default value if he external server is not available or does not contain a value for the variable to use. At run time, the variables are replaced by these actual values and are used to configure the subscriber interface.

NOTE: Most variables have a default value already configured in the JUNOS router software. The purpose of these defaults is to ensure that the dynamic profile contains a valid value if one is not created and assigned during dynamic profile configuration. However, we strongly recommend that you specifically define variables instead and not rely on the existence of an internal JUNOS default.

JUNOS Predefined Internal Variables

JUNOS software contains several predefined variables. 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 first having to define the variables at the [dynamic-profiles *profile-name* variables] hierarchy level.
Table 17 on page 247 provides a list of predefined variables, their descriptions, and where in the JUNOS hierarchy you can configure them.

Table 17: JUNOS Predefined Internal Variables and Definitions

Variable	Definition
$junos-interface-ifd-name	Name of the dynamic interface to which the subscriber access client connects. Its primary use is in creating single or multiple subscribers on a statically created interface. You specify this variable at the [dynamic-profiles *profile-name* interfaces] hierarchy level.

Table 17: JUNOS Predefined Internal Variables and Definitions *(continued)*

Variable	Definition
$junos-interface-name	Name of the dynamic interface to which the subscriber access client connects. Its use is in dynamically enabling IGMP on the subscriber interface. You specify this variable at the [dynamic-profiles *profile-name* protocols igmp] hierarchy level for the interface statement. The interface name is derived from concatenating the *$junos-interface-ifd-name* and the *$junos-underlying-interface-unit* variables obtained when a subscriber is created dynamically at the [dynamic-profiles *profile-name* interfaces] hierarchy level.
$junos-underlying-interface-unit	Unit number for the underlying interface. It specifies the use of the underlying interface for the subscriber. You specify this variable at the [dynamic-profiles *profile-name* interfaces *$junos-interface-ifd-name*] hierarchy for the unit statement.
$junos-interface-unit	Creates a unit number for a dynamic demux interface. DHCP supplies this information when the subscriber logs in. You specify this variable at the [dynamic-profiles *profile-name* interfaces demux0] hierarchy level for the unit statement.
$junos-subscriber-ip-address	IP address of the subscriber. You specify this variable at the [dynamic-profiles *profile-name* interfaces *demux0* unit family *inet* demux-source] hierarchy level.
$junos-underlying-interface	Creates a logical underlying interface for a dynamic demux interface. DHCP supplies this information when the subscriber logs in. You specify this variable at the [dynamic profiles *profile-name* interfaces demux0 unit "$junos-interface-unit" demux-options] hierarchy level for the underlying-interface statement. 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.

User-Defined Variables

JUNOS software enables you to configure variables at the [dynamic-profiles *profile-name* variables] hierarchy level and associate those variables with supported RADIUS VSAs.

The dynamic profile obtains and replaces data for these variables 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 (obtained from default information on the router or from the RADIUS server) and are used to configure the subscriber interface.

For a complete list of supported RADIUS VSAs for which you can create variable associations, see "RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework" on page 28.

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.

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Configuring a Dynamic Profile for Client Access on page 255
- Configuring a Dynamic Profile for Various Levels of Services on page 256
- Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 252
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 253
- Dynamic Profiles Overview on page 245
- Subscriber Interface Overview on page 273
- Example: Firewall Dynamic Profile on page 262
- Example: IGMP Dynamic Profile on page 261
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 28

Chapter 13

Configuring Dynamic Profiles

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 the interface-name and unit statements defined with variables in the dynamic-profiles interfaces stanza.

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 "Subscriber Interface Overview" on page 273 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 "Configuring RADIUS Server Parameters for Subscriber Access" on page 21

To configure a basic dynamic profile:

1. Name the profile.

   ```
   user@host# set 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# set interfaces $junos-interface-ifd-name
   ```

3. Define the unit statement with the internal $junos-underlying-interface-unit variable used by the router to match the unit value of the receiving interface.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- Configuring a Dynamic Profile for Various Levels of Services on page 256
- Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 252
- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279
- Dynamic Profiles Overview on page 245
- Dynamic Variables Overview on page 246
- Example: Firewall Dynamic Profile on page 262
- Example: IGMP Dynamic Profile on page 261

Configuring Predefined Internal Dynamic Variables in Dynamic Profiles

This topic discusses how to configure predefined internal dynamic 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 [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 251.

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

To configure predefined internal variables in a dynamic profile:

1. Access the desired dynamic profile.

   ```
   user@host# edit dynamic-profiles igmpProfile1
   [edit dynamic-profiles profile1]
   ```

2. Configure the necessary internal variables.

   ```
   [edit dynamic-profiles igmpProfile1]
   user@host# set protocols igmp interface $junos-interface-name
   ```

   For a complete list of supported predefined internal variables, see "Dynamic Variables Overview" on page 246

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 253
- Dynamic Profiles Overview on page 245
- Dynamic Variables Overview on page 246
- Example: Firewall Dynamic Profile on page 262
- Example: IGMP Dynamic Profile on page 261

Configuring User-Defined Dynamic Variables in Dynamic Profiles

This topic discusses how to configure the user-defined dynamic variables in a dynamic profile. You 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 call 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 default value in the variables stanza.

Before you configure dynamic variables:

1. Create a basic dynamic profile.

   See "Configuring a Basic Dynamic Profile" on page 251.

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" on page 19.

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

   See "Configuring RADIUS Server Parameters for Subscriber Access" on page 21

To configure variables in a dynamic profile:

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

   ```
   user@host# edit dynamic-profiles profile1 variables
   [edit dynamic-profiles profile1 variables]
   ```

2. Specify a name to identify the variable.

   The variable name can be any alphanumeric value. The name is an association to a variable in the dynamic profile configuration. For example, if you specify a variable name of "igmp-version" as the variable name, you must specify the call variable "$igmp-version" in the dynamic profile configuration for the statement you want the variable to define.

   ```
   [edit dynamic-profiles igmpProfile1variables]
   ```

```
user@host# set igmp-version
```

3. Configure the variable using one (or both) of the following methods:

   - Specify a RADIUS attribute and RADIUS tag (when required) for the variable.

     ```
     [edit dynamic-profiles igmpProfile1 variables]
     user@host# set igmp-version radius vendor-id 4874 attribute 78
     ```

   - Configure a default value for the variable.

     ```
     [edit dynamic-profiles igmpProfile1variables]
     user@host# set igmp-version default-value 3
     ```

NOTE: You can configure variables by either using the RADIUS method, the default value method, or both. If you choose to configure both a RADIUS attribute and a default value for the variable, the RADIUS attribute takes precedence over the default value. However, the dynamic profile applies the default value if the router cannot contact the RADIUS server or if the RADIUS server does not contain a value for the assigned attribute.

4. Configure the call variable in the dynamic profile.

   ```
   [edit dynamic-profiles igmpProfile1]
   user@host# set protocols igmp interface demux0 version $igmp-version
   ```

NOTE: The call variable must match the name of the variable that you configured in the variables stanza.

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access on page 342
- Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 252
- Dynamic Profiles Overview on page 245
- Dynamic Variables Overview on page 246
- Example: Firewall Dynamic Profile on page 262
- Example: IGMP Dynamic Profile on page 261

Configuring a Dynamic Profile for Client Access

This topic describes how to create a basic dynamic profile that enables DHCP clients to dynamically access the multicast network.

Before you configure dynamic profiles for initial client access:

1. Create a basic dynamic profile.

   See "Configuring a Basic Dynamic Profile" on page 251.

2. Configure the necessary router interfaces that you want accessing DHCP clients to use.

   See "Subscriber Interface Overview" on page 273 for information about the types of interfaces you can use with dynamic profiles and how to configure them.

3. 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" on page 19.

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

   See "Configuring RADIUS Server Parameters for Subscriber Access" on page 21

To configure an initial client access dynamic profile:

1. Access an IGMP access profile.

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

2. Define the IGMP interface with the interface variable.

NOTE: The variable value is replaced by the name of the interface over which the router received the DHCP message.

   ```
   [edit dynamic-profiles access-profile]
   user@host# set protocols igmp interface $junos-underlying-interface
   ```

3. (Optional) Enable accounting on the IGMP interface.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     $junos-underlying-interface]
   user@host# set accounting
   ```

4. Set the IGMP interface to remain enabled.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     $junos-underlying-interface]
   user@host# set disable:$junos-igmp-enable
   ```

NOTE: RADIUS is capable of disabling IGMP. By assigning the enable variable to the disable statement, you can ensure that IGMP remains enabled.

5. (Optional) Specify a group policy for the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface
   $junos-underlying-interface]
user@host# set group-policy report-reject-policy
```

6. (Optional) Enable immediate leave on the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface
   $junos-underlying-interface]
user@host# set immediate-leave:$junos-igmp-immediate-leave
```

7. (Optional) Disable the collection of IGMP join and leave even statistics on the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface
   $junos-underlying-interface]
user@host# set no-accounting
```

8. (Optional) Set the IGMP interface to obtain the IGMP version from RADIUS.

```
[edit dynamic-profiles access-profile protocols igmp interface
   $junos-underlying-interface]
user@host# set version:$junos-igmp-version
```

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Dynamic Profiles Overview on page 245

Configuring a Dynamic Profile for Various Levels of Services

This topic discusses how to create dynamic profiles to define various levels of service for DHCP clients.

Before you configure dynamic profiles for client services:

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 251.

2. Configure a dynamic profile that enables DHCP clients access to the network.

   See “Configuring a Dynamic Profile for Client Access” on page 255

NOTE: You can create a basic dynamic profile that contains both access configuration and some level of basic service.

3. 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" on page 19.

4. Configure all RADIUS values that you want the profiles to use when validating DHCP clients.

   See "Configuring RADIUS Server Parameters for Subscriber Access" on page 21

To configure an initial client access dynamic profile:

1. Access the desired service profile.

   user@host# **set dynamic-profiles basic-service-profile**

2. (Optional) Define any IGMP protocols values as described for creating a basic access profile to combine a basic service with access in a profile.

   See "Configuring a Dynamic Profile for Client Access" on page 255.

3. (Optional) Specify any filters for the interface.

   See "Dynamically Attaching Statically Created Filters" on page 315 or "Dynamically Attaching Filters Using RADIUS Variables" on page 316.

4. Define any CoS values for the service level you want this profile to configure on the interface.

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Dynamic Profiles Overview on page 245

Modifying Dynamic Profiles

You use dynamic profiles to configure large groups of subscribers. However, after you have configured and applied dynamic profiles, use caution when modifying any dynamic profiles that are in use by active subscribers on the router. This section provides guidelines and procedures for modifying existing profiles and applying them to subscriber interfaces.

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

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

When a dynamic profile is modified and committed, 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.

To properly modify a dynamic profile:

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.

Related Topics

- Configuring a Basic Dynamic Profile on page 251
- Dynamic Profiles Overview on page 245

Chapter 14

Dynamic Profile Examples

Example: IGMP Dynamic Profile

In this example, IGMP is configured for subscriber access using user-defined variables and JUNOS internal variables.

The user-defined variables equate to RADIUS settings as follows:

User-Defined Variable Name	JUNOS Variable	RADIUS VSA Name	RADIUS Attribute Number	RADIUS Setting
var-igmp-version	$var-igmp-version	IGMP-Version	26–78	3
var-igmp-access-grp	$var-igmp-access-grp	IGMP-Access-Group-Name	26–71	"reject_igmp_225"
var-igmp-access-src-grp	$var-igmp-access-src-grp	IGMP-Access-Source-Group-Name	26–72	"reject_igmp_115"

```
[edit dynamic-profiles profile-name]
variables {
   var-igmp-version {
      mandatory;
      radius {
         vendor-id 4874 attribute 78;
      }
   }
   var-igmp-access-grp {
      mandatory;
      radius {
         vendor-id 4874 attribute 71;
      }
   }
   var-igmp-access-src-grp {
      mandatory;
      radius {
         vendor-id 4874 attribute 72;
      }
   }
```

```
}
   interfaces {
      demux0 {
         unit "$junos-interface-unit" {
            demux-options {
               underlying-interface "$junos-underlying-interface";
            }
            family inet {
               demux-source {
                  $junos-subscriber-ip-address;
               }
               unnumbered-address lo0.0 preferred-source-address 20.21.0.1;
            }
         }
      }
   }
   protocols {
      igmp {
         interface "$junos-interface-name" {
            version "$var-igmp-version";
            group-policy [ "$var-igmp-access-grp" "$var-igmp-access-src-grp" ];
         }
      }
   }
```

NOTE: You must also configure any global IGMP parameters.

Example: Firewall Dynamic Profile

In this example, dynamic firewall is configured for subscriber access using user-defined variables and JUNOS internal variables.

The user-defined variables equate to RADIUS settings as follows:

User-Defined Variable Name	JUNOS Variable	RADIUS VSA Name	RADIUS Attribute Number	RADIUS Setting
inputFilterName	$inputFilterName	Ingress-Policy-Name	26–10	upstrm1
outputFilterName	$outputFilterName	Egress-Policy-Name	26–11	dnstrm1

```
variables {
   inputFilterName {
      radius {
         vendor-id 4874 attribute 10;
      }
   }
   outputFilterName {
      radius {
         vendor-id 4874 attribute 11;
      }
```

```
    }
}
    interfaces {
        demux0 {
            unit "$junos-interface-unit" {
                demux-options {
                    underlying-interface "$junos-underlying-interface";
                }
                family inet {
                    demux-source {
                        $junos-subscriber-ip-address;
                    }
                    filter {
                        input "$inputFilterName";
                        output "$outputFilterName";
                    }
                    unnumbered-address lo0.0 preferred-source-address 20.21.0.1;
                }
            }
        }
    }
```

NOTE: You must also configure any global firewall parameters.

Chapter 15

Summary of Dynamic Profile Statements

attribute

Syntax attribute *attribute-number*;

Hierarchy Level [edit dynamic-profiles *profile-name* variables radius vendor-id]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure a RADIUS attribute as a variable in a dynamic profile.

Options *attribute-number*—Number of the RADIUS attribute.

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

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

default-value

Syntax default-value *default-value*;

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

Release Information Statement introduced in JUNOS Release 9.3.

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.

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

dynamic-profiles

Syntax

```
dynamic-profiles {
    profile-name {
        class-of-service {
            interfaces {
                interface-name {
                }
                unit logical-unit-number {
                    output-traffic-control-profile profile-name;
                }
            }
            traffic-control-profiles profile-name {
                delay-buffer-rate (percent percentage | rate);
                guaranteed-rate (percent percentage | rate);
                scheduler-map map-name;
                shaping-rate (percent percentage | rate);
            }
        }
        interfaces {
            interface-name {
                unit logical-unit-number {
                    family family {
                        address address;
                            filter {
                                input filter-name;
                                output filter-name;
                            }
                        unnumbered-address interface-name {
                            preferred-source-address address;
                        }
                    vlan-id;
                    }
                    vlan-tagging;
                }
            }
            protocols {
            igmp {
                interface interface-name {
                    accounting;
                    disable;
                    group-policy policy-name;
                    immediate-leave;
                    no-accounting;
                    promiscuous-mode;
                    ssm-mapssm-map-name;
                    static {
                        group group {
                            source source;
                        }
                    }
                    version version;
                }
```

```
variables {
   statement-name {
   default-value default-value;
      radius {
         vendor-id id {
            attribute attribute-number;
            tag tag-number;
            }
         }
      }
   }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in JUNOS Release 9.2.

Description Create dynamic profiles for use with DHCP client access.

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

The remaining statements are explained separately.

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

Related Topics
- Dynamic Profiles Overview on page 245
- Configuring a Basic Dynamic Profile on page 251

mandatory

Syntax mandatory;

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

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure RADIUS to return a value for a user-defined variable. If RADIUS does not return a value for the variable, the dynamic profile fails.

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.

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

radius

Syntax
```
radius {
   vendor-id id {
      attribute attribute-number;
      tag tag-number;
      }
   }
}
```

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

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure RADIUS attribute variables in a dynamic profile.

The statements are explained separately.

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

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

tag

Syntax tag *tag-number*;

Hierarchy Level [edit dynamic-profiles *profile-name* variables radius vendor-id]

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure a tag for a RADIUS attribute as a variable in a dynamic profile.

Options *tag-number*—Tag number for the RADIUS attribute.

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

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

variables

Syntax
```
variables {
   variable-name {
      mandatory;
      default-value default-value;
      radius {
         vendor-id id {
            attribute attribute-number;
            tag tag-number;
            }
         }
      }
   }
}
```

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

Release Information Statement introduced in JUNOS Release 9.3.

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

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

The remaining statements are explained separately.

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

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

vendor-id

Syntax vendor-id *id*;

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

Release Information Statement introduced in JUNOS Release 9.3.

Description Configure the vendor ID as a variable in a dynamic profile.

Options *id*—Vendor ID for the RADIUS attribute.

The remaining statements are explained separately.

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

Related Topics
- Configuring CoS Variables in a Dynamic Profile on page 333

Part 5
Subscriber Interfaces

Chapter 16

Subscriber Interface Overview

Subscriber Interface Overview

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

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

Statically Identifying Subscribers

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

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

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

```
[edit dynamic-profiles]
interface-name {
    unit logical-unit-number {
        family family {
        address address;
            filter {
                input filter-name;
```

```
            output filter-name;
        }
        unnumbered-addressinterface-name {
            preferred-source-address address;
        }
    vlan-id;
  }
  vlan-tagging;
}
```

Dynamically Identifying Subscribers

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

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

Related Topics

- Static Subscriber Interfaces and VLAN Overview on page 274
- Subscriber Interfaces and IP Demux Overview on page 275

Static Subscriber Interfaces and VLAN Overview

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

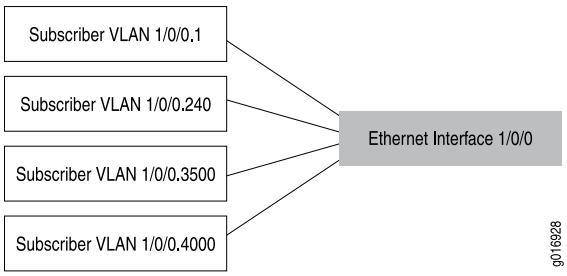
In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

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

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

Figure 4 on page 275 shows an example of subscriber interfaces on an individual VLAN.

Figure 4: VLAN Subscriber Interfaces



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

Related Topics

- Configuring a Subscriber Interface with a Static VLAN Interface on page 280
- For more information about IP demux interfaces, see Subscriber Interfaces and IP Demux Overview on page 275

Subscriber Interfaces and IP Demux Overview

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

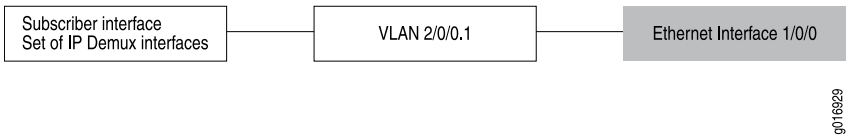
The subscriber interfaces can provide different levels of services for individual subscribers in an access network. For example, you can apply CoS parameters for each subscriber.

Interface Sets of Static Demux Interfaces

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

Figure 5 on page 275 shows a subscriber interface configured using a set of IP demux interfaces with an underlying VLAN interface.

Figure 5: IP Demux Subscriber Interface



Dynamic Demux Interfaces

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

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

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

Guidelines for Configuring IP Demux Interfaces for Subscriber Access

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

- You can only configure interface sets of static IP demux interfaces and dynamic demux interfaces on MX-series routers. Hierarchical and per-unit scheduling is supported for dynamically created demux interfaces on the EQ DPC.
- You can configure only one demux0 interface per chassis, but you can define logical demux interfaces on top of it (for example, demux0.1, demux0.2, and so on).
- You must associate demux interfaces with an underlying logical interface.

NOTE: IP demux interfaces currently support only Gigabit Ethernet, Fast Ethernet, and 10-Gigabit Ethernet underlying interfaces.

- You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the aggregate-clients option when attaching a dynamic profile to a demux interface for DHCP.

Related Topics

- Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 281
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- CoS and Static IP Demux Interface Set Overview on page 324
- For more information about static IP demux interfaces and other configuration guidelines, see the *JUNOS Network Interfaces Configuration Guide*

MAC Address Validation for Subscriber Interfaces Overview

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

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

When subscribers log in, they are automatically assigned IP addresses by DHCP. The router detects the valid IP source and MAC source addresses for incoming packets and forwards the packets regardless of which subscriber originated the packet.

Supported Types of Subscriber Interfaces

MAC address validation is supported on statically created Ethernet interfaces and dynamically created IP demux interfaces on MX-series routers.

Trusted Addresses

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

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

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

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

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

Types of MAC Address Validation

You can configure two types of MAC address validation:

- Loose—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

  Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not support the MAC address of the tuple. The system processes this packet as spoofed.

  Continues to forward packets when the source address of the incoming packet does not match any of the trusted IP addresses.

- Strict—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

  Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

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

Related Topics

- Configuring MAC Address Validation for Subscriber Interfaces on page 283

Chapter 17

Configuring Subscriber Interfaces for Dynamic Profiles

Configuring Static Subscriber Interfaces in Dynamic Profiles

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

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

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

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

This topic contains the following sections:

Configuring a Subscriber Interface with a Static VLAN Interface

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

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

To configure a subscriber interface over a VLAN:

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

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

2. Configure the units and assign the VLAN IDs.

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

Associating Dynamic Profiles with Statically Created Interfaces

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

NOTE: Configuration of the interface-name and unit statements within the interfaces stanza is required for a dynamic profile to function.

To configure the dynamic profile interfaces stanza with interface-name and unit variables:

1. Access the profile.

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

2. Specify the interface-name variable.

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

3. Specify the unit variable.

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

Related Topics

- Static Subscriber Interfaces and VLAN Overview on page 274
- For information about configuring logical interfaces and static VLAN interfaces, see the *JUNOS Network Interfaces Configuration Guide*

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

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

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

To configure a group of static IP demux interfaces:

1. Configure the interface set.

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

2. Define the units of the interface set.

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

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

Related Topics

- Configuring CoS on a Set of Static IP Demux Interfaces on page 337
- Subscriber Interfaces and IP Demux Overview on page 275
- For information about the edit interfaces hierarchy and the interface-set statement, see the *JUNOS Network Interfaces Configuration Guide*

Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles

You can configure dynamic subscriber interfaces using IP demux interfaces.

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

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 251.

To configure dynamic subscriber interfaces:

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

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

2. Configure the unit for the demux0 interface.

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

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

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

   b. Configure the variable for the underlying interface of the demux interfaces.

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

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

3. Configure the family for the demux interfaces.

   a. Specify that you want to configure the family.

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

   b. Configure the unnumbered address for the family.

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

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

   The variable is dynamically replaced with the IP address that DHCP supplies when the subscriber logs in.

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

Related Topics

- Subscriber Interfaces and IP Demux Overview on page 275
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 285
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 288

Configuring MAC Address Validation for Subscriber Interfaces

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

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

By default, MAC address validation is disabled.

This topic contains the following sections:

Configuring MAC Address Validation for Static Subscriber Interfaces

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

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 251.

To configure MAC address validation on static subscriber interfaces:

1. Configure the static VLAN interface.

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

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

   - To configure loose validation:

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

   - To configure strict validation:

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

After you configure MAC address validation:

- Associate the static VLAN interface with the dynamic profile.

  See "Associating Dynamic Profiles with Statically Created Interfaces" on page 280.

Configuring MAC Address Validation for Dynamic Subscriber Interfaces

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

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

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 251.

- Configure the dynamic demux interface.

  See "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 282.

To configure MAC address validation for a dynamic subscriber interface:

1. Configure loose validation for the demux interface.

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

2. (Optional) Configure strict validation for the underlying interface.

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

Related Topics

- MAC Address Validation for Subscriber Interfaces Overview on page 277
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 288

Chapter 18

Subscriber Interface Examples

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

```
[edit interfaces]
ge-5/0/0 {
   vlan-tagging;
   unit 1 {
      proxy-arp;
      vlan-id 1;
      family inet {
         unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
      }
   }
   unit 2 {
      proxy-arp;
      vlan-id 2;
      family inet {
         unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
      }
   }
}
```

Related Topics

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279

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

```
[edit interfaces]
```

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

Related Topics ■ Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279

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

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

Related Topics ■ Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279

Example: Configuring a Static Subscriber Interface with a Loopback

```
lo0 {
   unit 0 {
      family inet {
         address 192.1.1.1/32;
      }
   }
}
```

Related Topics ■ Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279

Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces

This example shows how to configure dynamic subscriber interfaces on IP demux interfaces.

DHCP dynamically creates the demux interface when a subscriber logs in.

To configure subscribers on dynamic demux interfaces:

1. Configure the static VLAN as the underlying interface.

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

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

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

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

   DHCP relay is the access method used in this example.

```
forwarding-options {
   dhcp-relay {
```

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

4. Configure the interface for DHCP.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 57

Chapter 19

Summary of Subscriber Interface Statements

address

Syntax address *address*;

Hierarchy Level [edit dynamic-profiles interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles interfaces *interface-name* unit *logical-unit-number* family *family*] hierarchy added in JUNOS Release 9.2.

Description Configure the interface address.

Options *address*—Address of the interface.

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

Related Topics
- "Configuring the Protocol Family," in *JUNOS Network Interfaces Configuration Guide*.
- *JUNOS System Basics Configuration Guide*

demux0

Syntax

```
demux0 {
   unit logical-unit-number {
      demux-options {
         underlying-interface interface-name
      }
      family family {
         address address;
         demux-source {
            source-prefix;
         }
         filter {
            input filter-name;
            output filter-name;
         }
         mac-validate (loose | strict):
         unnumbered-address interface-name {
            preferred-source-address address;
         }
      }
   }
}
```

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

Release Information Statement introduced in JUNOS Release 9.0.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Configure the logical demultiplexing (demux) interface in a dynamic profile.

The remaining statements are explained separately.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

demux-options

Syntax

```
demux–options {
    underlying-interface interface-name
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces demux0 *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in JUNOS Release 9.0.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Configure logical demultiplexing (demux) interface options in a dynamic profile.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

demux-source

Syntax

```
demux-source {
    source-address;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

Release Information Statement introduced in JUNOS Release 9.0.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Configure a logical demultiplexing (demux) source address for a subscriber in a dynamic profile.

Options *source-address*—Either the specific source address you want to assign to the subscriber interface or the source address variable ($junos-subscriber-ip-address). The source address for the interface is dynamically supplied by DHCP when the subscriber accesses the router.

The remaining statements are explained separately.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

family

Syntax

```
family family {
    address address;
    filter {
        input filter-name;
        output filter-name;
    }
    unnumbered-address interface-name {
        preferred-source-address address;
    }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles interfaces *interface-name* unit *logical-unit-number*] hierarchy added in JUNOS Release 9.2.

Description Configure protocol family information for the logical interface.

Options *family*—Protocol family:

- inet—Internet Protocol version 4 suite

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

Related Topics

- For general information about configuring static interfaces, see the *JUNOS Network Interfaces Configuration Guide*.
- "Configuring the Protocol Family," in *JUNOS Network Interfaces Configuration Guide*.

family

Syntax

```
family family {
    address address;
    demux-source {
        source-address;
    }
    filter {
        input filter-name;
        output filter-name;
    }
    mac-validate (loose | strict):
    unnumbered-address interface-name {
        preferred-source-address address;
    }
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles interfaces demux0 unit *logical-unit-number*] hierarchy added in JUNOS Release 9.3.

Description Configure protocol family information for the logical interface.

Options *family*—Protocol family:

- inet—Internet Protocol version 4 suite

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

filter

Syntax

```
filter {
    input filter-name;
    output filter-name;
}
```

Hierarchy Level

[edit dynamic-profiles family *profile-name* interfaces *interface-name* unit *logical-unit-number*family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*],
[edit interfaces *interface-name* unit *logical-unit-number*family *family*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

Release Information

Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-numbe*r family *family*] hierarchy added in JUNOS Release 9.2.

Description

Apply a filter to an interface. When you configure filters, you can configure the family inet only.

Options

input *filter-name*—Name of one filter to evaluate when packets are received on the interface.

output *filter-name*—Name of one filter to evaluate when packets are transmitted on the interface.

Required Privilege Level

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

Related Topics

- For general information about configuring firewall filters, see the *JUNOS Policy Framework Configuration Guide*
- Dynamic Firewall Filters Overview on page 311
- Guidelines for Creating and Applying Filters for Subscriber Interfaces on page 313
- Basic Filter Syntax on page 313

interfaces

Syntax

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

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description Define interfaces for dynamic profiles.

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

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

The remaining statements are explained separately.

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

Related Topics

- Relationship Between Subscribers and Interfaces in an Access Network on page 5
- Subscriber Interface Overview on page 273
- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 279
- For general information about configuring static interfaces, see the *JUNOS Network Interface Configuration Guide*

interfaces

Syntax

```
interfaces {
   demux0 {
      unit logical-unit-number {
         demux-options {
            underlying-interface interface-name
         }
         family family {
            address address;
            demux-source {
               source-prefix;
            }
            filter {
               input filter-name;
               output filter-name;
            }
            mac-validate (loose | strict):
            unnumbered-address interface-name {
               preferred-source-address address;
            }
         }
      }
   }
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description Define interfaces for dynamic profiles.

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

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

The remaining statements are explained separately.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

mac-validate

Syntax mac-validate (loose | strict);

Hierarchy Level [edit dynamic-profiles *profile-name* demux0 unit *logical-unit-number* family *family*]

Release Information Statement introduced in JUNOS Release 9.3.

Description Enable IP and MAC address validation for dynamic IP demux interfaces in a dynamic profile. Supported on MX-series routers only.

Options

loose—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not match the MAC address of the tuple. Continues to forward incoming packets when the source address of the incoming packet does not match any of the trusted IP addresses.

strict—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

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

Related Topics

- Configuring MAC Address Validation for Subscriber Interfaces on page 283

preferred-source-address

Syntax preferred-source-address *address*;

Hierarchy Level [edit dynamic-profiles interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*],
[edit interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*]

Release Information Statement introduced in JUNOS Release 9.0.
The [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*] hierarchy added in JUNOS Release 9.2.

Description For unnumbered Ethernet interfaces configured with a loopback interface as the donor interface, specify one of the loopback interface's secondary addresses as the preferred source address for the unnumbered Ethernet interface. Configuring the preferred source address enables you to use an IP address other than the primary IP address on some of the unnumbered Ethernet interfaces in your network.

Currently, configuration of a preferred source address for unnumbered Ethernet interfaces is supported only for the IPv4 address family.

Options *address*—Secondary IP address of the donor loopback interface.

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

Related Topics
- "Configuring a Preferred Source Address for Unnumbered Ethernet Interfaces," in *JUNOS Network Interfaces Configuration Guide*.
- address
- *JUNOS System Basics Configuration Guide*

underlying-interface

Syntax underlying-interface *underlying-interface-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces demux0 *interface-name* unit unit *logical-unit-number* demux-options]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* interfaces demux0] hierarchy added in JUNOS Release 9.3.

Description Configure the underlying interface on which the demultiplexing (demux) interface is running.

Options *underlying-interface-name*—Either the specific name of the interface on which the DHCP discover packet arrives or the interface variable ($junos-underlying-interface). The variable is used to specify the underlying interface when a new demux interface is dynamically created. The variable is dynamically replaced with the underlying interface that DHCP supplies when the subscriber logs in.

NOTE: Logical demux interfaces are currently supported only on Gigabit Ethernet, Fast Ethernet, or 10-Gigabit Ethernet interfaces.

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

Related Topics
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static underlying interfaces, see the *JUNOS Network Interfaces Configuration Guide*

unit

Syntax

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

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

Release Information Statement introduced before JUNOS 7.4.
The [edit dynamic-profiles *profile-name* interfaces *interface-name*] hierarchy added in JUNOS Release 9.2.

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

Options *logical-unit-number*—Either the specific unit number of the interface you want to assign to the dynamic profile or the static unit number variable ($junos-underlying-interface-unit). The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP client when it accesses the subscriber network.

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

unit

Syntax

```
unit logical-unit-number {
   demux-options {
      underlying-interface interface-name
   }
   family family {
      address address;
      demux-source {
         source-address;
      }
      filter {
         input filter-name;
         output filter-name;
      }
      mac-validate (loose | strict):
      unnumbered-address interface-name {
         preferred-source-address address;
      }
   }
}
```

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

Release Information Statement introduced before JUNOS 7.4.
The [edit dynamic-profiles *profile-name* interfaces demux0] hierarchy added in JUNOS Release 9.3.

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

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

The remaining statements are explained separately.

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

Related Topics

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 282
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

unnumbered-address

Syntax unnumbered-address *interface-name* <preferred-source-address *address*>;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*],
[edit interfaces *interface-name* unit *logical-unit-number* family inet],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet]

Release Information Statement introduced in JUNOS Release 8.2.
preferred-source-address option introduced in JUNOS Release 9.0.
The [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*] hierarchy added in JUNOS Release 9.2.

Description For Ethernet interfaces, enable the local address to be derived from the specified interface. Configuring an unnumbered Ethernet interface enables IP processing on the interface without assigning an explicit IP address to the interface.

Options *interface-name*—Name of the interface from which the local address is derived. The specified interface must have a logical unit number and a configured IP address, and must not be an unnumbered interface.

The preferred-source-address statement is explained separately.

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

Related Topics
- "Configuring an Unnumbered Interface," in *JUNOS Network Interfaces Configuration Guide*.
- address
- *JUNOS System Basics Configuration Guide*

vlan-id

Syntax vlan-id *number*;

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*] hierarchy added in JUNOS Release 9.2.

Description For Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.

Options *number*—A valid VLAN identifier.

Range: For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023.

For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094.

VLAN ID 0 is reserved for tagging the priority of frames.

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

vlan-tagging

Syntax vlan-tagging;

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* interfaces *interface-name*] hierarchy added in JUNOS Release 9.2.

Description For Fast Ethernet and Gigabit Ethernet interfaces and aggregated Ethernet interfaces configured for VPLS, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.

NOTE: For Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces supporting VPLS, the JUNOS software supports a subset of the IEEE 802.1Q standard for channelizing an Ethernet interface into multiple logical interfaces, allowing many hosts to be connected to the same Gigabit Ethernet switch, but preventing them from being in the same routing or bridging domain.

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

Part 6

Dynamic Firewall Services for Subscriber Access

Chapter 20

Dynamic Firewall Services Overview

Dynamic Firewall Filters Overview

Firewall filters provide rules that define whether to permit or deny packets that are transiting an interface on a router. You configure firewall filters to determine whether to permit or deny traffic before it enters or exits an interface to which the firewall filter is applied. An *input* (or *ingress*) firewall filter is one that is applied to packets that are entering a network. An *output* (or *egress*) firewall filter is one that is applied to packets that are exiting a network. You can configure firewall filters to subject packets to filtering or class-of-service (CoS) marking (grouping similar types of traffic together and treating each type of traffic as a class with its own level of service priority).

What makes firewall filters "dynamic" is the ability of the router to apply them to interfaces dynamically. This dynamic application is performed by associating input or output dynamic filters to a dynamic profile. When triggered, a dynamic profile can apply a named filter or a filter specified in RADIUS to an interface.

This overview covers:

Firewall Filter Types

The following firewall filter types are supported:

- Port (Layer 2) firewall filter—Port firewall filters apply to Layer 2 switch ports. You can apply port firewall filters only in the ingress direction on a physical port.
- VLAN firewall filter—VLAN firewall filters provide access control for packets that enter a VLAN, are bridged within a VLAN, and leave a VLAN. You can apply VLAN firewall filters in both ingress and egress directions on a VLAN. VLAN firewall filters are applied to all packets that are forwarded to or forwarded from the VLAN.

- Router (Layer 3) firewall filter—You can apply a router firewall filter in both ingress and egress directions on Layer 3 (routed) interfaces.

NOTE: Firewall filters are not supported on aggregated Ethernet interfaces.

To apply a firewall filter, you must:

1. Configure the firewall filter.
2. Apply the firewall filter.

Firewall Filter Components

When creating a firewall filter, you first define the family address type (inet) and then you define one or more terms that specify the filtering criteria and the action to take if a match occurs.

Each term consists of the following components:

- Match conditions—Specifies values or fields that the packet must contain. You can define various match conditions, including the IP source address field, IP destination address field, Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) source port field, IP protocol field, Internet Control Message Protocol (ICMP) packet type, TCP flags, and interfaces.
- Actions—Specifies what to do if a match condition occurs. Possible actions are to accept or discard a packet. In addition, packets can be counted to collect statistical information. If no action is specified for a term, the default action is to accept the packet.

Firewall Filter Processing

The order of the terms within a firewall filter is important. Packets are tested against each term in the order in which the terms are listed in the firewall filter configuration. When a firewall filter contains multiple terms, the router takes a top-down approach and compares a packet against the first term in the firewall filter. If the packet matches the first term, the router executes the action defined by that term to either permit or deny the packet, and no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the firewall filter by using the same match process. If no match occurs between the packet and the second term, the router continues to compare the packet to each successive term defined in the firewall filter until a match is found. If a packet does not match any terms in a firewall filter, the default action is to discard the packet.

Related Topics

- Guidelines for Creating and Applying Filters for Subscriber Interfaces on page 313
- Dynamically Attaching Statically Created Filters on page 315
- Dynamically Attaching Filters Using RADIUS Variables on page 316

Guidelines for Creating and Applying Filters for Subscriber Interfaces

This release does not support the dynamic configuration of firewall filters. However, you can create static firewall filters for interfaces as you do normally and dynamically apply those filters to statically created interfaces using dynamic profiles. You can also use dynamic profiles to attach input and output filters through RADIUS.

When creating and applying filters, keep the following in mind:

- This release supports dynamic application of only input and output filters.
- The filters must be interface-specific.
- This release supports only family inet filters.
- You can attach only input and output filters to an interface.
- You can chain up to five input filters and four output filters together.
- If you do not configure and apply a filter, the interface uses the default group filter configuration.
- You cannot modify a firewall filter while subscribers on the same logical interface are bound.

Related Topics

- Dynamic Firewall Filters Overview on page 311
- Dynamically Attaching Statically Created Filters on page 315
- Dynamically Attaching Filters Using RADIUS Variables on page 316
- For information about JUNOS default groups, see the *JUNOS CLI User Guide*

Basic Filter Syntax

This sections provides the basic filter CLI statement syntax. The first part of this syntax provides the CLI statements to associate an input and output filter to a dynamic profile. The second part of this syntax represents the configured input and output filters associated to the dynamic profile. When a DHCP event occurs, the dynamic profile applies the specified filters to the DHCP client interface on the router.

```
[edit]
dynamic-profiles {
   profile-name {
      interfaces {
         $junos-interface-ifd-name {
            unit $junos-underlying-interface-unit {
               family inet {
                  filter {
                     input filter-name;
                     output filter-name;
                  }
               }
            }
         }
      }
   }
[edit]
```

```
firewall {
   family inet {
      filter filter-name {
         [desired filter configuration]
      }
      filter filter-name {
         [desired filter configuration]
      }
   }
}
```

Related Topics

- Dynamically Attaching Statically Created Filters on page 315
- Dynamic Firewall Filters Overview on page 311

Chapter 21

Configuring Filters for Dynamic Profiles

Dynamically Attaching Statically Created Filters

Before you can attach a statically created filter using a dynamic profile.

1. Create the filters you want to attach.

   See the *JUNOS Policy Framework Configuration Guide* for detailed information about firewall filters and how to create them.

2. Create a basic dynamic profile.

   See "Configuring a Basic Dynamic Profile" on page 251.

To dynamically attach statically created input and output filters:

1. Specify the input filter in the dynamic profile.

   ```
   [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter input static-input-filter
   ```

2. Specify the output filter in the dynamic profile.

   ```
   [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter output static-output-filter
   ```

Related Topics

- Guidelines for Creating and Applying Filters for Subscriber Interfaces on page 313
- Dynamically Attaching Filters Using RADIUS Variables on page 316
- For information about JUNOS default groups, see the *JUNOS CLI User Guide*
- For information about firewall filters, see the *JUNOS Policy Framework Configuration Guide*

Dynamically Attaching Filters Using RADIUS Variables

You can attach filters to static interfaces by using dynamic profiles. By specifying a variable for the input and output filters, the dynamic profile uses RADIUS VSA attributes for ingress and egress policy.

RADIUS VSA	Attribute Name	Variable
26–10	ingress-policy-name	$junos-input-policy
26–11	egress-policy-name	$junos-output-policy

Before you can attach a filter using RADIUS.

1. Create a basic dynamic profile.

   See "Configuring a Basic Dynamic Profile" on page 251.

2. Ensure that RADIUS ingress and egress policies are configured appropriately.

   See "Configuring RADIUS Server Parameters for Subscriber Access" on page 21

To dynamically attach input and output filters using RADIUS:

1. Specify the input filter variable in the dynamic profile.

   ```
   [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter input $junos-input-filter
   ```

2. Specify the output filter variable in the dynamic profile.

   ```
   [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter output $junos-output-filter
   ```

Related Topics

- Guidelines for Creating and Applying Filters for Subscriber Interfaces on page 313
- Dynamically Attaching Statically Created Filters on page 315
- For more information about JUNOS default groups, see the *JUNOS CLI User Guide*
- For more information about firewall filters, see the *Policy Framework Configuration Guide*

Chapter 22
Firewall Filter Examples

Static Filter Examples

This topic provides some static filter configuration examples.

```
firewall {
    policer p1 {
        if-exceeding {
            bandwidth-limit 5m;
            burst-size-limit 10m;
        }
        then discard;
    }
    family inet {
        filter dfwd {
            interface-specific;
            term 1 {
                from {
                    source-address {
                        192.1.1.0/24;
                    }
                }
                then {
                    count c1;
                    next term;
                }
            }
            term 2 {
                from {
                    source-address {
                        192.2.1.0/24;
                    }
                }
                then count c2;
            }
            term 3 {
                then accept;
            }
        }
        filter dfwd1 {
            interface-specific;
```

```
    term 1 {
        from {
            address {
                192.1.1.0/24;
            }
        }
        then {
            discard;
        }
    }
}
filter tos {
    interface-specific;
    term 1 {
        from {
            precedence priority;
        }
        then forwarding-class assured-forwarding;
    }
    term 2 {
        then {
            log;
            accept;
        }
    }
}
filter dfwd2 {
    interface-specific;
    term 1 {
        from {
            forwarding-class best-effort;
        }
        then {
            sample;
            forwarding-class expedited-forwarding;
        }
    }
    term 2 {
        then accept;
    }
}
filter nodhcp {
    term dhcpdiscover {
        from {
            protocol udp;
            source-port 68;
            destination-port 67;
        }
        then {
            discard;
        }
    }
    term others {
        then accept;
    }
}
```

```
        filter p1 {
            interface-specific;
            term 1 {
                from {
                    precedence priority;
                }
                then {
                    policer p1;
                    log;
                }
            }
            term 2 {
                then accept;
            }
        }
        filter dscp {
            interface-specific;
            term 1 {
                from {
                    dscp af11;
                }
                then log;
            }
            term 2 {
                then accept;
            }
        }
        filter tcm {
            interface-specific;
            term 1 {
                from {
                    dscp af11;
                }
                then policer p1;
            }
            term 2 {
                then accept;
            }
        }
    }
    traceoptions {
        flag dynamic;
    }
}
```

Related Topics ■ Dynamically Attaching Statically Created Filters on page 315

Part 7
Class of Service for Subscriber Access

Chapter 23

Class of Service for Subscriber Access Overview

CoS for Subscriber Access Overview

This topic describes class-of-service (CoS) functionality for dynamic subscriber access.

JUNOS CoS enables you to divide traffic into classes and offer various levels of throughput and packet loss when congestion occurs. This allows packet loss to happen according to rules that you configure. The JUNOS CoS features provide a set of mechanisms that you can use to provide differentiated services when best-effort traffic delivery is insufficient.

In a subscriber access environment, service providers want to provide video, voice, and data services over the same network for subscribers. You can configure the router to provide hierarchical scheduling for subscribers by dynamically adding or deleting queues when subscribers require services.

In this network, subscribers are mapped to IP demux interfaces or VLANs. Depending on your deployment, you configure CoS parameters in the static [edit class-of-service] hierarchy and in the [edit dynamic profiles class-of-service] hierarchy.

Hardware Requirements for CoS for Dynamic Subscriber Access

To configure CoS for dynamic subscriber access, you must have a Enhanced Queuing Distributed Port Controllers (EQ DPC) on the MX-series router.

Related Topics
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329

CoS and Static IP Demux Interface Set Overview

This topic describes the scenario for configuring hierarchical scheduling on a set of statically created IP demux interfaces.

An interface set enables you to group IP demux interfaces into logical groups, and shape that group by binding a traffic control-profile to the interface set. You can also configure the remaining traffic on interface set to shape IP demux interfaces without traffic-control profiles to an aggregate rate.

Table 18 on page 324 shows the scheduler mapping for interface sets of IP demux interfaces.

Table 18: Scheduler Mapping for Interface Sets

Level	Type	Mapping
L4	Queues	Demux interface
L3	Scheduler	Demux interface
L2	Scheduler	Interface set of IP demux interfaces
L1	Scheduler	Underlying demux interface

Related Topics
- Configuring CoS on a Set of Static IP Demux Interfaces on page 337

Changing CoS Services Overview

This topic describes how to provide CoS when subscribers dynamically upgrade or downgrade services in an access environment.

You can configure your network with an access profile that provides all subscribers with default CoS parameters when they log in. For example, all subscribers can receive a basic data service. By configuring the access profile with RADIUS variables, you also 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 a different services through RADIUS change-of-authorization (CoA) messages after login.

Types of CoS Variables

You can configure variables for the following CoS parameters in a dynamic profile:

- Shaping rate
- Delay buffer rate

- Guaranteed rate
- Scheduler map

For each CoS parameter, you must associate a RADIUS vendor ID. For each vendor ID, you must assign an attribute number and a tag. The tag is used to differentiate between values for different CoS variables when you specify the same attribute number for those variables. These values are matched with the values supplied by RADIUS during subscriber authentication. All of the values in the dynamic profile must be defined in RADIUS or none of the values are passed.

Optionally, you can configure default values for each parameter. Configuring default values is beneficial if you do not configure RADIUS to enable service changes. During service changes, RADIUS takes precedence over the default value that is configured.

Static and Dynamic CoS Configurations

Depending on how you configure CoS parameters in the access and service profiles, certain CoS parameters are replaced or merged when subscribers change or activate new services.

Static configuration is when you configure the scheduler map and schedulers in the static [edit class-of-service] hierarchy and reference the scheduler map in the dynamic profile. Dynamic configuration is when you configure the scheduler map and schedulers within the dynamic profile.

The CoS configuration also depends on whether you have enabled multiple subscribers on the same logical interface using the aggregate-clients option in the dynamic profile referenced by DHCP. When you specify the aggregate-clients option, the scheduler map names specified in the dynamic profile are appended. If the length of the scheduler map name exceeds 128 characters, subscribers cannot log in.

Scenarios for Static and Dynamic Configuration of CoS Parameters

Table 19 on page 325 lists the scenarios for static and dynamic configuration of CoS parameters in access profiles and service profiles at subscriber login. The table also lists the behavior for each configuration for service activation and service modification using RADIUS CoA messages.

Table 19: CoS Services and Variables

Scenario	Static CoS Configuration	Dynamic CoS Configuration	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface)
Subscriber login	■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map in edit class-of-service hierarchy and reference in access profile	■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map and schedulers in access profile	■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map and schedulers in access profile

Table 19: CoS Services and Variables *(continued)*

Scenario	Static CoS Configuration	Dynamic CoS Configuration	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface)
	Static CoS Behavior	**Dynamic CoS Behavior**	**Dynamic CoS Behavior (Multiple Subscribers Enabled on Logical Interface)**
RADIUS CoA for service or variable change	Replaces the following parameters: ■ Delay buffer rate ■ Guaranteed rate ■ Scheduler map ■ Shaping rate	Replaces the following parameters: ■ Delay buffer rate ■ Guaranteed rate ■ Shaping rate Does not replace the scheduler map	Combines the values of the following parameters to their maximum scalar value: ■ Delay buffer rate ■ Guaranteed rate ■ Shaping rate Replaces the scheduler map parameter
RADIUS CoA for service activation	Does not merge queues	Merge queues if the queue specified in the service profile is not already in use for the subscriber	Merge queues if the queue specified in the service profile is not already in use for the subscriber

Related Topics

- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329
- Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 330
- For more information about enabling multiple subscribers on the same logical interface for DHCP, see Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 50
- For more information about RADIUS attributes, see RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 28

Guidelines for Configuring CoS for Subscriber Access

When configuring CoS for subscriber access, consider the following guidelines:

- In the current release, you configure the traffic scheduling and shaping parameters in a traffic-control profile within the dynamic profile. You can configure the scheduler map and schedulers in a dynamic profile or in the [edit class-of-service] hierarchy. You must statically configure the remaining CoS parameters, such as hierarchical scheduling, classifiers, drop profiles, and forwarding classes, in the [edit class-of-service] hierarchy.
- You must enable hierarchical scheduling in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails.
- You can configure only one traffic-control-profile under a dynamic profile.

- You must define the output-traffic-control-profile that binds the traffic-control profile to the interface within the same dynamic profile as the interface.
- We recommend that you provide different names for the schedulers defined in dynamic profiles that are used for access and services. For example, if there are two dynamic profiles, voice-profile and video-profile, provide unique names for the schedulers defined under those profiles.

Related Topics

- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329

Chapter 24

Configuring Class of Service for Subscriber Access

Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You can configure CoS in dynamic profile for subscriber access.

To configure CoS in a dynamic profile for subscriber access:

1. Configure static CoS parameters in the [edit class-of-service] hierarchy.
   a. Configure the scheduler map, forwarding classes, and schedulers.

      You reference the scheduler map in the dynamic profile.

   b. Configure drop profiles.

   c. Enable the hierarchical scheduler for the interface.

   See the *JUNOS Class of Service Configuration Guide* for information about configuring static CoS parameters.
2. Configure a static or dynamic subscriber interface.

   See "Configuring Static Subscriber Interfaces in Dynamic Profiles" on page 279 and "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 282.

3. Configure CoS parameters in a dynamic profile.
   a. Configure the dynamic profile.

      See “Configuring a Basic Dynamic Profile” on page 251.

   b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

      Reference the scheduler map you configured in the static [edit class-of-service] hierarchy.

      See “Configuring Traffic Shaping and Scheduling in a Dynamic Profile” on page 332.

   c. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

      See “Applying CoS to an Interface in a Dynamic Profile” on page 336.

4. To configure default values for subscribers on login, and enable subscribers to replace other CoS parameters when replacing services, configure variables in the dynamic profile.

   See “Configuring CoS Variables in a Dynamic Profile” on page 333.

Related Topics

- CoS for Subscriber Access Overview on page 323
- Example: Configuring Static Scheduling and Queuing for Subscriber Access on page 339

Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You can configure dynamic scheduling and queuing in dynamic profile for subscriber access.

To configure dynamic scheduling and queuing for subscriber access:

1. Configure a static or dynamic subscriber interface.

   See “Configuring Static Subscriber Interfaces in Dynamic Profiles” on page 279 and “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 282.

2. Configure CoS parameters in a dynamic profile.
   a. Configure the dynamic profile.

      See “Configuring a Basic Dynamic Profile” on page 251.

   b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

See “Configuring Traffic Shaping and Scheduling in a Dynamic Profile” on page 332.

c. Configure the schedulers and scheduler map in the dynamic profile.

See “Configuring Schedulers in a Dynamic Profile” on page 332.

d. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

See “Applying CoS to an Interface in a Dynamic Profile” on page 336.

3. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.

Because you have configured the scheduler map in the dynamic profile, queues are merged when subscribers change services. Other CoS parameters are replaced.

When multiple subscribers are enabled on a DHCP subscriber interface, the system does not replace the parameters. Instead, it combines the values of the parameters to their maximum scalar value.

a. Configure CoS variables in a dynamic profile.

See “Configuring CoS Variables in a Dynamic Profile” on page 333

b. (Optional) Enable multiple subscribers on a logical interface by configuring the aggregate-clients option for the dynamic profile attached to a DHCP subscriber interface.

See “Attaching Dynamic Profiles to DHCP Subscriber Interfaces” on page 57.

4. Configure the remaining static CoS parameters in the [edit class-of-service] hierarchy.

a. Configure the drop profiles. The scheduler map and schedulers are already configured in the dynamic profile.

See the *JUNOS Class of Service Configuration Guide* for information about configuring the scheduler map.

b. Enable the hierarchical scheduler for the interface.

See the *JUNOS Class of Service Configuration Guide* for information about configuring the remaining CoS parameters.

Related Topics

- CoS for Subscriber Access Overview on page 323
- Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access on page 342

Configuring Traffic Shaping and Scheduling in a Dynamic Profile

You use traffic-control profiles to configure traffic shaping and scheduling properties. When you reference a traffic-control profile in a dynamic profile, you can provide hierarchical shaping and scheduling for a subscriber interface.

To configure traffic-control profiles in a dynamic profile:

1. Create the traffic-control profile and assign a name.

   ```
   [edit dynamic-profiles business-profile class-of-service]
   user@host# edit traffic-control-profiles tcp-data
   ```

2. Reference a scheduler map in the dynamic profile. The scheduler map is statically configured in the [edit class-of-service] hierarchy.

   ```
   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles]
   user@host# set scheduler-map data-map
   ```

3. Configure the shaping rate to be used in the dynamic profile.

   ```
   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles]
   user@host# set shaping-rate 10m
   ```

4. Configure the guaranteed rate to be used in the dynamic profile.

   ```
   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles]
   user@host# set guaranteed-rate 10m
   ```

5. (Optional) Configure the delay-buffer rate. If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

   ```
   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles]
   user@host# set delay-buffer-rate 10m
   ```

Related Topics

- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329
- CoS for Subscriber Access Overview on page 323

Configuring Schedulers in a Dynamic Profile

This topic describes how to configure schedulers in a dynamic profile for subscriber access.

You use schedulers to define the parameters of output queues. These properties include the amount of interface bandwidth assigned to the queue, the size of the memory buffer allocated for storing packets, the priority of the queue, and the tail drop profiles associated with the queue.

You can configure up to four schedulers in a dynamic profile.

To configure scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.
   a. Specify the scheduler for which you want to configure parameters.

      ```
      [edit dynamic-profiles class-of-service]
      user@host# set schedulers be-sch
      ```

   b. Configure the buffer size.

      ```
      [edit dynamic-profiles class-of-service schedulers be-sch]
      user@host# set buffer-size remainder
      ```

   c. Configure the drop-profile map and drop profile.

      ```
      [edit dynamic-profiles class-of-service schedulers be-sch]
      user@host# set drop-profile-map loss-priority any protocol any drop-profile
        d3
      ```

   d. Configure the priority.

      ```
      [edit dynamic-profiles class-of-service schedulers be-sch]
      user@host# set priority low
      ```

   e. Configure the transmit rate.

      ```
      [edit dynamic-profiles class-of-service schedulers be-sch]
      user@host# set transmit-rate percent 40
      ```

2. Associate the scheduler with a scheduler map.
   a. Configure the scheduler map name.

      ```
      [edit dynamic-profiles class-of-service]
      user@host# set scheduler-maps data-smap
      ```

   b. Configure the forwarding class.

      ```
      [edit dynamic-profiles class-of-service scheduler-maps data-smap]
      user@host# set forwarding-class be
      ```

   c. Configure the scheduler.

      ```
      [edit dynamic-profiles class-of-service scheduler-maps data-smap]
      user@host# set scheduler be_sch
      ```

Related Topics ■ Changing CoS Services Overview on page 324

Configuring CoS Variables in a Dynamic Profile

You can configure user-defined variables in the dynamic profile for traffic scheduling and shaping parameters.

Configuring RADIUS attributes as variables for CoS parameters enables subscribers to upgrade or downgrade services after login using a RADIUS change of authorization (CoA).

Alternatively, you can use variables to provide subscribers with default values for CoS parameters. If you have configured values to be supplied by a RADIUS CoA, subscribers can receive the previously configured default value when deactivating a service.

You activate the variables by referencing them in the traffic control profile configured in the dynamic profile.

To configure variables for CoS in a dynamic profile:

1. Specify that you want to configure variables in the dynamic profile.

   [edit dynamic-profiles residential-silver variables]

2. Do one of the following to configure variables for the shaping rate:
   - Enable RADIUS to modify the shaping rate based on service changes.
     a. Configure the attribute:

        [edit dynamic-profiles residential-silver variables]
        user@host# **set srate radius vendor-id 4874 attribute 108**

     b. Configure the tag:

        [edit dynamic-profiles residential-silver variables]
        user@host# **set srate radius vendor-id 4874 tag 1**

   - Configure a default value for the shaping rate.

     [edit dynamic-profiles residential-silver variables]
     user@host# **set srate default-value 10m**

3. Do one of the following to configure variables for the guaranteed rate.
   - Enable RADIUS to modify the guaranteed rate based on service changes.
     a. Configure the attribute:

        [edit dynamic-profiles residential-silver variables]
        user@host# **set grate radius vendor-id 4874 attribute 108**

     b. Configure the tag:

        [edit dynamic-profiles residential-silver variables]
        user@host# **set grate radius vendor-id 4874 tag 2**

   - Configure a default value for the guaranteed rate.

     [edit dynamic-profiles residential-silver variables]
     user@host# **set grate default-value 5m**

4. Do one of the following to configure variables for the delay buffer rate:

- Enable RADIUS to modify the delay buffer rate based on service changes.

  a. Configure the attribute:

  ```
  [edit dynamic-profiles residential-silver variables]
  user@host# set dbrate radius vendor-id 4874 attribute 108
  ```

  b. Configure the tag:

  ```
  [edit dynamic-profiles residential-silver variables]
  user@host# set dbrate radius vendor-id 4874 tag 3
  ```

- Configure a default value for the delay buffer rate.

  ```
  [edit dynamic-profiles residential-silver variables]
  user@host# set dbrate default-value 10m
  ```

5. Do one of the following to configure variables for the scheduler map.

   - Enable RADIUS to modify the scheduler map based on service changes.

     a. Configure the attribute:

     ```
     [edit dynamic-profiles residential-silver variables]
     user@host# set smap radius vendor-id 4874 attribute 108
     ```

     b. Configure the tag:

     ```
     [edit dynamic-profiles residential-silver variables]
     user@host# set smap radius vendor-id 4874 tag 4
     ```

   - Configure a default value for the scheduler map.

     ```
     [edit dynamic-profiles residential-silver variables]
     user@host# set smap default-value triple-play
     ```

6. Configure the variables for the CoS parameters in the traffic control profile.

   Either the shaping rate or the guaranteed rate are required in the traffic control profile.

   a. Specify that you want to configure CoS parameters in the dynamic profile.

   ```
   user@host# edit dynamic-profiles residential-silver class-of-service
     traffic-control-profiles tcp1
   ```

   b. Configure the scheduler map variable.

   ```
   [edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
     tcp1]
   user@host# set scheduler-map "$smap"
   ```

   c. Configure the shaping rate variable.

   ```
   [edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
     tcp1]
   ```

```
user@host# set shaping-rate "$srate"
```

d. Configure the guaranteed rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set guaranteed-rate "$grate"
```

e. Configure the delay buffer rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set delay-buffer-rate "$dbrate"
```

Related Topics
- Changing CoS Services Overview on page 324

Applying CoS to an Interface in a Dynamic Profile

After you configure the CoS parameters in a dynamic profile, you apply them to an interface. The output-traffic control profile enables you to provide traffic scheduling to the interface.

To apply CoS attributes to an interface in a dynamic profile:

1. Specify the name of the interface using a variable.

```
[edit dynamic-profiles business-data class-of-service]
user@host# set interfaces “$junos-interface-ifd-name”
```

2. Configure the logical interface using a variable.

```
[edit dynamic-profiles business-data class-of-service interfaces]
user@host# set unit “$junos-underlying-interface-unit”
```

3. Apply the output-traffic control profile to the interface. Reference the name of the traffic-control profile that contains the scheduling properties that you want to use.

```
[edit dynamic-profiles business-data class-of-service interfaces unit]
user@host# set output-traffic-control-profile data-tcp
```

Related Topics
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329
- CoS for Subscriber Access Overview on page 323

Configuring CoS on a Set of Static IP Demux Interfaces

You can configure CoS on a set of static IP demux interfaces. The static IP demux interface represents a subscriber.

Although the interface set is applied at the [edit interfaces] hierarchy level, the CoS parameters for the interface set are defined at the [edit class-of-service interfaces] hierarchy level, usually with the output-traffic control profile statement.

Before you configure CoS on a static subscriber interface:

- Configure the static IP demux interface.

  See Configuring Static IP Demux Interfaces for Subscribers.

To configure CoS on a set of static IP demux interfaces:

1. Define the CoS parameters for the interface set.

```
class-of-service {
   traffic-control-profiles {
      voice {
         scheduler-map voice;
         shaping-rate 64k;
      }
      video {
         scheduler-map video;
         shaping-rate 5m;
      }
      data {
         scheduler-map data;
         shaping-rate 3m;
      }
      t2 {
         shaping-rate 7m;
      }
   }
```

2. Apply the CoS parameters to the interface set.

```
interfaces {
demux-set1 {
   output-traffic-control-profile T2;
}
   demux-set2 {
      output-traffic-control-profile T2;
   }
      demux0 {
         unit 0 {
            output-traffic-control-profile Voice;
         }
            unit 1 {
               output-traffic-control-profile Video;
            }
               unit 2 {
```

```
    output-traffic-control-profile Data;
}
    unit 3 {
        output-traffic-control-profile Voice;
    }
        unit 4 {
            output-traffic-control-profile Video;
        }
            unit 5 {
                output-traffic-control-profile Data;
                }
                }
            }
            scheduler-maps {
                voice {
                    forwarding-class assured-forwarding scheduler s0;
                }
                video {
                    forwarding-class expedited-forwarding scheduler s0;
                }
                data {
                    forwarding-class best-effort scheduler s0;
                }
            }
            schedulers {
                s0 {
                    transmit-rate percent 100;
                    buffer-size percent 100;
                }
            }
```

Related Topics ■ For more information about interface sets and hierarchical scheduling for VLANs, see the *JUNOS Class of Service Configuration Guide*

Chapter 25

Class of Service for Subscriber Access Examples

Example: Configuring Static Scheduling and Queuing for Subscriber Access

This example shows you how to configure CoS for a subscriber in a dynamic profile. The CoS parameters configure a best-effort, data service for subscribers.

1. Configure the static CoS parameters in the [edit class-of-service] hierarchy.

   You must configure the scheduler maps in this hierarchy; it will get referenced in the dynamic profile.

```
class-of-service {
   forwarding-classes {
      queue 0 best-effort;
      queue 1 expedited-forwarding;
      queue 3 network-control;
      queue 2 assured-forwarding;
   }
   scheduler-maps {
      data_smap {
         forwarding-class best-effort scheduler be_sch;
      }
   }
   schedulers {
      be_sch {
         transmit-rate percent 10;
         buffer-size remainder;
         priority low;
      }
   }
}
```

2. Configure the subscriber interface in the [edit interfaces] hierarchy. Enable hierarchical scheduling for the interface.

```
interfaces {
    ge-2/2/0 {
        hierarchical-scheduler;
        vlan-tagging;
        unit 100 {
            vlan-id 100;
            family inet {
                unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
            }
        }
    }
```

3. Configure CoS in the dynamic profile.

```
dynamic-profiles {
    data-service {
        interfaces {
            "$junos-interface-ifd-name" {
                unit "$junos-underlying-interface-unit" {
                    family inet;
                }
            }
        }
        class-of-service {
            traffic-control-profiles {
                tcp1 {
                    scheduler-map data_smap;
                    shaping-rate 50k;
                    guaranteed-rate 10k;
                }
            }
            interfaces {
                "$junos-interface-ifd-name" {
                    unit "$junos-underlying-interface-unit" {
                        output-traffic-control-profile tcp1;
                    }
                }
            }
        }
    }
}
```

Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces

In this example, scheduling is configured for a residential subscriber. Each forwarding class represents a multiplay service (voice, video and data), and is equivalent to a queue.

An interface set of IP demux interfaces represents a DSLAM, and provides shaping of subscribers services to a DSLAM aggregate rate.

```
interfaces {
    interface-set demux-set {
        interface demux0 {
            unit 0;
            unit 1;
            }
        }
        ge-2/0/1 {
            vlan-tagging;
            unit 1 {
                per-session-scheduler;
                vlan-id 1;
                demux-source inet;
                family inet {
                    address 4.4.4.4/24;
                }
            }
        }
        demux0 {
            unit 0 {
                demux-options {
                    underlying-interface ge-2/0/1.1;
                }
                family inet {
                    demux-source {
                        1.1.1.0/24;
                    }
                    address 1.1.1.1/24;
                }
            }
            unit 1 {
                demux-options {
                    underlying-interface ge-2/0/1.1;
                }
                family inet {
                    demux-source {
                        1.1.2.0/24;
                    }
                    address 1.1.2.1/24;
                }
            }
        }
    }
    class-of-service {
        traffic-control-profiles {
            T1 {
                scheduler-map m1;
                shaping-rate 5m;
            }
            T2 {
                shaping-rate 60m;
            }
        }
```

```
interfaces {
   demux-set {
      output-traffic-control-profile T2;
   }
      demux0 {
         unit 0 {
            output-traffic-control-profile T1;
            }
            unit 1 {
               output-traffic-control-profile T1;
               }
               }
            }
            scheduler-maps {
               m1 {
                  forwarding-class best-effort scheduler s0;
                  forwarding-class expedited-forwarding scheduler s1;
                  forwarding-class assured-forwarding scheduler s2;
                  forwarding-class network-control scheduler s3;
               }
            }
            schedulers {
               s0 {
                  transmit-rate percent 10;
                  buffer-size percent 10;
               }
               s1 {
                  transmit-rate percent 20;
                  buffer-size percent 20;
               }
               s2 {
                  transmit-rate percent 30;
                  buffer-size percent 30;
               }
               s3 {
                  transmit-rate percent 40;
                  buffer-size percent 40;
               }
            }
         }
```

Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access

In this example, subscribers are provided with a data and voice service defined in an access profile when they initially log in. The service activation is performed at login.

After the initial login, the subscriber adds an assured forwarding service that is not defined in the original access profile. A service profile is used to configure the schedulers and a RADIUS CoA activates the service. The queues defined for the schedulers in the initial scheduler map and the new scheduler map are merged.

In addition, the values for the initial data and voice service are upgraded by the RADIUS administrator through a separate RADIUS CoA message.

To configure the initial service and enable the activation through a RADIUS CoA:

1. Configure the access profile for the service activation.
   a. Configure the RADIUS attribute variables in the initial dynamic profile.

```
dynamic-profiles access-profile {
   variables {
      smap {
         radius {
            vendor-id 4874 {
               attribute 108;
               tag 4;
            }
         }
      }
      srate {
         radius {
            vendor-id 4874 {
               attribute 108;
               tag 1;
            }
         }
      }
      grate {
         radius {
            vendor-id 4874 {
               attribute 108;
               tag 2;
            }
         }
      }
      dbrate {
         radius {
            vendor-id 4874 {
               attribute 108;
               tag 3;
            }
         }
      }
   }
}
```

Table 20 on page 343 lists the initial values defined by the RADIUS administrator for the tags used in this example.

Table 20: Initial CoS Values for Subscriber Login

Variable	RADIUS Tag	Value
Shaping rate	T01	6m
Guaranteed rate	T02	4m
Delay buffer rate	T03	1m
Scheduler map	T04	data_voice_smap

b. Configure the class of service parameters in the access profile.

Include the configurations for the interfaces, schedulers, and the scheduler maps.

```
dynamic-profiles access-profile {
   class-of-service {
      traffic-control-profiles {
         tcp1 {
            scheduler-map "$smap";
            shaping-rate "$srate";
            guaranteed-rate "$grate";
            delay-buffer-rate "$dbrate";
         }
      }
      interfaces {
         "$junos-interface-ifd-name" {
            unit "$junos-underlying-interface-unit" {
               output-traffic-control-profile tcp1;
            }
         }
      }
      scheduler-maps {
         data_voice_smap {
            forwarding-class be scheduler be_sch;
            forwarding-class ef scheduler ef_sch;
         }
         schedulers {
            be_sch {
               transmit-rate percent 40;
               buffer-size remainder;
               priority low;
               drop-profile-map loss-priority any protocol any drop-profile d3;
            }
            ef_sch {
               transmit-rate percent 20;
               buffer-size remainder;
               priority low;
               drop-profile-map loss-priority any protocol any drop-profile d2;
            }
         }
```

2. Configure the interfaces for the access profile.

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

3. Configure the forwarding classes in the static [edit class-of-service] hierarchy.

```
class-of-service {
    drop-profiles {
        d0 {
            fill-level 25 drop-probability 100;
            fill-level 0 drop-probability 0;
        }
        d1 {
            fill-level 50 drop-probability 100;
            fill-level 0 drop-probability 0;
        }
        d2 {
            fill-level 75 drop-probability 100;
            fill-level 0 drop-probability 0;
        }
        d3 {
            fill-level 0 drop-probability 0;
            fill-level 100 drop-probability 100;
        }
    }
    forwarding-classes {
        queue 0 be;
        queue 1 ef;
        queue 2 af;
        queue 3 nc;
    }
    interfaces {
        ge-1/2/9 {
            shaping-rate 100m;
        }
    }
}
```

4. Configure the service profile to enable RADIUS to activate the assured forwarding service after login.

```
dynamic profiles service-af {
    class-of-service {
        scheduler-maps {
            service-af-smap {
                forwarding-class af scheduler af_sched;
            }
        }
        schedulers {
            af_sched {
                transmit-rate percent 30;
                buffer-size remainder;
                priority low;
                drop-profile-map loss-priority any protocol any drop-profile d1;
            }
        }
    }
}
```

Subscribers receive upgraded values for the initial data and voice service when RADIUS sends a change of authorization (CoA). In this case, the CoS parameters are replaced, because multiple subscribers were not enabled on the logical interface.

Table 21 on page 346 lists the upgraded values defined by the RADIUS administrator.

Table 21: Upgraded CoS Values for the Video Service

Variable	RADIUS Tag	Value
Shaping rate	T01	14m
Guaranteed rate	T02	13m
Delay buffer rate	T03	12m
Scheduler map	T04	data_voice_smap

Related Topics

- Changing CoS Services Overview on page 324
- Configuring CoS Variables in a Dynamic Profile on page 333

Chapter 26

Summary of Class of Service for Subscriber Access Statements

buffer-size

Syntax buffer-size (percent *percentage* | remainder | temporal *microseconds*);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify buffer size.

Default If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Options percent *percentage*—Buffer size as a percentage of total buffer.

remainder—Remaining buffer available.

temporal *microseconds*—Buffer size as a temporal value. The queuing algorithm starts dropping packets when it queues more than a computed number of bytes. This maximum is computed by multiplying the logical interface speed by the configured temporal value.
Range: The ranges vary by platform as follows:

- For other M-series platforms: 1 through 200,000 microseconds.
- For IQ PICs on T-series and M320 platforms: 1 through 50,000 microseconds.
- For IQ PICs on other M-series platforms: 1 through 100,000 microseconds.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

class-of-service

Syntax class-of-service { ... }

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

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description Configure JUNOS CoS features in a dynamic profile.

Default If you do not configure any CoS features, all packets are transmitted from output transmission queue 0.

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

Related Topics
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 329

delay-buffer-rate

Syntax delay-buffer-rate (percent *percentage* | *rate* | *variable*);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]

Release Information Statement introduced in JUNOS 7.6.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description For EQ DPC interfaces, base the delay-buffer calculation on a delay-buffer rate.

Default If you do not include this statement, the delay-buffer calculation is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

Options *rate*—For EQ DPC interfaces, delay-buffer rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 1000 through 160,000,000,000 bps

variable—Variable of the delay-buffer rate, expressed in the format "$variable-name".

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

Related Topics
- Configuring Traffic Shaping and Scheduling in a Dynamic Profile on page 332
- output-traffic-control-profile

drop-profile

Syntax drop-profile *profile-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol (any | non-tcp | tcp)]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Define drop profiles for RED in a dynamic profile. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

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

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

drop-profile-map

Syntax drop-profile-map loss-priority(any | low | medium-low | medium-high | high) protocol (any | non-tcp | tcp) protocol *profile-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Define loss priority value for drop profile.

The statements are explained separately.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

forwarding-class

Syntax forwarding-class *class-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Associate a scheduler with a scheduler map.

Options *scheduler-name*—Name of the scheduler configuration block.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

guaranteed-rate

Syntax guaranteed-rate (percent *percentage* | *rate* | *variable*);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]

Release Information Statement introduced in JUNOS 7.6.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2

Description For EQ DPC interfaces only, configure a guaranteed minimum rate for a logical interface.

Default If you do not include this statement and you do not include the delay-buffer-rate statement, the logical interface receives a minimal delay-buffer rate and minimal bandwidth equal to 2 MTU-sized packets.

Options *rate*—For EQ DPC interfaces, guaranteed rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 1000 through 160,000,000,000 bps

variable—Variable of the guaranteed rate, expressed in the format "$variable-name".

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

Related Topics
- Configuring Traffic Shaping and Scheduling in a Dynamic Profile on page 332

interfaces

Syntax

```
interfaces {
    interface-name {
    }
    unit logical-unit-number {
        output-traffic-control-profile profile-name;
    }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description Configure interface-specific CoS properties for incoming packets.

Options *interface-name*—Either the specific name of the interface you want to assign to the dynamic-profile or the interface variable ($junos-interface-ifd-name). The interface variable is dynamically replaced with the interface the DHCP client accesses when connecting to the router.

The remaining statements are explained separately.

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

Related Topics

- Applying CoS to an Interface in a Dynamic Profile on page 336

loss-priority

Syntax loss-priority (any | low | medium-low | medium-high | high);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify a loss priority to which to apply a drop profile in a dynamic profile. The drop profile map sets the drop profile for a specific PLP and protocol type. The inputs for the map are the PLP designation and the protocol type. The output is the drop profile.

Options any—The drop profile applies to packets with any PLP.

high—The drop profile applies to packets with high PLP.

medium—The drop profile applies to packets with medium PLP.

low—The drop profile applies to packets with low PLP.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

output-traffic-control-profile

Syntax output-traffic-control-profile *profile-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name logical-unit-number*]

Release Information Statement introduced in JUNOS Release 7.6.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description For EQ DPCs on MX-series routers, apply an output traffic scheduling and shaping profile to the logical interface.

Options *profile-name*—Name of the traffic-control profile to be applied to this interface

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

Related Topics
- Applying CoS to an Interface in a Dynamic Profile on page 336
- traffic-control-profiles

priority

Syntax priority *priority-level*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify packet-scheduling priority value in a dynamic profile.

Options *priority-level* can be one of the following:

- low—Scheduler has low priority.
- medium-low—Scheduler has medium-low priority.
- medium-high—Scheduler has medium-high priority.
- high—Scheduler has high priority. Assigning high priority to a queue prevents the queue from being underserved.
- strict-high—Scheduler has strictly high priority. Configure a high priority queue with unlimited transmission bandwidth available to it. As long as it has traffic to send, the strict-high priority queue receives precedence over low, medium-low, and medium-high priority queues, but not high priority queues. You can configure strict-high priority on only one queue per interface.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

protocol

Syntax protocol (any | non-tcp | tcp);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify the protocol type for the specified scheduler in a dynamic profile.

Options any—Accept any protocol type.

non-tcp—Accept any protocol type other than TCP/IP.

tcp—Accept only TCP/IP protocol.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

scheduler

Syntax scheduler *scheduler-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description Associate a scheduler with a scheduler map in a dynamic profile.

Options *scheduler-name*—Name of the scheduler configuration block.

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

scheduler-map

Syntax scheduler-map *map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description For EQ DPC interfaces only, associate a scheduler map name with a traffic-control profile in a dynamic profile.

Options *map-name*—Name of the scheduler map; can be expressed as a variable in the format "$variable-name"

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

Related Topics
- Configuring Traffic Shaping and Scheduling in a Dynamic Profile on page 332
- output-traffic-control-profile

scheduler-maps

Syntax

```
scheduler-maps {
    map-name {
        forwarding-class class-name scheduler scheduler-name;
    }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify a scheduler map name in a dynamic profile and associate it with the scheduler configuration and forwarding class.

Options *map-name*—Name of the scheduler map.

The remaining statements are explained separately.

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

Related Topics

- Configuring Schedulers in a Dynamic Profile on page 332

schedulers

Syntax

```
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;
        priority priority-level;
        shaping-rate (percent percentage | rate);
        transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
    }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify scheduler name and parameter values in a dynamic profile.

Options *scheduler-name*—Name of the scheduler to be configured.

The remaining statements are explained separately.

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

Related Topics

- Configuring Schedulers in a Dynamic Profile on page 332

shaping-rate

Syntax shaping-rate (percent *percentage* | *rate* | *variable*);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]
[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]

Release Information Statement introduced in JUNOS Release 7.6.
The [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.
The [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*] hierarchy added in JUNOS Release 9.3.

Description For EQ DPC interfaces only, configure a shaping rate for a logical interface. The sum of the shaping rates for all logical interfaces on the physical interface can exceed the physical interface bandwidth. This practice is known as oversubscription of the peak information rate (PIR).

Default The default behavior depends on various factors.

Options *rate*—For EQ DPC interfaces, peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 1000 through 160,000,000,000 bps

variable—Variable of the shaping rate, expressed in the format "$variable-name".

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

Related Topics
- Configuring Traffic Shaping and Scheduling in a Dynamic Profile on page 332
- Configuring Schedulers in a Dynamic Profile on page 332
- output-traffic-control-profile

traffic-control-profiles

Syntax

```
traffic-control-profiles profile-name {
    delay-buffer-rate (percent percentage | rate);
    guaranteed-rate (percent percentage | rate);
    scheduler-map map-name;
    shaping-rate (percent percentage | rate);
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced in JUNOS Release 7.6.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

Description For EQ DPC interfaces only, configure traffic shaping and scheduling profiles.

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

The remaining statements are explained separately.

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

Related Topics

- Configuring Traffic Shaping and Scheduling in a Dynamic Profile on page 332
- output-traffic-control-profile

transmit-rate

Syntax transmit-rate (*rate* | percent *percentage* | remainder) <exact | rate-limit>;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.
rate-limit option introduced in JUNOS Release 8.3.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.3.

Description Specify the transmit rate or percentage for a scheduler in a dynamic profile.

Default If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Options exact—(Optional) Enforce the exact transmission rate. Under sustained congestion, a rate-controlled queue that goes into negative credit fills up and eventually drops packets. Make sure this value never exceeds the rate-controlled amount.

rate—Transmission rate, in bps. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 3200 through 160,000,000,000 bps

rate-limit—(Optional) Limit the transmission rate to the rate-controlled amount during congestion. In contrast to the exact option, when there is no congestion, the scheduler with the rate-limit option shares unused bandwidth above the rate-controlled amount.

remainder—Use remaining rate available.

percent *percentage*—Percentage of transmission capacity. A percentage of zero drops all packets in the queue.
Range: 0 through 100 percent

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

Related Topics
- Configuring Schedulers in a Dynamic Profile on page 332

unit

Syntax

```
unit logical-unit-number {
    output-traffic-control-profile profile-name ;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name*] hierarchy added in JUNOS Release 9.2.

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

Options *logical-unit-number*—Either the specific unit number of the interface you want to assign to the dynamic-profile or the static unit number variable ($junos-underlying-interface-unit). The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP client when it accesses the subscriber network.
Range: 0 through 16,384

The remaining statements are explained separately.

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

Related Topics

- Applying CoS to an Interface in a Dynamic Profile on page 336

Part 8
Dynamic Protocols for Subscriber Access

Chapter 27

Dynamic Protocol Configuration Overview

Dynamic IGMP Configuration Overview

The Internet Group Management Protocol (IGMP) is a host to router signaling protocol for IPv4 used to support IP multicasting. This protocol manages the membership of hosts and routers in multicast groups. IP hosts use IGMP to report their multicast group memberships to any immediately neighboring multicast routers. Multicast routers use IGMP to learn, for each of their attached physical networks, which groups have members.

Subscriber access supports the configuration of IGMP within the dynamic profiles hierarchy. By specifying IGMP statements within a dynamic profile, you can dynamically apply IGMP configuration when a subscriber connects to an interface using a particular access technology (DHCP), enabling the subscriber to access a carrier (multicast) network.

Related Topics

- Dynamic Profiles Overview on page 245
- Configuring a Dynamic Profile for Client Access on page 255
- For general information about configuring IGMP, see the *JUNOS Multicast Protocols Configuration Guide*

Chapter 28

Summary of IGMP Dynamic Profile Statements

accounting

Syntax accounting;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced in JUNOS Release 8.5.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Enable the collection of IGMP join and leave event statistics on a per-interface basis.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about recording IGMP join and leave events, see "Recording IGMP Join and Leave Events" in the *JUNOS Multicast Protocols Configuration Guide*

disable

Syntax "disable:$junos-igmp-enable";

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Disable IGMP on the interface.

NOTE: Though the purpose of this statement is to disable IGMP on interfaces, under the dynamic-profiles hierarchy you can use this statement and an enable variable (disable:$junos-igmp-enable) to ensure that IGMP is not disabled by a AAA-based authentication and management method (RADIUS).

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about disabling IGMP, see "Disabling IGMP" in the *JUNOS Multicast Protocols Configuration Guide*

group

Syntax For group configuration with a source, use the following syntax:

```
group ip-address {
   source ip-address;
}
```

For group configuration without a source, use the following syntax:

```
group group;
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name* static], [edit logical-systems *logical-system-name* protocols igmp interface *interface-name* static], [edit protocols igmp interface *interface-name* static]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name* static] hierarchy added in JUNOS Release 9.2.

Description When configuring with a source address, configure the IGMP multicast group address that receives data on an interface and a source address for certain packets. For configuration without a source address, configure only the IGMP multicast group address that receives data on an interface.

Options *ip-address*—Group IP address.

group—Name of group.

NOTE: You must specify a unique address for each group.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about configuring static group membership, see "Enabling IGMP Static Group Membership" in the *JUNOS Multicast Protocols Configuration Guide*

group-policy

Syntax group-policy *policy-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmpinterface *interface-name*]

Release Information Statement introduced in JUNOS Release 9.1.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description When this statement is enabled on a router running IGMP version 2 (IGMPv2), after the router receives an IGMP report, compare the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

When this statement is enabled on a router running IGMP version 3 (IGMPv3), after the router receives an IGMP report, compare the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about rejecting unwanted reports for an IGMP interface, see "Filtering Unwanted IGMP Reports at the IGMP Interface Level" in the *JUNOS Multicast Protocols Configuration Guide*

igmp

Syntax

```
igmp {
   interface interface-name {
      accounting;
      disable;
      group-policy;
      immediate-leave
      no-accounting;
      promiscuous-mode;
      ssm-mapssm-map-name;
      static {
         groupgroup {
            source source;
         }
      }
      version version;
   }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols],
[edit logical-systems *logical-system-name* protocols],
[edit protocols]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols] hierarchy added in JUNOS Release 9.2.

Description Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.

Default IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).

Options The statements are explained separately.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For general information about configuring IGMP, see the *JUNOS Multicast Protocols Configuration Guide*
- For information about enabling IGMP, see "Enabling IGMP" in the *JUNOS Multicast Protocols Configuration Guide*

immediate-leave

Syntax immediate-leave;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced in JUNOS Release 8.3.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Immediately remove the group membership from the interface and suppresses the sending of any group-specific queries for the multicast group when this statement is enabled on a router running IGMP version 2 (IGMPv2), after the router receives a leave group membership message from a host associated with the interface.

Suppress the sending of group-and-source queries but rely on the JUNOS-supported host tracking mechanism to determine whether or not it should remove a particular source group membership from the interface when this statement is enabled on a router running IGMP version 3 (IGMPv3), after the router receives a report with the type BLOCK_OLD_SOURCES.

NOTE: When issuing this command on IGMPv2 interfaces, ensure that the IGMP interface has only one IGMP host connected. If more than one IGMPv2 host is connected to a LAN through the same interface, and one host sends a done message, the router removes all hosts on the interface from the multicast group. The router loses contact with the hosts that are supposed to remain in the multicast group until they send join requests in response to the next general multicast listener query from the router.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about configuring IGMP immediate leave, see “Specifying Immediate-Leave Host Removal” in the *JUNOS Multicast Protocols Configuration Guide*

interface

Syntax

```
interface interface-name {
    accounting;
    disable;
    group-policy;
    immediate-leave
    no-accounting;
    promiscuous-mode;
    ssm-map ssm-map-name;
    static {
        group group {
            source source;
        }
    }
    version version;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp],
[edit logical-systems *logical-system-name* protocols igmp],
[edit protocols igmp]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp] hierarchy added in JUNOS Release 9.2.

Description Enable IGMP on an interface and configure interface-specific properties.

Options *interface-name*—Variable for the interface. Specify the interface variable ($junos-underlying-interface) to indicate that the dynamic profile chooses an interface for the accessing DHCP client.

The remaining statements are explained separately.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about configuring IGMP interfaces, see "Enabling IGMP" in the *JUNOS Multicast Protocols Configuration Guide*

no-accounting

Syntax no-accounting;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced in JUNOS Release 8.5.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Disable the collection of IGMP join and leave event statistics on a per-interface basis.

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

Related Topics
- Configuring a Dynamic Profile for Client Access on page 255
- For information about disabling IGMP accounting on and interface, see "Enabling or Disabling IGMP Accounting on Individual Interfaces" in the *JUNOS Multicast Protocols Configuration Guide*

promiscuous-mode

Syntax promiscuous-mode;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced in JUNOS Release 8.3.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Specify that the interface accepts IGMP reports from hosts on any subnetwork.

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

Related Topics
- Configuring a Dynamic Profile for Client Access on page 255
- For information about how to use IGMP promiscuous mode, see "Accepting IGMP Messages from Remote Subnetworks" in the *JUNOS Multicast Protocols Configuration Guide*

protocols

Syntax

```
protocols {
   igmp {
      interface interface-name {
         accounting;
         disable;
         group-policy;
         immediate-leave
         no-accounting;
         promiscuous-mode;
         ssm-map ssm-map-name;
         static {
            group group {
               source source;
            }
         }
         version version;
      }
   }
```

Hierarchy Level [edit dynamic-profiles protocols],
[edit logical-systems *logical-system-name* protocols],
[edit protocols]

Release Information Statement introduced before JUNOS Release 7.4.
Statement supported in the [edit dynamic-profiles] hierarchy in JUNOS Release 9.2.

Description Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.

Default IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).

Options The statements are explained separately.

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

Related Topics

- For general information about configuring IGMP, see the *JUNOS Multicast Protocols Configuration Guide*, Part 3, "IGMP"

source

Syntax source *source*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name* static],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name* static],
[edit protocols igmp interface *interface-name* static]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name* static] hierarchy added in JUNOS Release 9.2.

Description Specify the IP version 4 (IPv4) unicast address to send data on an interface.

Options *source*—IPv4 unicast address.

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

Related Topics
- Configuring a Dynamic Profile for Client Access on page 255
- For information about defining an IGMP source, see "Enabling IGMP Static Group Membership" in the *JUNOS Multicast Protocols Configuration Guide*

ssm-map

Syntax ssm-map *ssm-map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced in JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Apply an SSM map to an IGMP interface.

Options *ssm-map-name*—Name of SSM map.

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

Related Topics
- Configuring a Dynamic Profile for Client Access on page 255
- For information about configuring SSM maps, see "Source-Specific Multicast Groups Overview" in the *JUNOS Multicast Protocols Configuration Guide*

static

Syntax

```
static {
    group group;
    group group {
        source source;
    }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*], [edit logical-systems *logical-system-name* protocols igmp interface *interface-name*], [edit protocols igmp interface *interface-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Test multicast forwarding on an interface without a receiver host.

Options The remaining statements are explained separately.

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

Related Topics

- Configuring a Dynamic Profile for Client Access on page 255
- For information about testing multicast forwarding without a receiver host, see "Enabling IGMP Static Group Membership" in the *JUNOS Multicast Protocols Configuration Guide*

version

Syntax version *version*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmpinterface *interface-name*],
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],
[edit protocols igmp interface *interface-name*]

Release Information Statement introduced before JUNOS Release 7.4.
The [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*] hierarchy added in JUNOS Release 9.2.

Description Specify the version of IGMP.

Options *version*—IGMP version number.
Range: 1, 2, or 3
Default: IGMP version 2

NOTE: Routers running different versions of IGMP negotiate the lowest common version of IGMP that is supported by hosts on their subnet and operate in that version.

If you have already configured the router to use IGMP version 1 and then configure it to use IGMP version 2, the router continues to use IGMP version 1 for up to 6 minutes and then uses IGMP version 2.

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

Related Topics
- Configuring a Dynamic Profile for Client Access on page 255
- For information about specifying a different IGMP version, see "Changing the IGMP Version" in the *JUNOS Multicast Protocols Configuration Guide*

Part 9
Subscriber Access Examples

Chapter 29
Service Profile Examples

Example: Configuring a Tiered Service Profile for Subscriber Access

This example shows how to configure a tiered service profile for subscribers.

The profile contains three services:

- Gold—Subscribers that pay for this service are allocated 10M bandwidth for data, voice, and video services.
- Silver—Subscribers that pay for this service are allocated 5M bandwidth for data, voice, and video services.
- Bronze—Subscribers that pay for this service are allocated 1M bandwidth for the data service only.

Each subscriber is allocated a VLAN that is created statically. Subscribers log in using DHCP and authenticate using RADIUS. The subscribers can migrate from one service to another when they change subscriptions.

To configure a profile for a tiered service:

1. Configure the VLAN interfaces associated with each subscriber. Enable hierarchical scheduling for the interface.

```
interfaces {
   ge-2/0/0 {
      description subscribers;
      hierarchical-scheduler;
      stacked-vlan-tagging;
      unit 1 {
         vlan-tags outer 100 inner 100;
         family inet {
            unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
         }
      }
      unit 2 {
         family inet {
            vlan-tags outer 101 inner 101;
            unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
         }
      }
```

```
        unit 3 {
            vlan-tags outer 102 inner 102;
            family inet {
                unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
            }
        }
    }
}
```

2. Configure the static CoS parameters.

   In this example, each offering (video, voice, and data) is assigned a queue, and each service (Gold, Silver, and Bronze) is assigned a scheduler.

```
class-of-service {
    forwarding-classes {
        queue 0 data;
        queue 1 voice;
        queue 3 video;
    }
    scheduler-maps {
        bronze_service_smap {
            forwarding-class data scheduler data_sch;
        }
        silver_service_smap {
            forwarding-class data scheduler data_sch;
            forwarding-class voice scheduler silver_voice_sch;
            forwarding-class video scheduler silver_video_sch;
        }
        gold_service_smap {
            forwarding-class data scheduler data_sch;
            forwarding-class voice scheduler gold_voice_sch;
            forwarding-class video scheduler gold_video_sch;
        }
    }
    schedulers {
        data_sch {
            transmit-rate percent 20;
            buffer-size remainder;
            priority low;
        }
        silver_voice_sch {
            transmit-rate percent 30;
            buffer-size remainder;
            priority high;
        }
        silver_video_sch {
            transmit-rate percent 30;
            buffer-size remainder;
            priority medium;
        }
        gold_voice_sch {
            transmit-rate percent 40;
            buffer-size remainder;
            priority high;
        }
```

```
        gold_video_sch {
            transmit-rate percent 40;
            buffer-size remainder;
            priority medium;
        }
    }
}
```

3. Configure the dynamic profile for the service.

   The scheduler maps configured for each service are referenced in the dynamic profile.

```
dynamic-profiles {
    subscriber_profile {
        interfaces {
            "$junos-interface-ifd-name" {
                unit "$junos-underlying-interface-unit" {
                    family inet;
                }
            }
        }
        class-of-service {
            traffic-control-profiles {
                subscriber_tcp {
                    scheduler-map $smap;
                    shaping-rate $shaping-rate;
                    guaranteed-rate $guaranteed-rate;
                    delay-buffer-rate $delay-buffer-rate;
                }
            }
            interfaces {
                "$junos-interface-ifd-name" {
                    unit "$junos-underlying-interface-unit" {
                        output-traffic-control-profile subscriber_tcp;
                    }
                }
            }
        }
```

4. Configure access for the subscribers.

   The DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server. You use DHCP relay to obtain configuration parameters, including an IP address, for subscribers. In this example, one DHCP server, address 100.20.42.1, can be used by subscribers.

   The DHCP relay configuration is attached to an active server group named service_provider_group.

   The subscribers are grouped together within the subscriber_group, and identifies characteristics such as authentication, username info, and the associated interfaces for the group members. In this example, it also identifies the active server group and the dynamic interface that is used by the subscribers in the group.

```
forwarding-options {
   dhcp-relay {
      server-group {
         service_provider_group {
            100.20.42.1;
         }
      }
      group subscriber_group {
         active-server-group service_provider_group;
         dynamic-profile subscriber_profile;
         interface ge-2/0/0.1;
         interface ge-2/0/0.2;
         interface ge-2/0/0.3;
      }
   }
}
```

Related Topics

- For more information about configuring CoS for subscriber access, see CoS for Subscriber Access Overview on page 323

Part 10
Complete Configuration Statement Hierarchy for Subscriber Access

Chapter 30

Subscriber Access Statement Hierarchy

[edit access address-assignment] Hierarchy Level

```
address-assignment {
   pool pool-name family inet {
      network address-or-prefix</subnet-mask>;
      range range-name {
         low lower-limit high upper-limit;
      }
      host hostname {
         hardware-address mac-address;
         ip-address ip-address;
      }
      dhcp-attributes {
         [protocol-specific attributes]
      }
   }
}
```

[edit access profile] Hierarchy Level

```
profile profile-name {
   authentication-order [ authentication-methods ];
   accounting {
      accounting-stop-on-access-deny;
      accounting-stop-on-failure;
      order [ accounting-method ];
      statistics (time);
      update-interval minutes;
   }
   radius {
      authentication-server [ ip-address ];
      accounting-server [ ip-address ];
      options {
```

```
        accounting-session-id-format (decimal | description);
        ethernet-port-type-virtual;
        interface-description-format [sub-interface | adapter];
        nas-identifier identifier-value;
        nas-port-extended-format {
            adapter-width width;
            port-width width;
            slot-width width;
            stacked-vlan-width width;
            vlan-width width;
        }
        override-nas-information;
        revert-interval interval;
        vlan-nas-port-stacked-format;
    }
    attributes {
        ignore {
            framed-ip-netmask;
            input-filter;
            logical-system:routing-instance;
            output-filter;
        }
        exclude
            accounting-authentic [ accounting-on | accounting-off ];
            accounting-delay-time [ accounting-on | accounting-off ];
            accounting-session-id [ access-request | accounting-on | accounting-off |
              accounting-stop ];
            accounting-terminate-cause [ accounting-off ];
            called-station-id [ access-request | accounting-start | accounting-stop ];
            calling-station-id [ access-request | accounting-start | accounting-stop ];
            class [ accounting-start | accounting-stop ];
            dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
            dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
            output-filter [ accounting-start | accounting-stop ];
            event-timestamp [ accounting-on | accounting-off | accounting-start |
              accounting-stop ];
            framed-ip-address [ accounting-start | accounting-stop ];
            framed-ip-netmask [ accounting-start | accounting-stop ];
            input-filter [ accounting-start | accounting-stop ];
            input-gigapackets [ accounting-stop ];
            input-gigawords [ accounting-stop ];
            interface-description [ access-request | accounting-start | accounting-stop ];
            nas-identifier [ access-request | accounting-on | accounting-off |
              accounting-start | accounting-stop ];
            nas-port [ access-request | accounting-start | accounting-stop ];
            nas-port-id [ access-request | accounting-start | accounting-stop ];
            nas-port-type [ access-request | accounting-start | accounting-stop ];
            output-gigapackets [ accounting-stop ];
            output-gigawords [ accounting-stop ];
        }
    }
}
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
```

```
    routing-instance routing-instance-name;
    secret password;
    timeout source-address;
    timeout seconds;
  }
}
```

[edit dynamic-profiles] Hierarchy Level

```
dynamic-profiles {
  profile-name {
    class-of-service {
      interfaces{
        interface-name {
        }
        unit logical-unit-number {
          output-traffic-control-profile profile-name;
        }
      }
      traffic-control-profiles profile-name {
        delay-buffer-rate (percent percentage | rate);
        guaranteed-rate (percent percentage | rate);
        scheduler-map map-name;
        shaping-rate (percent percentage | rate);
      }
    }
    interfaces {
      interface-name {
        unit logical-unit-number {
          family family {
          address address;
            filter {
              input filter-name;
              output filter-name;
            }
            unnumbered-addressinterface-name {
              preferred-source-address address;
            }
          vlan-id;
        }
        vlan-tagging;
      }
      demux0 {
        unit logical-unit-number {
          demux-options {
            underlying-interface interface-name
          }
          demux-source {
            source-prefix;
          }
          family family {
            address address;
            filter {
              input filter-name;
              output filter-name;
```

```
                }
                mac-validate (loose | strict):
                unnumbered-address interface-name {
                   preferred-source-address address;
                }
             }
          }
       }
       protocols {
       igmp {
          interfaceinterface-name {
             accounting;
             disable;
             group-policy;
             immediate-leave
             no-accounting;
             promiscuous-mode;
             ssm-mapssm-map-name;
             static {
                groupgroup {
                   source source;
                }
             }
             version version;
          }
    }
}
```

[edit forwarding-options dhcp-relay] Hierarchy Level

```
dhcp-relay {
   authentication {
      password password-string;
      username-include {
         circuit-type;
         delimiter delimiter-character;
         domain-name domain-name-string;
         logical-system-name;
         mac-address;
         option-60;
         option-82 [circuit-id] [remote-id];
         routing-instance-name;
         user-prefix user-prefix-string;
      }
   }
   dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
   overrides {
      always-write-giaddr;
      always-write-option-82;
      interface-client-limit number;
      layer2-unicast-replies;
      no-arp;
      trust-option-82;
      disable-relay;
```

```
}
relay-option-60 {
   vendor-option {
      (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
         (default-relay-server-group server-group-name |
         default-local-server-group local-server-group-name |
         drop);
      }
      (default-relay-server-group server-group-name |
      default-local-server-group local-server-group-name |
      drop);
   }
}
relay-option-82 {
   circuit-id {
      prefix host-name logical-system-name routing-instance-name;
   }
}
server-group {
   server-group-name {
      server-ip-address;
   }
}
active-server-group server-group-name;
group group-name {
   active-server-group server-group-name;
   authentication {
      password password-string;
      username-include {
         circuit-type;
         delimiter delimiter-character;
         domain-name domain-name-string;
         logical-system-name;
         mac-address;
         option-60;
         option-82 [circuit-id] [remote-id];
         overrides {
            always-write-giaddr;
            always-write-option-82;
            interface-client-limit number;
            layer2-unicast-replies;
            no-arp;
            trust-option-82;
            disable-relay;
         }
         routing-instance-name;
         user-prefix user-prefix-string;
      }
   }
   dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
   relay-option-60 {
      vendor-option {
         (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
            (default-relay-server-group server-group-name |
            default-local-server-group local-server-group-name |
            drop);
```

```
            }
            (default-relay-server-group server-group-name |
            default-local-server-group local-server-group-name |
            drop);
          }
        }
        relay-option-82 {
          circuit-id {
            prefix host-name logical-system-name routing-instance-name;
          }
        }
        interface interface-name [upto upto-interface-name] [exclude];
      }
      traceoptions {
        flag all;
        flag database;
        flag state;
        flag interface;
        flag rtsock;
        flag packet;
        flag packet-option;
        flag io;
        flag ha;
        flag ui;
        flag general;
        flag fwd;
        flag rpd;
        file file-name {
          <files number>;
          <size maximum-file-size>;
          <match regex>;
          <world-readable | no-world-readable>;
        }
      }
    }
```

[edit system services dhcp-local-server] Hierarchy Level

```
dhcp-local-server {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name (aggregate-clients | use-primary primary-profile-name);
  group group-name {
```

```
    authentication {
    password password-string;
      username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 <circuit-id> <remote-id>;
        overrides;
        routing-instance-name;
        user-prefix user-prefix-string;
        }
      }
      dynamic-profile profile-name (aggregate-clients | use-primary
        primary-profile-name);
      interface interface-name [upto upto-interface-name] [exclude];
      overrides {
        interface-client-limit number;
        no-arp;
      }
  }
  overrides {
    interface-client-limit number;
    no-arp;
  }
  pool-match-order {
    ip-address-first;
    option-82;
  }
  traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>
    <match regex>;
    flag flag;
  }
}
```

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