



JUNOS® Software

Subscriber Access Configuration Guide

Release 10.0

Juniper Networks, Inc.

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Table of Contents

About This Guide xxxix

JUNOS Documentation and Release Notes	xxxix
Objectives	xl
Audience	xl
Supported Routing Platforms	xli
Using the Indexes	xli
Using the Examples in This Manual	xli
Merging a Full Example	xli
Merging a Snippet	xl ii
Documentation Conventions	xl ii
Documentation Feedback	xl iv
Requesting Technical Support	xl iv
Self-Help Online Tools and Resources	xl v
Opening a Case with JTAC	xl v

Part 1

Managing Access Networks

Chapter 1

Subscriber Access Overview 3

Subscriber Access Overview	3
Subscriber Access Terms and Acronyms	4
Subscriber Access Environment	4
Relationship Between Subscribers and Interfaces in an Access Network	5
Subscriber Access Support Limitations	5
Platform Support	5
Interface Support	5
DPC Support	6
Subscriber Access Licensing Overview	6
Subscriber Access Operation Flow	6
Activating Subscribers and Managing Services in an Access Network	7
Components of a Dynamic Profile	8
Router Predefined Variables Used by Dynamic Profiles	8
Configuring Subscriber Access	9

Part 2	Subscriber Management	
Chapter 2	Subscriber Management Overview	15
	Subscriber Access Management Overview	15
	Access and Access-Internal Routes for Subscriber Management	15
Chapter 3	Configuring the AAA Service Framework for Subscriber Access	17
	AAA Service Framework Overview	18
	Configuring Router or Switch Interaction with RADIUS Servers	19
	Configuring Authentication and Accounting Parameters for Subscriber Access	20
	Specifying the Authentication and Accounting Methods for Subscriber Access	20
	Configuring How Accounting Statistics Are Collected for Subscriber Access	21
	Configuring RADIUS Server Parameters for Subscriber Access	22
	Specifying RADIUS Authentication and Accounting Servers for Subscriber Access	23
	RADIUS Server Options for Subscriber Access	24
	Configuring RADIUS Server Options for Subscriber Access	25
	Configuring How RADIUS Attributes Are Used for Subscriber Access	27
	Using RADIUS Dynamic Requests for Subscriber Access Management	30
	Dynamic Service Activation During Login Overview	31
	RADIUS-Initiated Change of Authorization (CoA) Overview	31
	CoA Messages	32
	Qualifications for Change of Authorization	32
	Message Exchange	32
	RADIUS-Initiated Disconnect Overview	33
	Disconnect Messages	33
	Qualifications for Disconnect	33
	Message Exchange	33
	Configuring RADIUS-Initiated Dynamic Request Support	34
	Verifying and Managing the RADIUS Dynamic-Request Feature	35
	RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework	35
	RADIUS IETF Attributes Supported by the AAA Service Framework	35
	Juniper Networks VSAs Supported by the AAA Service Framework	38
	Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests	43
	Configuring an Access Profile for Subscriber Management	44
	Attaching Access Profiles	45
	Verifying and Managing Subscriber AAA Information	45
Chapter 4	Configuring Address-Assignment Pools for Subscriber Access	47
	Address-Assignment Pools Overview	47
	Configuring Address-Assignment Pools	48
	Configuring an Address-Assignment Pool Name and Addresses	48

Configuring a Named Address Range for Dynamic Address Assignment	49
Configuring Static Address Assignment	50
Configuring DHCP Client-Specific Attributes	50
DHCP Attributes for Address-Assignment Pools	51
Address-Assignment Pools Licensing Requirements	52
Tracing Address-Assignment Pool Processes	52
Configuring the Address-Assignment Pool Trace Log Filename	53
Configuring the Number and Size of Address-Assignment Pool Processes Log Files	54
Configuring Access to the Log File	54
Configuring a Regular Expression for Lines to Be Logged	55
Configuring the Trace Operation	55

Chapter 5

Configuring DHCP Local Server for Subscriber Access 57

Extended DHCP Local Server Overview	58
Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools	60
Providing DHCP Client Configuration Information	60
Minimal Configuration for Clients	61
DHCP Local Server and Address-Assignment Pools	62
DHCPv6 Local Server Overview	63
Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview	64
Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface	65
Primary Dynamic Profile	65
Using External AAA Authentication Services with DHCP	66
Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use	67
Grouping Interfaces with Common DHCP Configurations	68
Group-Specific DHCP Local Server Options	69
Overriding Default DHCP Local Server Configuration Settings	70
Specifying the Maximum Number of DHCP Clients Per Interface	70
Disabling ARP Table Population	71
DHCP Auto Logout Overview	73
Auto Logout Overview	73
How DHCP Identifies and Releases Clients	73
Option 60 and Option 82 Requirements	74
Automatically Logging Out DHCP Clients	74
Attaching Dynamic Profiles to DHCP Subscriber Interfaces	75
Attaching a Dynamic Profile to All DHCP Subscriber Interfaces	75
Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces	76
Configuring Passwords for Usernames	77
Creating Unique Usernames for DHCP Clients	78
Understanding Dynamic Reconfiguration of Extended DHCP Local Server Clients	80
Default Client/Server Interaction	80
Dynamic Client/Server Interaction	81
Dynamic Configuration Options	81

Configuring Extended DHCP Local Server Dynamic Client Reconfiguration	82
Configuring Dynamic Reconfiguration Attempts for DHCP Clients	83
Configuring Deletion of the Client When Dynamic Reconfiguration Fails	84
Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect	84
Configuring a Token for DHCP Local Server Authentication	85
Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings	85
Verifying and Managing DHCP Local Server Configuration	86
Graceful Routing Engine Switchover	86
Tracing Extended DHCP Operations	87
Configuring the Extended DHCP Log Filename	88
Configuring the Number and Size of Extended DHCP Log Files	89
Configuring Access to the Extended DHCP Log File	89
Configuring a Regular Expression for Extended DHCP Lines to Be Logged	90
Configuring the Extended DHCP Tracing Flags	90

Chapter 6

Configuring DHCP Relay for Subscriber Access 93

Extended DHCP Relay Agent Overview	94
Interaction Among the DHCP Relay Agent, DHCP Client, and DHCP Servers	94
DHCP Relay Proxy Overview	96
Interaction Among DHCP Relay Proxy, DHCP Client, and DHCP Servers	96
Configuring Dynamic Access Routes for Subscriber Management	97
Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management	98
Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management	99
Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview	100
Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface	100
Primary Dynamic Profile	101
Using External AAA Authentication Services with DHCP	101
Grouping Interfaces with Common DHCP Configurations	102
Group-Specific DHCP Relay Options	103
Overriding the Default DHCP Relay Configuration	104
Overwriting giaddr Information	105
Replacing the DHCP Relay Request and Release Packet Source Address	106
Overriding Option 82 Information	106
Using Layer 2 Unicast Transmission for DHCP Packets	107
Trusting Option 82 Information	107
Disabling ARP Table Population	107

Specifying the Maximum Number of DHCP Clients Per Interface	109
Disabling DHCP Relay	109
DHCP Auto Logout Overview	110
Auto Logout Overview	110
How DHCP Identifies and Releases Clients	110
Option 60 and Option 82 Requirements	111
DHCP Relay Agent Option 82 Value for Auto Logout	111
Automatically Logging Out DHCP Clients	112
Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers	113
Using Matching Option 60 Strings to Process DHCP Client Traffic	114
Using Nonmatching Option 60 Strings to Process DHCP Client Traffic	117
Displaying a Count of Discarded DHCP Packets with Option 60 Information	117
Enabling and Disabling Insertion of Option 82 Information	117
Configuring Agent Circuit ID Information	118
Configuring an Option 82 Prefix	119
Using a Textual Description in Option 82	120
Configuring Server Groups	121
Configuring Active Server Groups	121
Enabling DHCP Relay Proxy Mode	122
Attaching Dynamic Profiles to DHCP Subscriber Interfaces	122
Attaching a Dynamic Profile to All DHCP Subscriber Interfaces	123
Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces	123
Verifying and Managing DHCP Relay Configuration	124
Tracing Extended DHCP Operations	125
Configuring the Extended DHCP Log Filename	126
Configuring the Number and Size of Extended DHCP Log Files	126
Configuring Access to the Extended DHCP Log File	127
Configuring a Regular Expression for Extended DHCP Lines to Be Logged	127
Configuring the Extended DHCP Tracing Flags	128

Chapter 7

Configuring PPP for Subscriber Access 129

Dynamic Profiles for PPP Subscriber Interfaces Overview	129
Creating Dynamic Profiles for PPP Subscriber Interfaces	130
Configuring Dynamic Access Routes for Subscriber Management	131
Configuring Dynamic Access-Internal Routes for PPP Subscriber Management	131
Attaching Dynamic Profiles to Static PPP Subscriber Interfaces	132
Verifying and Managing PPP Configuration for Subscriber Management	132
Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management	133

Chapter 8	Configuring Subscriber Secure Policy Traffic Mirroring	135
	Subscriber Secure Policy Overview	136
	Subscriber Secure Policy Terms	136
	Subscriber Secure Policy Licensing Requirements	137
	Subscriber Secure Policy Traffic Mirroring Architecture	137
	RADIUS Attributes Used for Subscriber Secure Policy	140
	RADIUS Attributes Used as Traffic Mirroring Triggers	140
	RADIUS-Based Mirroring Attributes	140
	Considerations When Using RADIUS Attributes for Subscriber Secure Policy	141
	Configuring Subscriber Secure Policy Mirroring Overview	142
	Guidelines for Configuring Subscriber Secure Policy Mirroring on the Flow-Tap Service	143
	Configuring Flow-Tap Service Support for Subscriber Secure Policy Mirroring	144
	Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring	145
	Terminating Subscriber Secure Policy Mirroring Sessions	146
Chapter 9	AAA and Remote Subscriber Access Configuration Examples	147
	Example: Configuring RADIUS-Based Subscriber Authentication and Accounting	147
	Example: Configuring an Address-Assignment Pool	149
	Example: Minimum Extended DHCP Local Server Configuration	150
	Example: Extended DHCP Local Server Configuration with Optional Pool Matching	150
	Example: Minimum DHCP Relay Agent Configuration	151
	Example: DHCP Relay Agent Configuration with Multiple Clients and Servers	151
	Example: Extended DHCPv6 Local Server Configuration	152
	Example: Using Option 60 Strings to Forward DHCP Client Traffic	153
	Example: Using Option 60 Strings to Drop DHCP Client Traffic	155
Chapter 10	Summary of AAA and Remote Subscriber Access Statements	157
	access	157
	access-internal	158
	accounting	159
	accounting-port	160
	accounting-server	161
	accounting-session-id-format	161
	accounting-stop-on-access-deny	162
	accounting-stop-on-failure	162
	active-server-group	163
	address-assignment (Address-Assignment Pools)	164
	aggregate-clients	165

aggregate-clients	166
always-write-giaddr	167
always-write-option-82	168
attempts	169
attributes	170
authentication (DHCP Local Server)	171
authentication (DHCP Relay Agent)	173
authentication-order	174
authentication-server	175
boot-file	175
boot-server	176
chap (Dynamic Profiles)	176
circuit-id	177
circuit-id	178
circuit-type	179
circuit-type	180
clear-on-abort	181
client-accounting-algorithm	182
client-authentication-algorithm	182
client-discover-match	183
client-discover-match	184
client-id	185
coa-immediate-update	186
default-local-server-group	187
default-relay-server-group	188
delimiter	189
delimiter	190
dhcp-attributes (Address-Assignment Pools)	191
dhcp-local-server	192
dhcp-relay	195
dhcpv6	198
disable-relay	200
dns-server	200
domain-name	201
domain-name (Subscriber Access Management)	202
domain-name	203
drop	204
dynamic-profile	205
dynamic-profile	206
dynamic-profile	207
external-authority	208
ethernet-port-type-virtual	208
exclude	209
family (Address-Assignment Pools)	211
forwarding-class	212
grace-period	213
group (DHCP Local Server)	214
group	216
hardware-address	218
host (Address-Assignment Pools)	218
ignore	219

immediate-update	220
interface (DHCP Local Server)	221
interface	222
interface-client-limit	223
interface-client-limit	224
interface-description-format	225
interfaces	225
ip-address	226
ip-address-first	226
ipv6-address (Address-Assignment Pools)	227
keepalives (Dynamic Profiles)	227
layer2-unicast-replies	228
local-server-group	229
logical-system-name	230
logical-system-name	231
mac-address	232
mac-address	233
mac-address	234
maximum-lease-time	234
metric	235
name-server	235
nas-identifier	236
nas-port-extended-format	237
netbios-node-type	238
network	238
next-hop	239
no-arp	239
no-arp	240
option	241
option-60	242
option-60	243
option-82	244
option-82 (DHCP Local Server Authentication)	245
option-82 (DHCP Local Server Pool Matching)	246
option-82	247
option-match	248
options	249
order	250
overrides	251
overrides	253
pap (Dynamic Profiles)	254
password (DHCP Local Server)	255
password	256
pool (Address-Assignment Pools)	257
pool-match-order	258
port	259
ppp-options (Dynamic Profiles)	259
preference	260
prefix (Address-Assignment Pools)	260
prefix	261
profile	263

proxy-mode	266
qualified-next-hop	267
radius	268
radius-disconnect	270
radius-flow-tap	271
radius-server	272
range (Address-Assignment Pools)	273
reconfigure	274
relay-agent-interface-id	275
relay-agent-remote-id	276
relay-agent-subscriber-id	277
relay-option-60	278
relay-option-82	279
relay-server-group	280
remote-id	281
replace-ip-source-with	282
retry	283
revert-interval	284
route	285
route	286
router	287
routing-instance	287
routing-instance-name	288
routing-instance-name	289
secret	290
server-group	291
sip-server-address	291
sip-server-domain-name	292
source-address	292
source-ipv4-address	293
statistics	293
tftp-server	294
timeout	294
timeout	295
token	296
traceoptions	297
traceoptions (DHCP Local Server)	300
traceoptions (DHCP Relay Agent)	303
trigger	305
trust-option-82	306
update-interval	306
use-interface-description	307
use-primary	308
use-primary	309
user-prefix	310
user-prefix	311
username-include	312
username-include	314
vendor-option	315
vlan-nas-port-stacked-format	316
wins-server	317

Part 3	Diameter Base Protocol and Applications for Subscriber Access	
Chapter 11	Diameter Base Protocol Overview	321
	Diameter Base Protocol Overview	321
Chapter 12	Configuring Diameter Base Protocol	323
	Configuring Diameter	323
	Configuring the Origin Attributes of the Diameter Instance	324
	Configuring Diameter Peers	324
	Configuring Diameter Network Elements	325
	Tracing Diameter Base Protocol Processes	326
	Configuring the Diameter Base Protocol Trace Log Filename	327
	Configuring the Number and Size of Diameter Base Protocol IP Log Files	327
	Configuring Access to the Diameter Base Protocol Log File	328
	Configuring a Regular Expression for Diameter Base Protocol Lines to Be Logged	328
	Configuring the Diameter Base Protocol Tracing Flags	328
	Troubleshooting Diameter Network Configuration	329
	Troubleshooting Diameter Network Connectivity	330
	Verifying Diameter Node, Instance, and Route Information	330
	Verifying and Managing Diameter Function Information	331
	Verifying and Managing Diameter Peer Information	332
	Verifying Diameter Network Element Information	333
Chapter 13	Summary of Diameter Base Protocol Statements	335
	address	335
	connect-actively	336
	destination	336
	diameter	337
	forwarding	338
	function	338
	host	339
	logical-system	339
	metric	340
	network-element	341
	origin	342
	peer	342
	peer	343
	port	343
	priority	344
	realm	344
	route	345

	routing-instance	345
	traceoptions	346
Chapter 14	JSRC and Juniper Networks Session Resource Control (SRC) Overview	349
	Juniper Networks Session and Resource Control (SRC) and JSRC	
	Overview	349
	Hardware Requirements for JSRC for Subscriber Access	350
	Diameter Messages Exchanged by JSRC and the SAE	350
	Understanding Diameter AVPs	351
	Understanding JSRC-SAE Interactions	354
	Subscriber Login	354
	Subscriber Service Activation and Deactivation	354
	Subscriber Resynchronization	355
	Subscriber Session Terminated by the SAE	355
	Subscriber Logout	355
Chapter 15	Configuring JSRC for Subscriber Access	357
	Configuring JSRC	357
	Configuring the JSRC Partition	358
	Assigning a Partition to JSRC	359
	Authorizing Subscribers with JSRC	359
	Provisioning Subscribers with JSRC	360
Chapter 16	Summary of JSRC Statements	361
	authorization-order	361
	destination-host	362
	destination-realm	362
	diameter-instance	363
	jsrc	364
	jsrc-partition	364
	partition	365
	provisioning-order	365
Chapter 17	Subscribers on Static Interfaces	367
	Subscribers on Static Interfaces Overview	367
Chapter 18	Configuring Subscribers over Static Interfaces	371
	Configuring Subscribers over Static Interfaces	371
	Tracing Static Subscriber Operations	373
	Configuring the Static Subscribers Trace Log Filename	374
	Configuring the Number and Size of Static Subscribers Log Files	374

Configuring Access to the Static Subscribers Log File	375
Configuring a Regular Expression for Static Subscriber Lines to Be Logged	375
Configuring the Static Subscribers Tracing Flags	376
Specifying the Static Subscriber Global Access Profile	376
Specifying the Static Subscriber Global Dynamic Profile	377
Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers	377
Configuring the Static Subscriber Global Authentication Password	378
Configuring the Static Subscriber Global Username	378
Creating a Static Subscriber Group	379
Specifying the Static Subscriber Group Access Profile	380
Specifying the Static Subscriber Group Dynamic Profile	380
Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group	381
Configuring the Static Subscriber Group Authentication Password	382
Configuring the Static Subscriber Group Username	382
Forcing a Static Subscriber to Be Logged Out	383
Resetting the State of an Interface for Static Subscriber Login	383
Forcing a Group of Static Subscribers to Be Logged Out	384
Resetting the State of an Interface Group for Static Subscriber Login	384

Chapter 19	Static Subscribers for Subscriber Access Examples	385
-------------------	--	------------

Example: Configuring Static Subscribers for Subscriber Access	385
---	-----

Chapter 20	Summary of Static Subscriber Statements	387
-------------------	--	------------

access-profile	387
access-profile	388
aggregate-clients	389
aggregate-clients	390
authentication	391
authentication	392
domain-name	393
domain-name	394
dynamic-profile	395
dynamic-profile	396
group	397
interface	398
interface	399
interface	400
logical-system-name	400
logical-system-name	401
password	402
password	403
routing-instance-name	404
routing-instance-name	404
static-subscribers	405
traceoptions	406

username-include	408
username-include	409
user-prefix	410
user-prefix	411

Part 4

Mobile IP Access

Chapter 21

Mobile IP Overview **415**

Mobile IP Home Agent Elements and Behavior	415
Mobile IP Registration	418
Home Address Assignment	418
Authentication	418
Reauthentication	419
AAA Authentication	419
Local Authentication	420
Accounting	421
Mobile IP Routing and Forwarding	422
Mobile IP in the WiMAX Environment	423

Chapter 22

Configuring Mobile IP **427**

Configuring Mobile IP	427
Tracing Mobile IP Operations	428
Configuring the Mobile IP Trace Log Filename	429
Configuring the Number and Size of Mobile IP Log Files	430
Configuring Access to the Mobile IP Log File	430
Configuring a Regular Expression for Mobile IP Lines to Be Logged	430
Configuring the Mobile IP Tracing Flags	431
Configuring the Mobile IP Authentication Method	432
Configuring the Mobile IP Home Agent	432
Configuring the Local Authentication Attributes for the Mobile Node	433
Configuring Accounting for Mobile IP Subscribers	433
Configuring Dynamic Home Assignment for the Mobile Node	434
Configuring the Access Type for Mobile IP	435

Chapter 23

Summary of Mobile IP Statements **437**

access-type	437
algorithm	438
authenticate	439
dynamic-home-assignment	440
enable-service	441
entity-type	442
generic	443
home-agent	444
home-agent	445

home-agent	446
home-agent-address	447
key	448
mobile-ip	449
nai	451
order	452
peer	453
registration-lifetime	454
replay-method	455
revocation-required	456
spi	457
statistics	458
timestamp-tolerance	459
traceoptions	460
wimax	462
virtual-network	463

Part 5

Dynamic Profiles for Access and Services

Chapter 24

Dynamic Profiles Overview **467**

Dynamic Profiles Overview	467
Dynamic Profile Interface Support	467
What Dynamic Profiles Do	468
How Dynamic Profiles Work	468
Dynamic Variables Overview	468
How Dynamic Variables Work	468
JUNOS Predefined Variables	469
User-Defined Variables	478

Chapter 25

Configuring Dynamic Profiles **481**

Configuring a Basic Dynamic Profile	481
Configuring Predefined Internal Dynamic Variables in Dynamic Profiles	482
Configuring User-Defined Dynamic Variables in Dynamic Profiles	483
Configuring a Dynamic Profile for Client Access	485
Configuring a Dynamic Profile for Various Levels of Services	487
Modifying Dynamic Profiles	488

Chapter 26

Dynamic Profile Examples **491**

Example: IGMP Dynamic Profile	491
Example: Firewall Dynamic Profile	492
Example: Minimum PPPoE Dynamic Profile	492
Example: Subscriber Secure Policy Dynamic Profile	493

Chapter 27	Summary of Dynamic Profile Statements	495
	attribute	495
	default-value	495
	dynamic-profiles	496
	interface	499
	mandatory	499
	radius	500
	routing-instances	501
	tag	501
	variables	502
	vendor-id	503
	vlan-id	503
	vlan-tags	504
 Part 6	 Dynamic VLANs	
 Chapter 28	 Dynamic VLAN Overview	 507
	Dynamic 802.1Q VLAN Overview	507
	Static VLAN Configuration	507
	Dynamic VLAN Configuration	507
 Chapter 29	 Configuring Dynamic VLANs	 509
	Configuring VLAN Dynamic Profiles	509
	Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values	510
	Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values	511
	Configuring a Stacked VLAN Dynamic Profile	513
	Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces to Separate Routing Instances	514
	Configuring VLAN Interfaces to Use Dynamic Profiles	516
	Associating a Single-Tag VLAN Dynamic Profile to an Interface	516
	Associating a Stacked VLAN Dynamic Profile to an Interface	516

Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept	517
Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles	517
Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles	518
Configuring an Authentication Password for VLAN or Stacked VLAN Ranges	518
Configuring VLAN Ranges for Use with Dynamic Profiles	519
Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles	520
Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles	520
Configuring Dynamic Mixed VLAN Ranges	521
Configuring Dynamic Authentication for VLAN Interfaces	522
Configuring VLAN Interface Username Information for AAA Authentication	524
Verifying and Managing Dynamic VLAN Configuration	525

Chapter 30**Dynamic VLAN Examples****527**

Example: Configuring a VLAN Dynamic Profile for VLANs with a TPID of 0x8100	527
Example: Configuring a VLAN Dynamic Profile for VLANs with Any TPID Value and Enabling Demux Interfaces over the VLAN Interface	527
Example: Configuring a Stacked VLAN Dynamic Profile	528
Example: Dynamic VLAN Interface Configuration	528
Example: Dynamic Stacked VLAN Interface Configuration	528
Example: Dynamic Flexible VLAN Interface Configuration	529
Example: Configuring a Flexible VLAN Interface for Use with a Nonstandard Ethertype	529

Part 7**Subscriber Interfaces****Chapter 31****Subscriber Interface Overview****533**

Subscriber Interface Overview	533
Statically Identifying Subscribers	533
Dynamically Identifying Subscribers	534
Static Subscriber Interfaces and VLAN Overview	534

Subscriber Interfaces and IP Demux Overview	535
Interface Sets of Static Demux Interfaces	535
Dynamic Demux Interfaces	535
Guidelines for Configuring IP Demux Interfaces for Subscriber Access	536
MAC Address Validation for Subscriber Interfaces Overview	536
Supported Types of Subscriber Interfaces	537
Trusted Addresses	537
Types of MAC Address Validation	537

Chapter 32

Configuring Subscriber Interfaces for Dynamic Profiles 539

Configuring Static Subscriber Interfaces in Dynamic Profiles	539
Configuring a Subscriber Interface with a Static VLAN Interface	540
Configuring Static Subscriber Interfaces Using IP Demux Interfaces	540
Associating Dynamic Profiles with Statically Created Interfaces	541
Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces	542
Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles	543
Configuring MAC Address Validation for Subscriber Interfaces	544
Configuring MAC Address Validation for Static Subscriber Interfaces	544
Configuring MAC Address Validation for Dynamic Subscriber Interfaces	545

Chapter 33

Subscriber Interface Examples 547

Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units)	547
Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface	547
Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation)	548
Example: Configuring a Static Subscriber Interface with a Loopback	548
Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces	548

Chapter 34	Subscriber Interfaces over Aggregated Ethernet Overview	551
	Static VLAN Subscriber Interfaces over Aggregated Ethernet Overview	551
	Guidelines for Configuring a Static VLAN Subscriber Interface over Aggregated Ethernet for Static or Dynamic CoS Support	551
	Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static VLAN Subscriber Interface	552
	Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet Overview	553
	Options for Aggregated Ethernet Logical Interfaces That Support IP Demux Subscriber Interfaces	553
	Features Supported with Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet	554
Chapter 35	Configuring Subscriber Interfaces over Aggregated Ethernet	555
	Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet	555
	Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet	556
Chapter 36	Subscriber Interfaces over Aggregated Ethernet Examples	559
	Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet	559
	Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet	562
Chapter 37	Summary of Subscriber Interface Configuration Statements	565
	address	565
	demux0	566
	demux-options	567
	demux-source	568
	family	569
	family	570
	filter	571
	interfaces	572
	interfaces	574
	mac-validate	575
	mode	575
	precedence	576
	preferred-source-address	577
	proxy-arp	578
	rpf-check	579
	underlying-interface	580
	unit	581

unit	582
unnumbered-address	583
vlan-id	584
vlan-tagging	585

Part 8

Dynamic Firewall Services for Subscriber Access

Chapter 38

Dynamic Firewall Services Overview 589

Dynamic Firewall Filters Overview	589
Classic Filters Overview	590
Classic Filter Types	590
Classic Filter Components	590
Classic Filter Processing	591
Guidelines for Creating and Applying Classic Filters for Subscriber Interfaces	591
Basic Classic Filter Syntax	592
Fast Update Filters Overview	593
Fast Update Filter Components	594
Fast Update Filter Processing	594
Fast Update Filter Names	595
Guidelines for Creating and Applying Fast Update Filters	595
Basic Fast Update Filter Syntax	596
Match Conditions and Actions in Fast Update Filters	597
Match Conditions	597
Actions	597
Adding Terms Only Once	598

Chapter 39

Configuring Filters for Dynamic Profiles 599

Dynamically Attaching Statically Created Filters	599
Dynamically Attaching Filters Using RADIUS Variables	600
Defining Dynamic Filter Processing Order	601

Chapter 40

Configuring Fast Update Filters 603

Configuring Fast Update Filters	603
Configuring the Match Order for Fast Update Filters	605

	Configuring Terms for Fast Update Filters	606
	Fast Update Filter Match Conditions	607
	Fast Update Filter Actions and Action Modifiers	607
	Configuring Filters to Permit Expected Traffic	608
	Avoiding Conflicts When Terms Are Matched	609
	How the Router Evaluates Terms in a Filter	609
	Using Implied Wildcards	610
	Conflict Caused by Overlapping Ranges	612
	Associating Fast Update Filters to Interfaces in a Dynamic Profile	614
	Verifying and Managing Firewall Filter Configuration	615
Chapter 41	Firewall Filter Examples	617
	Examples: Configuring Static Filters	617
	Example: Configuring Fast Update Filters for Subscriber Access	619
Chapter 42	Summary of Dynamic Firewall For Subscriber Access Statements	621
	family	621
	fast-update-filter	622
	firewall	623
	interface-specific	623
	match-order	624
	precedence	625
	term	626
Part 9	Class of Service for Subscriber Access	
Chapter 43	Class of Service for Subscriber Access Overview	629
	CoS for Subscriber Access Overview	629
	Hardware Requirements for CoS for Subscriber Access	629
	Subscriber Interfaces That Provide Initial CoS Parameters Dynamically	
	Obtained from RADIUS	630
	Dynamic Configuration of Initial CoS in Access Profiles	630
	Predefined Variables for Dynamic Configuration of Initial Traffic	
	Shaping	630
	Predefined Variables for Dynamic Configuration of Initial Scheduling	
	and Queuing	631
	Changing CoS Services Overview	633
	Types of CoS Variables Used in a Service Profile	634
	Static and Dynamic CoS Configurations	634
	Scenarios for Static and Dynamic Configuration of CoS Parameters	634
	Guidelines for Configuring CoS for Subscriber Access	636
	CoS and Static IP Demux Interface Set Overview	636
	CoS for PPPoE Subscriber Interfaces Overview	637

Chapter 44	Configuring Class of Service for Subscriber Access	639
	Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access	639
	Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access	641
	Configuring Traffic Scheduling and Shaping for Subscriber Access	642
	Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile	643
	Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile	644
	Configuring Schedulers for Subscriber Access in a Dynamic Profile	644
	Configuring Static Schedulers in a Dynamic Profile	645
	Configuring Dynamic Schedulers in a Dynamic Profile	646
	Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition	647
	Configuring Initial CoS Parameters Dynamically Obtained from RADIUS	649
	Configuring a RADIUS Authentication Server with Values for Initial CoS	650
	Associating an Access Dynamic Profile with a Subscriber Interface That Supports Hierarchical CoS	650
	Applying a Traffic-Control Profile to the Subscriber Interface	651
	Configuring Initial Traffic-Shaping Parameters to be Obtained from RADIUS	651
	Configuring Static Forwarding Classes and Scheduler Maps	652
	Configuring Initial Scheduling and Queuing Parameters to be Obtained from RADIUS	652
	Configuring User-Defined CoS Variables in a Dynamic Service Profile	653
	Applying CoS to an Interface in a Dynamic Profile	656
	Configuring CoS on a Set of Static IP Demux Interfaces	656
	Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links	658
	Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface	659
	Verifying the Scheduling and Shaping Configuration for Subscriber Access	660
 Chapter 45	 Class of Service for Subscriber Access Examples	 661
	Example: Configuring Static Scheduling and Queuing for Subscriber Access	661
	Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access	663
	Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS	669
	Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile	671
	Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces	672

	Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface	674
	Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface	676
	Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces	679
Chapter 46	Class of Service Shaping-Rate Adjustments Overview	683
	Hierarchical CoS Shaping-Rate Adjustments Overview	683
	CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview	684
	Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops	685
Chapter 47	Configuring Class of Service Shaping-Rate Adjustments	687
	Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops	687
	Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops	688
	Configuring the Logical Interfaces That Compose the Static Logical Interface Sets	688
	Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops	689
	Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops	691
	Displaying Configuration Information About ANCP	692
	Displaying Configuration Information About Shaping-Rate Adjustments for Subscriber Local Loops	692
	Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops	693
	Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping	693
Chapter 48	Class of Service Shaping-Rate Adjustments Examples	695
	Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops	695
Chapter 49	Summary of Class of Service for Subscriber Access Configuration Statements	699
	buffer-size	700
	class-of-service	701
	delay-buffer-rate	702
	drop-profile	703
	drop-profile-map	704
	forwarding-class	705
	guaranteed-rate	706

interfaces (Dynamic CoS)	707
loss-priority	708
output-traffic-control-profile	708
priority	709
protocol	710
scheduler	710
scheduler-map	711
scheduler-maps	712
schedulers	713
shaping-rate	714
traffic-control-profiles	715
transmit-rate (Dynamic Scheduler)	716
unit (Dynamic CoS)	717

Part 10

Protocols for Subscriber Access

Chapter 50

Dynamic IGMP Configuration Overview 721

Dynamic IGMP Configuration Overview	721
---	-----

Chapter 51

Summary of IGMP Dynamic Profile Statements 723

accounting	723
disable	724
group	725
group-policy	726
igmp	727
immediate-leave	728
interface	729
no-accounting	730
oif-map	730
passive	731
promiscuous-mode	732
protocols	733
source	734
ssm-map	734
static	735
version	736

Chapter 52

ANCP Overview 737

ANCP Topology Discovery and Traffic Monitoring Overview	737
---	-----

Chapter 53 Configuring ANCP 741

Configuring ANCP	741
Tracing ANCP Operations	742
Configuring the ANCP Trace Log Filename	743
Configuring the Number and Size of ANCP Log Files	743
Configuring Access to the ANCP Log File	744
Configuring a Regular Expression for ANCP Lines to Be Logged	744
Configuring the ANCP Tracing Flags	745
Configuring ANCP Neighbors	745
Associating an Access Node with Subscribers for ANCP Operations	746
Specifying the Interval Between ANCP Adjacency Messages	747
Specifying the Maximum Number of Discovery Table Entries	747
Configuring ANCP for Backward Compatibility	748
Specifying How Long Processes Wait for ANCP Restart to Complete	748
Configuring ANCP to Adjust CoS Traffic Shaping	749

Chapter 54 Summary of ANCP Configuration Statements 751

access-identifier	751
adjacency-timer	752
ancp	753
discovery-mode	754
ietf-mode	754
interface-set	755
interfaces	756
maximum-discovery-table-entries	757
maximum-helper-restart-time	757
neighbor	758
neighbor	758
pre-ietf-mode	759
qos-adjust	759
traceoptions	760

Part 11 Subscriber Access Examples

Chapter 55 Service Profile Examples 765

Example: Configuring a Tiered Service Profile for Subscriber Access	765
---	-----

Part 12**Complete Configuration Statement Hierarchy for Subscriber Access**

Chapter 56**Subscriber Access Statement Hierarchy 771**

[edit access address-assignment] Hierarchy Level	771
[edit access profile] Hierarchy Level	772
[edit diameter] Hierarchy Level	773
[edit dynamic-profiles] Hierarchy Level	774
[edit dynamic-profiles profile-name protocols] Hierarchy Level	776
[edit forwarding-options dhcp-relay] Hierarchy Level	777
[edit protocols ancp] Hierarchy Level	779
[edit jsrsc] Hierarchy Level	779
[edit services mobile-ip] Hierarchy Level	780
[edit services radius-flow-tap] Hierarchy Level	780
[edit system services dhcp-local-server] Hierarchy Level	781
[edit system services static-subscribers] Hierarchy Level	783

Part 13**Index**

Index	787
Index of Statements and Commands	801

List of Figures

Part 1	Managing Access Networks	
Chapter 1	Subscriber Access Overview	3
	Figure 1: Subscriber Access Network Example	5
	Figure 2: Subscriber Access Operation Flow	7
	Figure 3: Subscriber Access Configuration Workflow	11
Part 2	Subscriber Management	
Chapter 8	Configuring Subscriber Secure Policy Traffic Mirroring	135
	Figure 4: Subscriber Secure Policy Architecture	138
Part 4	Mobile IP Access	
Chapter 21	Mobile IP Overview	415
	Figure 5: Mobile IP Network Without Reverse Tunneling	416
	Figure 6: Mobile IP Network with Reverse Tunneling	417
	Figure 7: Sample Mobile IP WiMAX Topology	425
Part 7	Subscriber Interfaces	
Chapter 31	Subscriber Interface Overview	533
	Figure 8: VLAN Subscriber Interfaces	534
	Figure 9: IP Demux Subscriber Interface	535

List of Tables

About This Guide	xxxix
Table 1: Notice Icons	xlili
Table 2: Text and Syntax Conventions	xlili

Part 1

Managing Access Networks

Chapter 1	Subscriber Access Overview	3
	Table 3: Subscriber Access Terms and Acronyms	4

Part 2

Subscriber Management

Chapter 3	Configuring the AAA Service Framework for Subscriber Access	17
	Table 4: Attributes That Can Be Ignored in RADIUS Accept-Accept Messages	27
	Table 5: Attributes That Can Be Excluded from RADIUS Messages	28
	Table 6: Supported RADIUS IETF Attributes	35
	Table 7: Supported Juniper Networks VSAs	39
	Table 8: Error-Cause Codes (RADIUS Attribute 101)	43
Chapter 4	Configuring Address-Assignment Pools for Subscriber Access	47
	Table 9: DHCP Attributes	51
	Table 10: DHCPv6 Attributes	52
Chapter 5	Configuring DHCP Local Server for Subscriber Access	57
	Table 11: Information in Authentication Grant	61
	Table 12: RADIUS Attributes and VSAs for DHCPv6 Local Server	63
	Table 13: ARP Table in Trusted Environment	71
	Table 14: ARP Table in Distrusted Environment	72
	Table 15: Action Taken for Events That Occur During a Reconfiguration	82
Chapter 6	Configuring DHCP Relay for Subscriber Access	93
	Table 16: ARP Table in Trusted Environment	108
	Table 17: ARP Table in Distrusted Environment	108
	Table 18: DHCP Relay Agent Option 82 Value for Auto Logout	112
Chapter 8	Configuring Subscriber Secure Policy Traffic Mirroring	135
	Table 19: Subscriber Secure Policy Terms	137
	Table 20: Subscriber Secure Policy Configuration Steps	138
	Table 21: RADIUS-Initiated Mirroring at Subscriber Login	139
	Table 22: RADIUS-Initiated Mirroring for Current Subscriber	139
	Table 23: RADIUS Attributes Used as Traffic Mirroring Triggers	140
	Table 24: RADIUS-Based Mirroring Attributes	141
	Table 25: LI-Action VSA Action	142

Part 3	Diameter Base Protocol and Applications for Subscriber Access	
Chapter 14	JSRC and Juniper Networks Session Resource Control (SRC) Overview	349
	Table 26: Diameter Messages Used by JSRC and the SAE	350
	Table 27: Standard Diameter AVPs	351
	Table 28: Juniper Networks Diameter AVPs	352
Part 4	Mobile IP Access	
Chapter 21	Mobile IP Overview	415
	Table 29: Juniper VSAs Used by Mobile IP	419
	Table 30: WiMAX Forum VSAs used by Mobile IP	424
Part 5	Dynamic Profiles for Access and Services	
Chapter 24	Dynamic Profiles Overview	467
	Table 31: JUNOS Predefined Variables and Definitions	470
Part 7	Subscriber Interfaces	
Chapter 34	Subscriber Interfaces over Aggregated Ethernet Overview	551
	Table 32: Features Supported with Static or Dynamic IP Demux Subscriber Interfaces	554
Part 8	Dynamic Firewall Services for Subscriber Access	
Chapter 40	Configuring Fast Update Filters	603
	Table 33: Fast Update Filter Match Conditions	607
	Table 34: Fast Update Filter Actions and Action Modifiers	607
Part 9	Class of Service for Subscriber Access	
Chapter 43	Class of Service for Subscriber Access Overview	629
	Table 35: CoS Predefined Variables for Scheduler Map and Traffic Shaping	631
	Table 36: CoS Predefined Variables for Scheduler Map and Traffic Shaping	632
	Table 37: CoS Services and Variables	635
	Table 38: Scheduler Mapping for Interface Sets	636
Chapter 45	Class of Service for Subscriber Access Examples	661
	Table 39: Initial Scheduler Map and Shaping Values at Subscriber Login	664
	Table 40: Initial CoS Values for the Voice Scheduler at Subscriber Login	664
	Table 41: Initial CoS Values for the Data Scheduler at Subscriber Login	665
	Table 42: Upgraded CoS Values for the Video Service	667
	Table 43: Upgraded CoS Values for the Video Scheduler	667
	Table 44: Initial CoS Values for the Expedited Forwarding Scheduler at Subscriber Login	668

Table 45: Initial CoS Values for the Best Effort Scheduler at Subscriber Login	668
Table 46: Scheduler Per Logical Interface Mapping	674
Table 47: Scheduler Per Underlying Interface Mapping	677
Table 48: Scheduler per Logical Interface with Interface Set Mapping	679

About This Guide

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

- JUNOS Documentation and Release Notes on page xxxix
- Objectives on page xl
- Audience on page xl
- Supported Routing Platforms on page xli
- Using the Indexes on page xli
- Using the Examples in This Manual on page xli
- Documentation Conventions on page xlii
- Documentation Feedback on page xliv
- Requesting Technical Support on page xliv

JUNOS Documentation and Release Notes

For a list of related JUNOS documentation, see <http://www.juniper.net/techpubs/software/junos/>.

If the information in the latest release notes differs from the information in the documentation, follow the *JUNOS Software Release Notes*.

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

Juniper Networks supports a technical book program to publish books by Juniper Networks engineers and subject matter experts with book publishers around the world. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration using JUNOS Software and Juniper Networks devices. In addition, the Juniper Networks Technical Library, published in conjunction with O'Reilly Media, explores improving network security, reliability, and availability using JUNOS configuration techniques. All the books are for sale at technical bookstores and book outlets around the world. The current list can be viewed at <http://www.juniper.net/books>.

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: 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 Juniper Networks MX Series Ethernet Services Routers.

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 routers

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 xliii 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 xliii 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 <code>configure</code> 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
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>JUNOS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Plain text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> 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 <i>metric</i> >;

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

Convention	Description	Examples
(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]
Indentation 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.	<ul style="list-style-type: none">■ 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 .

Documentation Feedback

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

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

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNAS 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.

Self-Help Online Tools and Resources

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

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

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

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

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

Part 1

Managing Access Networks

- Subscriber Access Overview on page 3

Chapter 1

Subscriber Access Overview

- Subscriber Access Overview on page 3
- Subscriber Access Environment on page 4
- Relationship Between Subscribers and Interfaces in an Access Network on page 5
- Subscriber Access Support Limitations on page 5
- Subscriber Access Licensing Overview on page 6
- Subscriber Access Operation Flow on page 6
- Activating Subscribers and Managing Services in an Access Network on page 7
- Configuring Subscriber Access on page 9

Subscriber Access Overview

The Juniper Networks 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 3 on page 4 defines terms and acronyms that are used in this discussion of subscriber access.

Table 3: Subscriber Access Terms and Acronyms

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

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 9

Subscriber Access Environment

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

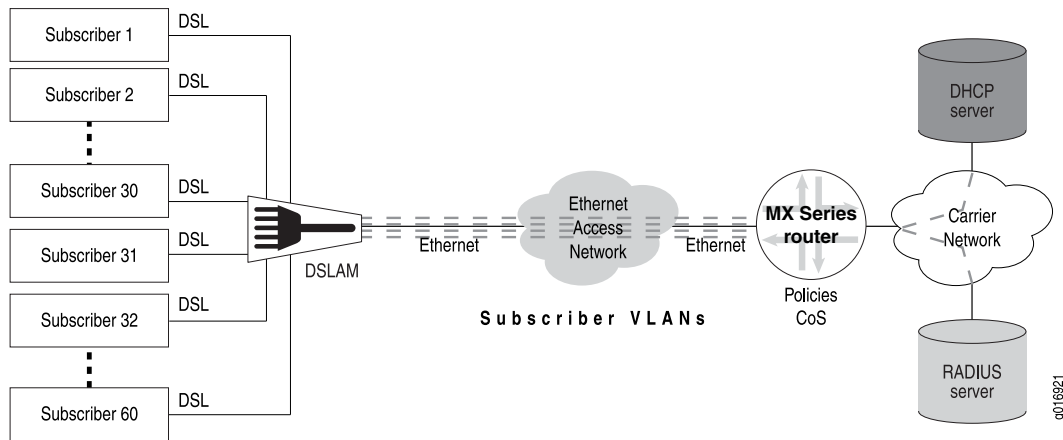
The subscriber access technologies include:

- Dynamic Host Configuration Protocol (DHCP) server
 - Local DHCP server
 - External DHCP server
- Point-to-Point Protocol (PPP)

The subscriber authentication protocols include the 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 533

Subscriber Access Support Limitations

The subscriber access feature is limited to MX Series Ethernet Services 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 DHCP configuration on MX Series routers only. In addition, PPPoE configuration is currently supported on M120 and M320 routers only.

Interface Support

You can use dynamic profiles to configure statically created interfaces and also to create and configure interfaces 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.

The subscriber access feature supports the following device types:

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

DPC Support

Certain subscriber management features require the use of specific dense port concentrators (DPCs) on the MX series router. For a list of the MX series DPCs and the features they support, see the *MX Series Ethernet Services Routers DPC Guide*.

- Related Topics**
- Relationship Between Subscribers and Interfaces in an Access Network on page 5
 - Configuring Subscriber Access on page 9

Subscriber Access Licensing Overview

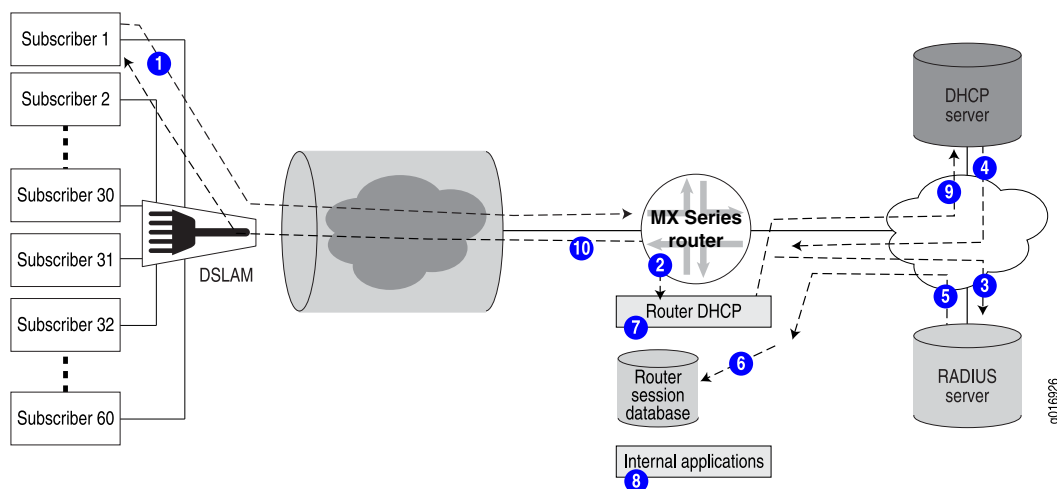
To enable some Juniper Networks JUNOS Software features or router scaling levels, you might have to purchase, install, and manage separate software license packs. The presence on the router of the appropriate software license keys (passwords) determines whether you can configure and use certain features 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 subscriber (for example, a DHCP client) send a discover message to the router interface to initialize dynamic configuration of that interface.

Figure 2 on page 7 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 9

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 shaping rate for traffic in a video service by referencing CoS statements in a dynamic profile.
- Dynamic signaling protocol—Includes dynamic IGMP configuration for host to router signaling for IPv4 to support IP multicasting.

Router Predefined Variables Used by Dynamic Profiles

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

The predefined 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 467
- Subscriber Interface Overview on page 533

Configuring Subscriber Access

To configure subscriber access, perform the following tasks:

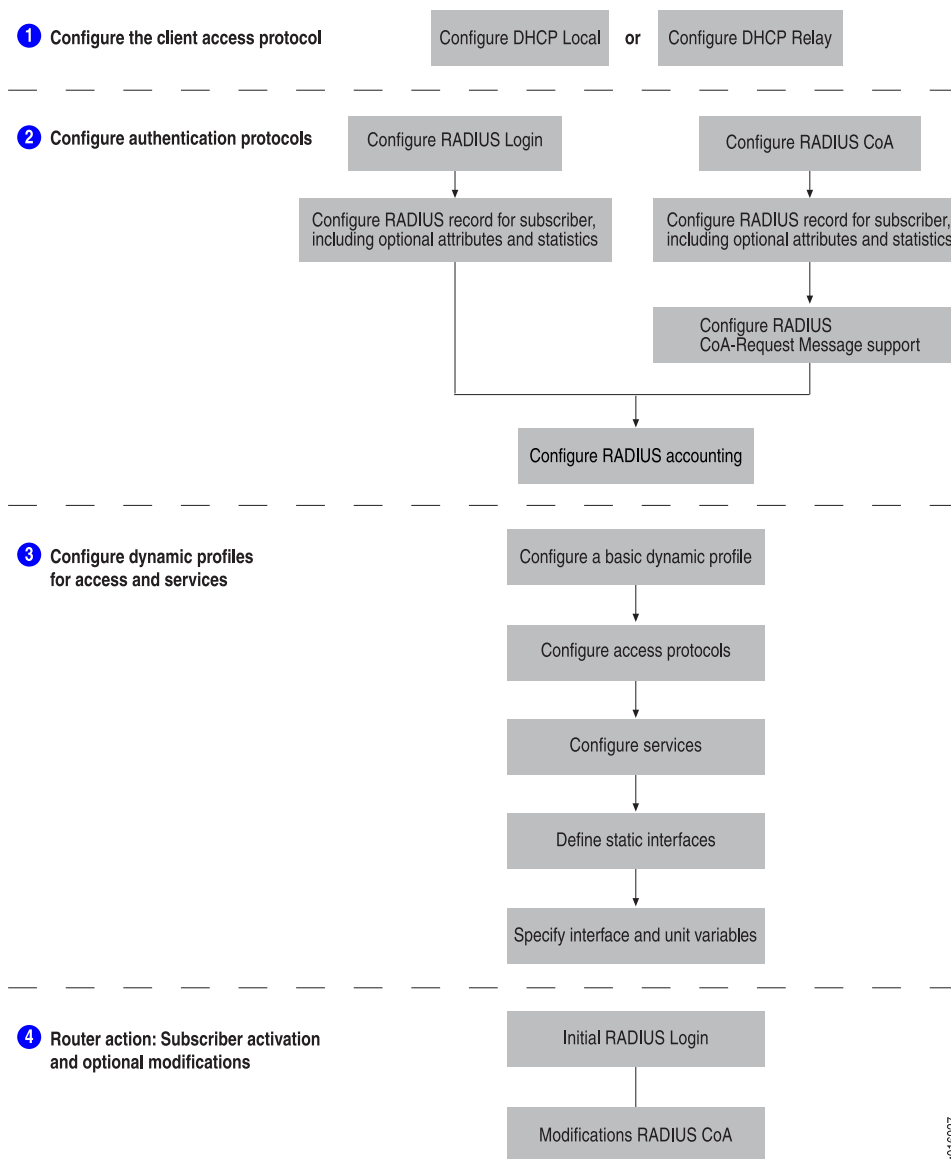
1. Configure the client access protocol.
 - Configure DHCP local server.
See “Extended DHCP Local Server Overview” on page 58.
 - Configure DHCP relay.
See “Extended DHCP Relay Agent Overview” on page 94.
 - Configure PPP.
See the “Configuring Logical Interface Properties” and “Configuring Point-to-Point Protocol over Ethernet” chapters of the *JUNOS Network Interfaces Configuration Guide*.
2. Configure subscriber authentication, accounting, and addressing.
 - a. Configure RADIUS:
 1. Specify the RADIUS servers.
See “Specifying RADIUS Authentication and Accounting Servers for Subscriber Access” on page 23.
 2. Specify any optional server attributes.
See “Configuring RADIUS Server Options for Subscriber Access” on page 25.
 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 34.
 4. Configure subscriber accounting (RADIUS accounting).
See “Configuring How Accounting Statistics Are Collected for Subscriber Access” on page 21.
 - b. Configure addressing:
 - Configure address-assignment pools.
See “Configuring Address-Assignment Pools” on page 48.
3. Create and manage dynamic profiles for access and service.

- a. Configure a basic dynamic profile.
 See “Configuring a Basic Dynamic Profile” on page 481.
 See “Example: Minimum PPPoE Dynamic Profile” on page 492
- b. Configure a dynamic profile for access.
 See “Configuring a Dynamic Profile for Client Access” on page 485.
- c. Configure a dynamic profile for services.
 See “Configuring a Dynamic Profile for Various Levels of Services” on page 487.
- 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 540.
- 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 541.
- f. Add, modify, or delete dynamic profile values to manage subscriber access and services.
 See “Modifying Dynamic Profiles” on page 488.

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 31.
- 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 31.

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

Figure 3: Subscriber Access Configuration Workflow

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- Related Topics**
- Subscriber Access Overview on page 3
 - Subscriber Access Support Limitations on page 5

Part 2

Subscriber Management

- Subscriber Management Overview on page 15
- Configuring the AAA Service Framework for Subscriber Access on page 17
- Configuring Address-Assignment Pools for Subscriber Access on page 47
- Configuring DHCP Local Server for Subscriber Access on page 57
- Configuring DHCP Relay for Subscriber Access on page 93
- Configuring PPP for Subscriber Access on page 129
- Configuring Subscriber Secure Policy Traffic Mirroring on page 135
- AAA and Remote Subscriber Access Configuration Examples on page 147
- Summary of AAA and Remote Subscriber Access Statements on page 157

Chapter 2

Subscriber Management Overview

- Subscriber Access Management Overview on page 15
- Access and Access-Internal Routes for Subscriber Management on page 15

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 or PPP subscribers, and specify the authentication, accounting, and service for the subscribers.

Access and Access-Internal Routes for Subscriber Management

The DHCP and PPP applications 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.

You can dynamically configure access routes using values specified in Framed-Route Attribute [22]. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes Attribute [22], values from the access-internal variables are used instead.

- Related Topics**
- Configuring Dynamic Access Routes for Subscriber Management on page 97
 - Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
 - Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131
 - RADIUS IETF Attributes Supported by the AAA Service Framework on page 35

Chapter 3

Configuring the AAA Service Framework for Subscriber Access

- AAA Service Framework Overview on page 18
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
- Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21
- Configuring RADIUS Server Parameters for Subscriber Access on page 22
- Specifying RADIUS Authentication and Accounting Servers for Subscriber Access on page 23
- RADIUS Server Options for Subscriber Access on page 24
- Configuring RADIUS Server Options for Subscriber Access on page 25
- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 27
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
- Dynamic Service Activation During Login Overview on page 31
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 31
- RADIUS-Initiated Disconnect Overview on page 33
- Configuring RADIUS-Initiated Dynamic Request Support on page 34
- Verifying and Managing the RADIUS Dynamic-Request Feature on page 35
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
- RADIUS IETF Attributes Supported by the AAA Service Framework on page 35
- Juniper Networks VSAs Supported by the AAA Service Framework on page 38
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 43
- Configuring an Access Profile for Subscriber Management on page 44
- Attaching Access Profiles on page 45
- Verifying and Managing Subscriber AAA Information on page 45

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.
- Subscriber secure policy—RADIUS VSAs and attributes provide RADIUS-initiated traffic mirroring on a per-subscriber basis.

Related Topics

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Address-Assignment Pools Overview on page 47
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
- Subscriber Secure Policy Overview on page 136

Configuring Router or Switch Interaction with RADIUS Servers

You specify the RADIUS servers that the router or switch can use and you configure how the router or switch interacts with the servers. You can configure the router or switch to use multiple RADIUS servers on the network.

To specify a RADIUS server and how the router or switch interacts with the server:

1. Configure the IP address of the RADIUS server and specify that you want to configure the router or switch interaction with the server.

```
[edit access]
user@host# edit radius-server 192.168.1.250
```

2. (Optional) Configure the RADIUS server accounting port number. The default accounting port number is 1813.

```
[edit access radius-server 192.168.1.250]
user@host# set accounting-port 1813
```

3. (Optional) Configure the port number the router or switch uses to contact the RADIUS server. The default port number is 1812.

```
[edit access radius-server 192.168.1.250]
user@host# set port 1813
```

4. (Optional) Configure the number of times that the router or switch attempts to contact a RADIUS accounting server. You can configure the router or switch to retry from 1 through 16 times. The default setting is 3 retry attempts.

```
[edit access radius-server 192.168.1.250]
user@host# set retry 4
```

5. Configure the required secret (password) that the local router or switch passes to the RADIUS client. Secrets enclosed in quotation marks can contain spaces.

```
[edit access radius-server 192.168.1.250]
user@host# set secret &nt1UE1*7688+
```

6. Configure the 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 or switch interfaces.

```
[edit access radius-server 192.168.1.250]
user@host# set source-address 192.168.1.100
```

7. Configure the length of time that the local router or switch waits to receive a response from a RADIUS server. By default, the router or switch waits 3 seconds. You can configure the timeout to be from 1 through 90 seconds.

```
[edit access radius-server 192.168.1.250]
user@host# set timeout 45
```

Related Topics ■ AAA Service Framework Overview on page 18

- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

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.

To configure authentication and accounting for subscriber access:

1. Specify the authentication and accounting methods to use.

See “Specifying the Authentication and Accounting Methods for Subscriber Access” on page 20.

2. Specify how accounting statistics are collected.

See “Configuring How Accounting Statistics Are Collected for Subscriber Access” on page 21.

Related Topics

- AAA Service Framework Overview on page 18
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

Specifying the Authentication and Accounting Methods for Subscriber Access

You can specify the authentication and accounting methods that subscriber access management uses.

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 password** specifies that RADIUS authentication is performed first and, if it fails, local authentication (**password**) is done.

You can specify the following authentication methods:



NOTE: The **password** keyword is not supported by the subscriber access management feature in this release.

- **password**—Local authentication
- **radius**—RADIUS-based authentication

You can specify the following accounting methods:

- radius—RADIUS-based accounting

To configure the authentication and accounting methods for subscriber access management:

1. Specify the authentication methods and the order in which they are used.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# set authentication-order radius password
```

2. Specify the accounting method.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# set accounting order radius
```

- Related Topics**
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
 - Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
 - Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21
 - Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

Configuring How Accounting Statistics Are Collected for Subscriber Access

You can configure how the subscriber access management feature collects and uses accounting statistics. For example, you can specify when statistics collection is terminated, the order in which different accounting methods are used, the types of statistics collected, and how often statistics are collected. You can also configure the router or switch to request that the RADIUS server immediately update the accounting statistics when certain events occur, such as when a subscriber logs in or when a CoA occurs.

To configure how accounting statistics are collected:

1. Specify that you want to configure accounting.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# edit accounting
```

2. (Optional) Configure AAA to issue an Acct-Stop message if the AAA server denies access to the subscriber.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set accounting-stop-on-access-deny
```

3. (Optional) Configure AAA to send an Acct-Stop message if the subscriber fails AAA but is granted access by the AAA server.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
```

```
user@host# set accounting-stop-on-failure
```

4. (Optional) Configure the order in which multiple accounting methods are used.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set order radius
```

5. (Optional) Configure the types of statistics to gather. You can specify that the router or switch collect both volume and time statistics or only time statistics for subscriber sessions. When you change the type of statistics being collected, current subscribers continue to use the previous collection specification. Subscribers who log in after the change use the new specification.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set statistics time
```

6. (Optional) Configure the number of minutes between accounting updates. You can configure an interval from 10 through 1440 minutes. If you specify an interval of 10 through 15, the interval is rounded up to 15.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set update-interval 12
```

7. (Optional) Configure the router or switch to send an Acct-Update message to the RADIUS accounting server when the router or switch receives a response (for example, an ACK or timeout) to the Acct-Start message.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set immediate-update
```

8. (Optional) Configure the router or switch to send an Acct-Update message to the RADIUS accounting server when a CoA occurs.

```
[edit access profile isp-bos-metro-fiber-basic accounting]
user@host# set coa-immediate-update
```

- Related Topics**
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
 - Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
 - Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

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. The following list provides an overview of the parameters you can configure:

- The IP addresses of one or more RADIUS authentication and accounting servers.
- Options for the RADIUS servers, such as the format (decimal or description) used for the accounting session, the method (round-robin or direct) the router or

switch uses to communicate with the servers, the NAS identifier to use for RADIUS requests, and the revert time setting that specifies when the router or switch reverts to using the primary RADIUS server.

- The RADIUS attributes to be ignored or excluded from RADIUS messages.

To configure RADIUS server parameters:

1. Specify that you want to configure RADIUS support.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# edit radius
```

2. Specify the addresses of RADIUS authentication and accounting servers.

See “Specifying RADIUS Authentication and Accounting Servers for Subscriber Access” on page 23.

3. Configure the RADIUS server options.

See “Configuring RADIUS Server Options for Subscriber Access” on page 25.

4. Configure RADIUS attributes that are ignored or excluded from RADIUS messages.

See “Configuring How RADIUS Attributes Are Used for Subscriber Access” on page 27.

Specifying RADIUS Authentication and Accounting Servers for Subscriber Access

You can specify one or more RADIUS authentication or accounting servers to use for subscriber access management.

To configure RADIUS authentication and accounting support:

1. Specify that you want to configure RADIUS support.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# edit radius
```

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

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# set authentication-server 192.168.1.251
```

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

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# set accounting-server 192.168.1.250
```

To configure multiple RADIUS authentication or accounting servers:

- Specify the IP addresses of all RADIUS servers used for authentication or accounting.

```
[edit access profile isp-bos-metro-fiber-basic radius]
```

```
user@host# set authentication-server 192.168.1.251 192.168.1.252
user@host# set accounting-server 192.168.1.250 192.168.1.251
```

- Related Topics**
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
 - Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
 - Configuring RADIUS Server Options for Subscriber Access on page 25
 - Configuring How RADIUS Attributes Are Used for Subscriber Access on page 27
 - Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

RADIUS Server Options for Subscriber Access

You can specify options that the router uses when communicating with RADIUS authentication and accounting servers for subscriber access.

The following list describes the RADIUS options you can configure:

- **client-accounting-algorithm** and **client-authentication-algorithm**—The method the router uses to access RADIUS accounting and RADIUS authentication servers. You can specify the following methods:
 - **direct**—The default method, in which there is no load balancing. For example, in the direct method, the router always accesses **server1** (the primary server) first, and uses **server2** and **server3** as backup servers.
 - **round-robin**—The round-robin method provides load balancing by rotating router requests among the list of configured RADIUS servers. For example, if three RADIUS servers are configured to support the router, the router sends the first request to **server1**, and uses **server2** and **server3** as backup servers. The router then sends the second request to **server2**, and uses **server3** and **server1** as backups.



NOTE: When a RADIUS server in the round-robin list becomes unreachable, the next reachable server in the round-robin list is used for the current request. That same server is also used for the next request since it is at the top of the list of available servers. As a result, after a server failure, the server that is used takes up the load of two servers.

- **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 fastEthernet 3/2.6:1010101010101**

- **ethernet-port-type-virtual**—Specifies that the router uses a physical port type of **virtual** to authenticate clients. The port type is passed in RADIUS attribute 61 (NAS-Port-Type). By default the router passes a port type of **ethernet** in RADIUS attribute 61.
- **interface-description-format**—The information that is 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. You can specify:
 - **adapter**—Includes the adapter only.
 - **subinterface**—Includes the subinterface only.
- **nas-identifier**—The value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests. You can specify a string in the range 1 through 64 characters.
- **nas-port-extended-format**—Configures the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and the width of the fields in the NAS-Port attribute. You can specify:
 - **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 number of seconds that the router waits after a server has become unreachable. The router rechecks the connection to the server when the **revert-interval** expires. If the server is then reachable, it is used in accordance with the order of the server list. You can configure from 60 through 429496729 seconds. The default is 600 seconds.
- **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.

Related Topics ■ Configuring RADIUS Server Options for Subscriber Access on page 25

Configuring RADIUS Server Options for Subscriber Access

You can specify options that the router or switch uses when communicating with RADIUS authentication and accounting servers for subscriber access.

To configure RADIUS authentication and accounting server options:

1. Specify that you want to configure RADIUS.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# edit radius
```

2. Specify that you want to configure RADIUS options.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# edit options
```

3. (Optional) Configure the method the router or switch uses to access RADIUS accounting servers.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set client-accounting-algorithm round-robin
```

4. (Optional) Configure the method the router or switch uses to access RADIUS authentication servers.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set client-authentication-algorithm round-robin
```

5. (Optional) Configure the format the router or switch uses to identify the accounting session.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set accounting-session-id-format decimal
```

6. (Optional) Configure the router or switch to use a port type of virtual to authenticate clients.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set ethernet-port-type-virtual
```

7. (Optional) Specify the information that is included in or omitted from the interface description that the router or switch passes to RADIUS for inclusion in RADIUS attribute 87 (NAS-Port-Id).

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set interface-description-format adapter
```

8. (Optional) Configure the value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set nas-identifier 56
```

9. (Optional) Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set nas-port-extended-format 16
```

10. (Optional) Configure the number of seconds that the router or switch waits after a server has become unreachable.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
user@host# set revert-interval port-width 1200
```

11. (Optional) Specify that RADIUS attribute 5 (NAS-Port) includes the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

```
[edit access profile isp-bos-metro-fiber-basic radius options]
```



```
user@host# set vlan-nas-port-stacked-format
```

- Related Topics**
- RADIUS Server Options for Subscriber Access on page 24
 - Configuring Router or Switch Interaction with RADIUS Servers on page 19
 - Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

Configuring How RADIUS Attributes Are Used for Subscriber Access

You can specify the attributes RADIUS ignores in RADIUS Access-Accept messages, and the attributes RADIUS excludes from specified message types.

To configure the attributes RADIUS ignores or excludes:

1. Specify that you want to configure RADIUS.

```
[edit access profile isp-bos-metro-fiber-basic]
user@host# edit radius
```

2. Specify that you want to configure how RADIUS attributes are ignored or excluded.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# edit attributes
```

3. Specify the attributes you want RADIUS to ignore when the attributes are in Access-Accept messages. See Table 4 on page 27 for the attributes you can configure.

```
[edit access profile isp-bos-metro-fiber-basic radius attributes]
user@host# set ignore input-filter output-filter
```

4. Configure RADIUS to exclude the specified attribute from the specified RADIUS message type. See Table 5 on page 28 for the attributes and message type combinations you can configure.

```
[edit access profile isp-bos-metro-fiber-basic radius attributes]
user@host# set exclude input-filter output-filter
```

You use the `ignore` statement to configure the router or switch to ignore a particular attribute in RADIUS Access-Accept messages. By default, the router or switch processes the attributes received from the external AAA server. Table 4 on page 27 lists the attributes supported in the `ignore` statement.

Table 4: Attributes That Can Be Ignored in RADIUS Accept-Accept Messages

CLI Entry	Attribute Name	Attribute Number
framed-ip-netmask	Framed-Ip-Netmask	RADIUS attribute 9
input-filter	Ingress-Policy-Name	Juniper VSA 26–10

Table 4: Attributes That Can Be Ignored in RADIUS Accept-Accept Messages (continued)

CLI Entry	Attribute Name	Attribute Number
logical-system:routing-instance	Virtual-Router	Juniper VSA 26–1
output-filter	Egress-Policy-Name	Juniper VSA 26–11

You use the **exclude** statement to configure the router or switch 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 or switch includes the specified attributes in RADIUS Access-Request, Acct-On, Acct-Off, Acct-Start, and Acct-Stop messages. Table 5 on page 28 lists the attributes and message types supported in the **exclude** statement.

Table 5: Attributes That Can Be Excluded from RADIUS Messages

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
accounting-authentic	Acct-Authentic	RADIUS attribute 45	Accounting-On Accounting-Off
accounting-delay-time	Acct-Delay-Time	RADIUS attribute 41	Accounting-On Accounting-Off
accounting-session-id	Acct-Session-Id	RADIUS attribute 44	Access-Request Accounting-On Accounting-Off Accounting-Stop
accounting-terminate-cause	Acct-Terminate-Cause	RADIUS attribute 49	Accounting-Off
called-station-id	Called-Station-Id	RADIUS attribute 30	Access-Request Accounting-Start Accounting-Stop
calling-station-id	Calling-Station-Id	RADIUS attribute 31	Access-Request Accounting-Start Accounting-Stop
class	Class	RADIUS attribute 25	Accounting-Start Accounting-Stop

Table 5: Attributes That Can Be Excluded from RADIUS Messages *(continued)*

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
dhcp-gi-address	DHCP-GI-Address	Juniper VSA 26–57	Access-Request
			Accounting-Start
			Accounting-Stop
dhcp-mac-address	DHCP-MAC-Address	Juniper VSA 26–56	Access-Request
			Accounting-Start
			Accounting-Stop
event-timestamp	Event-Timestamp	RADIUS attribute 55	Accounting-On
			Accounting-Off
			Accounting-Start
			Accounting-Stop
framed-ip-address	Framed-IP-Address	RADIUS attribute 8	Accounting-Start
			Accounting-Stop
framed-ip-netmask	Framed-IP-Netmask	RADIUS attribute 9	Accounting-Start
			Accounting-Stop
input-filter	Ingress-Policy-Name	Juniper VSA 26–10	Accounting-Start
			Accounting-Stop
input-gigapackets	Acct-Input-Gigapackets	Juniper VSA 26–42	Accounting-Stop
input-gigawords	Acct-Input-Gigawords	RADIUS attribute 52	Accounting-Stop
interface-description	Interface-Desc	Juniper VSA 26–53	Access-Request
			Accounting-Start
			Accounting-Stop
nas-identifier	NAS-Identifier	RADIUS attribute 32	Access-Request
			Accounting-on
			Accounting-off
			Accounting-Start
			Accounting-Stop

Table 5: Attributes That Can Be Excluded from RADIUS Messages *(continued)*

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
nas-port	NAS-Port	RADIUS attribute 5	Access-Request
			Accounting-Start
			Accounting-Stop
nas-port-id	NAS-Port-Id	RADIUS attribute 87	Access-Request
			Accounting-Start
			Accounting-Stop
nas-port-type	NAS-Port-Type	RADIUS attribute 61	Access-Request
			Accounting-Start
			Accounting-Stop
output-filter	Egress-Policy-Name	Juniper VSA 26–11	Accounting-Start
			Accounting-Stop
ouput-gigapackets	Acct-Output-Gigapackets	Juniper VSA 26–43	Accounting-Stop
output-gigawords	Acct-Output-Gigawords	RADIUS attribute 53	Accounting-Stop

Related Topics

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Specifying RADIUS Authentication and Accounting Servers for Subscriber Access on page 23
- Configuring RADIUS Server Options for Subscriber Access on page 25
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147

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 31
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 31
- RADIUS-Initiated Disconnect Overview on page 33
- Configuring RADIUS-Initiated Dynamic Request Support on page 34
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 43

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.

Related Topics

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
- Configuring RADIUS-Initiated Dynamic Request Support on page 34
- RADIUS-Initiated Disconnect Overview on page 33

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 request for the same subscriber, the framework responds with a CoA-NAK message.

- Related Topics**
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
 - Dynamic Service Activation During Login Overview on page 31
 - RADIUS-Initiated Disconnect Overview on page 33
 - Configuring RADIUS-Initiated Dynamic Request Support on page 34

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.

- Related Topics**
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
 - Dynamic Service Activation During Login Overview on page 31
 - Configuring RADIUS-Initiated Dynamic Request Support on page 34

Configuring RADIUS-Initiated Dynamic Request Support

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

To configure RADIUS dynamic request support:

- Specify the IP address of the RADIUS server.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# authentication-server 192.168.1.3
```

To configure the router to support dynamic requests from more than one RADIUS server:

- Specify the IP addresses of multiple RADIUS servers.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# authentication-server 192.168.1.3 192.168.10.15
```

- Related Topics**
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 30
 - Dynamic Service Activation During Login Overview on page 31
 - RADIUS-Initiated Change of Authorization (CoA) Overview on page 31
 - RADIUS-Initiated Disconnect Overview on page 33
 - RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
 - Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 43

Verifying and Managing the RADIUS Dynamic-Request Feature

Purpose Display RADIUS dynamic request statistics and information.

Action ■ To display RADIUS dynamic request statistics:

```
user@host> show network-access aaa statistics dynamic-requests
```

Related Topics ■ For more information, 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.

Related Topics ■ RADIUS IETF Attributes Supported by the AAA Service Framework on page 35
 ■ Juniper Networks VSAs Supported by the AAA Service Framework on page 38

RADIUS IETF Attributes Supported by the AAA Service Framework

Table 6 on page 35 describes the RADIUS IETF attributes that the JUNOS AAA Service Framework supports.

Table 6: Supported RADIUS IETF Attributes

Attribute Number	Attribute Name	Description
1	User-Name	<ul style="list-style-type: none"> ■ Name of user to be authenticated ■ Configurable username override
2	User-Password	<ul style="list-style-type: none"> ■ Password of user to be authenticated by Password Authentication Protocol (PAP) ■ Configurable password override
4	NAS-IP-Address	IP address of the network access server (NAS) that is requesting authentication of the user

Table 6: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description
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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ IP network to be configured for the user when the user is a router or switch to a network ■ Absence implies 255.255.255.255
11	Filter-ID	<ul style="list-style-type: none"> ■ Name of the filter list for the user ■ Interpreted as input policy name
18	Reply-Message	<ul style="list-style-type: none"> ■ Text that may be displayed to the user ■ Only the first instance of this attribute is used
22	Framed-Route	<p>String that provides routing information to be configured for the user on the NAS; in the format:</p> <pre><addr>[/<maskLen>] [<nexthop> [<cost>]] [tag <tagValue>] [distance <distValue>]</pre> <p>NOTE: The tag value is ignored when the Framed-Route attribute is used for configuring access routes.</p>
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
31	Calling-Station-ID	Indicates that the NAS can send the phone number from which the call originated
32	NAS-Identifier	Identifies the NAS originating the request
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

Table 6: Supported RADIUS IETF Attributes (*continued*)

Attribute Number	Attribute Name	Description
44	Acct-Session-ID	<p>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:</p> <ul style="list-style-type: none"> ■ decimal—For example, 435264 ■ description—In the generic format, <i>jnpr interface-specifier:subscriber-session-id</i>; For example, <i>jnpr fastEthernet 3/2.6:1010101010101</i>
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
49	Acct-Terminate-Cause	<p>Contains the reason the service (a PPP session) was terminated. The service can be terminated for the following reasons:</p> <ul style="list-style-type: none"> ■ 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

Table 6: Supported RADIUS IETF Attributes (*continued*)

Attribute Number	Attribute Name	Description
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 to use to assign an address for the user
95	NAS-IPv6-Address	Address of the NAS that is requesting authentication of the user
96	Framed-Interface-ID	Interface identifier that is configured for the user
97	Framed-IPv6-Prefix	Prefix and corresponding route that is configured for the user
98	Login-IPv6-Host	System the user connects to when the Login-Service attribute is included
100	Framed-IPv6-Pool	Name of assigned pool used to assign an IPv6 prefix for the user
123	Delegated-IPv6-Prefix	Prefix that is delegated to the user

Juniper Networks VSAs Supported by the AAA Service Framework

Table 7 on page 39 describes Juniper Networks VSAs supported by the JUNOS 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 7: Supported Juniper Networks VSAs

Attribute Number	Attribute Name	Description	Value
26-1	LSRI-Name	Client logical system:routing instance name. Allowed only from RADIUS server for “default” logical system:routing instance.	string: logical system:routing instance
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

Table 7: Supported Juniper Networks VSAs (continued)

Attribute Number	Attribute Name	Description	Value
26-25	Redirect-LSRI-Name	Client logical system:routing instance name indicating to which logical system:routing instance the request is redirected for user authentication.	string: logical-system:routing-instance
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
26-43	Output-Gigapackets	Number of times output-packets attribute rolls over its 4-octet field	integer
26-55	DHCP Options	Client DHCP options	string: dhcp-options
26-56	DHCP-MAC-Address	Client MAC address	string: mac-address
26-57	DHCP-GI-Address	DHCP relay agent IP address	integer: 4-octet
26-58	LI-Action	Traffic mirroring action	0 = stop mirroring 1 = start mirroring 2 = no action
26-59	Med-Dev-Handle	Link to which traffic mirroring is applied	Salt-encrypted string
26-60	MD-Ip-Address	IP address of content destination device to which mirrored traffic is forwarded	Salt-encrypted IP address
26-61	MD-Port-Number	UDP port in the content destination device to which mirrored traffic is forwarded	Salt-encrypted integer
26-63	Interface-Desc	Text string that identifies the subscriber's access interface	string: interface-description

Table 7: Supported Juniper Networks VSAs (continued)

Attribute Number	Attribute Name	Description	Value
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 <ul style="list-style-type: none"> ■ 1 = MLD version ■ 2 = MLD version
26-78	IGMP-Version	IGMP Protocol Version	integer: 1-octet <ul style="list-style-type: none"> ■ 1 = IGMP version ■ 2 = IGMP version ■ 3 = IGMP version
26-83	Acct-Service-Session	Name of the service (including parameter values) that is associated with service manager statistics	string: service-name
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

Table 7: Supported Juniper Networks VSAs (continued)

Attribute Number	Attribute Name	Description	Value
26-89	Mobile-IP-Lifetime	Registration lifetime for Mobile IP registration	integer: 4-octet
26-97	IGMP-Immediate-Leave	IGMP Immediate Leave	integer: 4-octet <ul style="list-style-type: none"> ■ 0 = disable ■ 1 = enable
26-100	MLD-Immediate-Leave	MLD Immediate Leave	integer: 4-octet <ul style="list-style-type: none"> ■ 0 = disable ■ 1 = enable
26-108	CoS-Shaping-Pmt-Type	CoS traffic-shaping parameter type and description: <ul style="list-style-type: none"> ■ T01: Scheduler-map name ■ T02: Shaping rate ■ T03: Guaranteed rate ■ T04: Delay-buffer rate 	2 parts, delimited by white space: <ul style="list-style-type: none"> ■ Parameter type ■ Parameter value Examples: <ul style="list-style-type: none"> ■ T01 smap_basic ■ T02 50m ■ T03 1m ■ T04 2000
26-143	Max-Clients-Per-Interface	Maximum allowable client sessions per interface. For DHCP clients, the maximum sessions per logical interface.	integer: 4-octet

Table 7: Supported Juniper Networks VSAs (continued)

Attribute Number	Attribute Name	Description	Value
26-146	CoS-Scheduler-Pmt-Type	CoS scheduler parameter type and description:	3 parts, delimited by white space:
		<ul style="list-style-type: none"> ■ Null: CoS scheduler name ■ T01: CoS scheduler transmit rate ■ T02: CoS scheduler buffer size ■ T03: CoS scheduler priority ■ T04: CoS scheduler drop-profile low ■ T05: CoS scheduler drop-profile medium-low ■ T06: CoS scheduler drop-profile medium-high ■ T07: CoS scheduler drop-profile high ■ T08: CoS scheduler drop-profile any 	<ul style="list-style-type: none"> ■ Scheduler name ■ Parameter type ■ Parameter value <p>Examples:</p> <ul style="list-style-type: none"> ■ be_sched ■ be_sched T01 12m ■ be_sched T02 26

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 8 on page 43 describes the error-cause codes.

Table 8: 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).

Table 8: Error-Cause Codes (RADIUS Attribute 101) (continued)

Code	Value	Description
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	A request could not be honored due to lack of available NAS resources (such as memory).

Configuring an Access Profile for Subscriber Management

Access profiles enable you to specify subscriber access authentication and accounting parameters. Once created, you can attach access profiles at the [edit logical-systems *logical-system-name* routing-instances *routing-instance-name*] hierarchy level or for use in automatically configuring VLANs or stacked VLANs at the [edit interfaces *interface-name* auto-configure *vlan-ranges*] or [edit interfaces *interface-name* auto-configure *stacked-vlan-ranges*] hierarchy levels.

To configure an access profile:

1. Edit the access stanza.

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

2. Specify an access profile name.

```
[edit access]
user@host# set profile profile-name
```

3. Specify any desired subscriber access authentication and accounting parameters for the access profile.

- Related Topics**
- Configuring Dynamic Authentication for VLAN Interfaces on page 522
 - Attaching Access Profiles on page 45

Attaching Access Profiles

After you have created the access profile that specifies the subscriber access management authentication and accounting parameters, you can attach the profile. Subscriber access management supports attaching access profiles at the following hierarchy levels:

- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]
- [edit interfaces *interface-name* auto-configure vlan-ranges]
- [edit interfaces *interface-name* auto-configure stacked-vlan-ranges]

To attach an access profile:

1. Edit the desired hierarchy level.

```
[edit]
user@host# edit logical-systems LS1 routing-instances RI1
```

2. Specify the name of the access profile that you want to attach.

```
[edit logical-systems logical-system-name routing-instances routing-instance-name]
user@host# set access-profile vz-bos-metro-fios-basic
```

Related Topics ■ AAA Service Framework Overview on page 18

Verifying and Managing Subscriber AAA Information

Purpose View or clear subscriber access statistics and information.

Action ■ To display subscriber AAA statistics:

```
user@host> show network-access aaa statistics
```

- To display subscriber access AAA information:

```
user@host> show network-access aaa subscribers
```

- To display subscriber session information:

```
user@host> show network-access aaa subscribers session-id session-id
```

- To clear subscriber access statistics and to log out specific subscribers:

```
user@host> clear network-access aaa subscriber
```

- To clear AAA accounting statistics:

```
user@host> clear network-access aaa statistics accounting
```

- To clear AAA address-assignment statistics for a client:

```
user@host> clear network-access aaa statistics address-assignment client
```

- To clear AAA address-assignment pool statistics:

```
user@host> clear network-access aaa statistics address-assignment pool  
pool-name
```

- To clear AAA authentication statistics:

```
user@host> clear network-access aaa statistics authentication
```

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

Chapter 4

Configuring Address-Assignment Pools for Subscriber Access

- Address-Assignment Pools Overview on page 47
- Configuring Address-Assignment Pools on page 48
- Configuring an Address-Assignment Pool Name and Addresses on page 48
- Configuring a Named Address Range for Dynamic Address Assignment on page 49
- Configuring Static Address Assignment on page 50
- Configuring DHCP Client-Specific Attributes on page 50
- DHCP Attributes for Address-Assignment Pools on page 51
- Address-Assignment Pools Licensing Requirements on page 52
- Tracing Address-Assignment Pool Processes on page 52

Address-Assignment Pools Overview

The address-assignment pool feature supports subscriber management functionality by enabling you to create IPv4 and IPv6 address pools that different client applications can share. 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, which is supported for IPv4 pools only, 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, for IPv4 address-assignment pools, 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 48
 - Address-Assignment Pools Licensing Requirements on page 52

- Example: Configuring an Address-Assignment Pool on page 149

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. An address-assignment pool can support either IPv4 address or IPv6 addresses. You cannot use the same pool for both types of address.



NOTE: You cannot use address-assignment pools with the J Series Services Routers 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:

1. Configure the address-assignment pool name and specify the addresses for the pool.

See “Configuring an Address-Assignment Pool Name and Addresses” on page 48.

2. (Optional) Configure named ranges (subsets) of addresses.

See “Configuring a Named Address Range for Dynamic Address Assignment” on page 49.

3. (Optional) Create static address bindings (IPv4 only).

See “Configuring Static Address Assignment” on page 50.

4. (Optional) Configure attributes for DHCP clients.

See “Configuring DHCP Client-Specific Attributes” on page 50.

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Address-Assignment Pools Licensing Requirements on page 52
 - Example: Configuring an Address-Assignment Pool on page 149

Configuring an Address-Assignment Pool Name and Addresses

To configure an address-assignment pool, you must specify the name of the pool and configure the addresses for the pool.

To configure an IPv4 address-assignment pool:

1. Configure the name of the pool and specify the IPv4 family.

[edit access]

```
user@host# edit address-assignment pool isp_1 family inet
```

2. Configure the network address and the prefix length of the addresses in the pool.

```
[edit access address-assignment pool isp_1 family inet]
user@host# set network 192.168.0.0/16
```

To configure an IPv6 address-assignment pool:

1. Configure the name of the pool and specify the IPv6 family.

```
[edit access]
user@host# edit address-assignment pool isp_2 family inet6
```

2. Configure the IPv6 network prefix for the address pool. The prefix specification is required when you configure an IPv6 address-assignment pool.

```
[edit access address-assignment pool isp_2 family inet6]
user@host# set prefix 2008:2009::/32
```

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48

Configuring a Named Address Range for Dynamic Address Assignment

You can optionally configure multiple named ranges, or 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, you specify a name for the range and define the address range.

To create a named range within an IPv4 address-assignment pool:

1. Specify the name of the address-assignment pool and the IPv4 family.

```
[edit access]
user@host# edit address-assignment pool isp_1 family inet
```

2. Configure the name of the range and the lower and upper boundaries of the addresses in the range.

```
[edit access address-assignment pool isp_1 family inet]
user@host# set range southeast low 192.168.102.2 high 192.168.102.254
```

To create a named range within an IPv6 address-assignment pool:

1. Specify the name of the address-assignment pool and the IPv6 family.

```
[edit access]
user@host# edit address-assignment pool isp_2 family inet6
```

2. Configure the name of the range and define the range. You can define the range based on the lower and upper boundaries of the prefixes in the range, or based on the length of the prefixes in the range.

```
[edit access address-assignment pool isp_2 family inet6]
user@host# set range dsl-range low 2008:2010:2011:0100::/64 high
2008:2010:2011:ffff::/64
user@host# set range fiber-east prefix-length 48
```

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48

Configuring Static Address Assignment

You can optionally create a static IPv4 address binding by reserving a specific address for a particular client. The address is removed from the address-assignment pool so that it is not assigned to another client. When you reserve an address, you identify the client host and create a binding between the client MAC address and the assigned IP address. IPv6 address-assignment pools do not support static address binding.

To configure a static binding for an IPv4 address:

1. Specify the name of the IPv4 address-assignment pool containing the IP address you want to reserve for the client.

```
[edit access]
user@host# edit address-assignment pool isp_1 family inet
```

2. Specify the name of the client for the static binding, the client MAC address, and the IP address to reserve for the client. This configuration specifies that the client with MAC address 90:00:00:01:00:01 is always assigned IP address 192.168.44.12.

```
[edit access address-assignment pool isp_1 family inet]
user@host# set host svale6_boston_net hardware-address 90:00:00:01:00:01
ip-address 192.168.44.12
```

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48

Configuring DHCP Client-Specific Attributes

You 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.

You use the **dhcp-attributes** statement to configure DHCP client-specific attributes for address-assignment pools. “DHCP Attributes for Address-Assignment Pools” on page 51 describes the supported attributes you can configure for IPv4 and IPv6 address-assignment pools.

To configure address-assignment pool attributes for DHCP clients:

1. Specify the name and IP family of the address-assignment pool.

```
[edit access]
user@host# edit address-assignment pool isp_1 family inet
```

2. Configure optional DHCP client attributes.

```
[edit access address-assignment pool isp_1 family inet]
user@host# set dhcp-attributes boot-server 192.168.200.100 grace-period
3600 maximum-lease-time 18000
```

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48
 - DHCP Attributes for Address-Assignment Pools on page 51

DHCP Attributes for Address-Assignment Pools

Table 9 on page 51 describes the DHCP client attributes that you can use with the **dhcp-attributes** statement when you configure address-assignment pools. Table 10 on page 52 describes the DHCPv6 client attributes for configuring IPv6 address-assignment pools.

Table 9: DHCP Attributes

Attribute	Description	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.	–
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.	–
option-match	Maps option 82 value to named address range.	–

Table 9: DHCP Attributes (*continued*)

Attribute	Description	DHCP Option
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

Table 10: DHCPv6 Attributes

Attribute	Description	DHCPv6 Option
dns-server	IPv6 address of DNS server to which clients can send DNS queries.	23
grace-period	Grace period offered with the lease.	–
maximum-lease-time	Maximum lease time allowed by the DHCP server.	–
option	User-defined options.	–
sip-server-address	IPv6 address of SIP outbound proxy server.	22
sip-server-domain-name	Domain name of the SIP outbound proxy server.	21

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48

Address-Assignment Pools Licensing Requirements

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.

- Related Topics**
- For information about installing and managing JUNOS licenses, see the “Installing and Managing JUNOS Licenses” chapter of the *JUNOS Software Installation and Upgrade Guide*

Tracing Address-Assignment Pool Processes

The JUNOS Software trace operations feature tracks address-assignment pool operations and records events in a log file. By default, the tracing operation is inactive. To trace address-assignment pool processes, you 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. You cannot change the directory (`/var/log`) in which trace files are located.
- When the file `authd` reaches 128 kilobytes (KB), it is renamed `authd.0`, then `authd.1`, and so on, until there are three trace files. Then the oldest trace file (`authd.2`) 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.

To configure address-assignment pool tracing operations:

1. Specify that you want to configure tracing options.

```
[edit system processes general-authentication-service]
user@host# edit traceoptions
```

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

See “Configuring the Address-Assignment Pool Trace Log Filename” on page 53.

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

See “Configuring the Number and Size of Address-Assignment Pool Processes Log Files” on page 54.

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

See “Configuring Access to the Log File” on page 54.

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

See “Configuring a Regular Expression for Lines to Be Logged” on page 55.

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

See “Configuring the Trace Operation” on page 55.

The tracing options are described in the following sections:

- Configuring the Address-Assignment Pool Trace Log Filename on page 53
- Configuring the Number and Size of Address-Assignment Pool Processes Log Files on page 54
- Configuring Access to the Log File on page 54
- Configuring a Regular Expression for Lines to Be Logged on page 55
- Configuring the Trace Operation on page 55

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:

To configure the filename for address-assignment pool tracing operations:

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

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1
```

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 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, by including the files and size options with the `traceoptions` statement.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 files 20 size 2097152
```

Configuring Access to the Log File

By default, log files can be accessed only by the user who configures the tracing operation. You can allow 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 processes general-authentication-service traceoptions]
user@host# set file aap_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 processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 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 regular expressions (regex) that will be matched.

To configure regular expressions to match:

- Configure the regular expression.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 match regex
```

Configuring the Trace Operation

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
address-assignment	All address-assignment pool 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

To configure the flags for the event to be logged:

- Configure the flags.

```
[edit system processes general-authentication-service traceoptions]
user@host# set flag address-assignment
```


Chapter 5

Configuring DHCP Local Server for Subscriber Access

- Extended DHCP Local Server Overview on page 58
- DHCPv6 Local Server Overview on page 63
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64
- Using External AAA Authentication Services with DHCP on page 66
- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67
- Grouping Interfaces with Common DHCP Configurations on page 68
- Group-Specific DHCP Local Server Options on page 69
- Overriding Default DHCP Local Server Configuration Settings on page 70
- DHCP Auto Logout Overview on page 73
- Automatically Logging Out DHCP Clients on page 74
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75
- Configuring Passwords for Usernames on page 77
- Creating Unique Usernames for DHCP Clients on page 78
- Understanding Dynamic Reconfiguration of Extended DHCP Local Server Clients on page 80
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
- Configuring Dynamic Reconfiguration Attempts for DHCP Clients on page 83
- Configuring Deletion of the Client When Dynamic Reconfiguration Fails on page 84
- Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect on page 84
- Configuring a Token for DHCP Local Server Authentication on page 85
- Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings on page 85
- Verifying and Managing DHCP Local Server Configuration on page 86
- Graceful Routing Engine Switchover on page 86
- Tracing Extended DHCP Operations on page 87

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.



NOTE: You can also configure the extended DHCP local server to support IPv6 clients. See “DHCPv6 Local Server Overview” on page 63 for information about the DHCPv6 local server feature.

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 48 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 781 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 on page 60
- Providing DHCP Client Configuration Information on page 60
- Minimal Configuration for Clients on page 61
- DHCP Local Server and Address-Assignment Pools on page 62

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. Table 11 on page 61 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 35 for a complete list of RADIUS attributes and Juniper Networks VSAs that the extended DHCP applications supports for subscriber access management.

Table 11: Information in Authentication Grant

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 27	Session-Timeout	Lease time
RADIUS attribute 88	Framed-Pool	Address assignment pool name
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 48](#)
 - [Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67](#)
 - [Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64](#)
 - [Using External AAA Authentication Services with DHCP on page 66](#)
 - [Graceful Routing Engine Switchover on page 86](#)
 - [Tracing Extended DHCP Operations on page 87](#)
 - [Verifying and Managing DHCP Local Server Configuration on page 86](#)
 - [Example: Minimum Extended DHCP Local Server Configuration on page 150](#)
 - [Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 150](#)

DHCPv6 Local Server Overview

The DHCPv6 local server enhances the extended DHCP local server by providing support for IPv6. When a DHCPv6 client logs in, the DHCPv6 local server uses the AAA service framework to interact with the RADIUS server. The RADIUS server, which is configured independently of DHCP, authenticates the client and supplies the IPv6 prefix and client configuration parameters.

You can configure DHCPv6 local server to communicate the following attributes to the AAA service framework and RADIUS at login time:

- Client username
- Client password



NOTE: The client username, which uniquely identifies a subscriber, must be present in the configuration in order for DHCPv6 local server to use RADIUS authentication.

Based on the attributes that the DHCPv6 local server provides, RADIUS returns the information shown in Table 12 on page 63 to configure the client:

Table 12: RADIUS Attributes and VSAs for DHCPv6 Local Server

Attribute Number	Attribute Name	Description
27	Session-Timeout	Lease time, in seconds. If not supplied, the lease does not expire
125	Delegated-IPv6-Prefix	Prefix that is delegated to the client
26-143	Max-Clients-Per-Interface	Maximum number of clients allowed per interface

The DHCPv6 local server is compatible with the extended DHCP local server and the extended DHCP relay agent, and can be enabled on the same interface as either the extended DHCP local server or DHCP relay agent.

The DHCPv6 local server provides many of the same features as the extended DHCP local server, including:

- Configuration for a specific interface or for a group of interfaces
- Site-specific usernames and passwords
- Numbered Ethernet interfaces
- Statically configured CoS and filters
- AAA directed login



NOTE: DHCPv6 local server does not support dynamic profiles or the local address-assignment pool feature, which the DHCP local server does support.

To configure the extended DHCPv6 local server on the router, you include the `dhcpv6` statement at the `[edit system services dhcp-local-server]` hierarchy level. See the “[edit system services dhcp-local-server] Hierarchy Level” on page 781 for the complete DHCP local server syntax, including the DHCPv6 syntax.

You can also include the `dhcpv6` statement at the following hierarchy levels:

- `[edit logical-systems logical-system-name system services dhcp-local-server]`
- `[edit logical-systems logical-system-name routing-instances routing-instance-name system services dhcp-local-server]`
- `[edit routing-instances routing-instance-name system services dhcp-local-server]`

Related Topics

- Extended DHCP Local Server Overview on page 58
- Using External AAA Authentication Services with DHCP on page 66
- Grouping Interfaces with Common DHCP Configurations on page 68
- Group-Specific DHCP Local Server Options on page 69
- Overriding Default DHCP Local Server Configuration Settings on page 70
- Configuring Passwords for Usernames on page 77
- Creating Unique Usernames for DHCP Clients on page 78
- Example: Extended DHCPv6 Local Server Configuration on page 152

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

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

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

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

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

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

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

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

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

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

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



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

Primary Dynamic Profile

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

This feature can conserve logical interfaces in a network where dynamic 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 75

Using External AAA Authentication Services with DHCP

The extended DHCP local server, including DHCPv6 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 responds as though it were 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
```

- For DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
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 77.

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

See “Creating Unique Usernames for DHCP Clients” on page 78.

- Related Topics**
- Extended DHCP Local Server Overview on page 58
 - Extended DHCP Relay Agent Overview on page 94
 - DHCPv6 Local Server Overview on page 63

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

You can specify the match order in which the extended DHCP local server uses the client data to determine the address-assignment pool that provides the IP address and configuration for a DHCP client. You use the **pool-match-order** statement to specify the match order. If you do not specify the **pool-match-order**, the router uses the default **ip-address-first** matching to select the address pool. Once DHCP local server determines the address assignment pool to use, the server performs the matching based on the criteria you specified in the pool configuration.

In the default **ip-address-first** matching, 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.

In **external-authority** matching, the DHCP local server receives the address assignment from an external authority, such as RADIUS or Diameter. If RADIUS is the external authority, the DHCP local server uses, the Framed-IPv6-Pool attribute (RADIUS attribute 100) select the pool. If Diameter is the external authority, the server uses the Diameter counterpart of the Framed-IPv6-Pool attribute to determine the pool.

For IPv4 address-assignment pools, 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, which you can configure when you create the address-assignment pool.



NOTE: To use the DHCP local server option 82 matching feature with an IPv4 address-assignment pool, you must ensure that the **option-82** statement is included in the **dhcp-attributes** statement for the address-assignment pool.

To configure the matching order the extended DHCP local server uses to determine the address-assignment pool used for a client:

1. Access the **pool-match-order** configuration.

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

2. Specify the pool matching methods in the order in which the router performs the methods. You can specify the methods in any order. All methods are optional—the router uses the **ip-address-first** method by default.
 - a. Configure the router to use an external addressing authority.

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

- b. Configure the router to use the ip-address-first method.

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

- c. (IPv4 address-assignment pools only) Specify the option 82 matching method.

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

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48
 - Extended DHCP Local Server Overview on page 58
 - Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 150

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, including the DHCPv6 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 the DHCPv6 local server, and 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 58
 - Extended DHCP Relay Agent Overview on page 94
 - DHCPv6 Local Server Overview on page 63
 - Group-Specific DHCP Local Server Options on page 69
 - Group-Specific DHCP Relay Options on page 103

Group-Specific DHCP Local Server Options

You can include the following statements at both the `[edit system services dhcp-local-server group group-name]` hierarchy level to set group-specific DHCP local server configuration options, and at the `[edit system services dhcp-local-server]` hierarchy level to set global DHCP local server configuration options:

- **authentication**—Configure the parameters the router sends to the external AAA server.
- **dynamic-profile**—Specify the dynamic profile that is attached to a group of interfaces.
- **interface**—Specify one or more interfaces, or a range of interfaces, that are within the specified group.
- **overrides**—Override the default configuration settings for the extended DHCP local server. For information, see “Overriding Default DHCP Local Server Configuration Settings” on page 70.

The DHCPv6 local server supports the same set of statements with the exception of the **dynamic-profile** statement.

The statements configured at the `[edit system services dhcp-local-server group group-name]` hierarchy level apply only to the named group of interfaces, and override any global DHCP local server settings configured with the same statements at the `[edit system services dhcp-local-server]` hierarchy level.

Related Topics ■ Grouping Interfaces with Common DHCP Configurations on page 68

Overriding Default DHCP Local Server Configuration Settings

You can override certain default DHCP and DHCPv6 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 70.

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

See “Disabling ARP Table Population” on page 71.

4. (Optional) Configure DHCP client auto logout.

See “DHCP Auto Logout Overview” on page 73.

This topic contains the following sections:

- Specifying the Maximum Number of DHCP Clients Per Interface on page 70
- Disabling ARP Table Population on page 71

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 through 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs or DHCPv6 Solicit PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.



NOTE: The maximum number of DHCP (and DHCPv6) 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 DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
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, DHCPv6 local server, and DHCP relay agent all 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 13: ARP Table in Trusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC A

Table 13: ARP Table in Trusted Environment *(continued)*

IP Address	MAC Address
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 14: 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:

- 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
```
- 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
```

DHCP Auto Logout Overview

This topic provides an introduction to the optional DHCP auto logout feature and includes the following sections:

- Auto Logout Overview on page 73
- How DHCP Identifies and Releases Clients on page 73
- Option 60 and Option 82 Requirements on page 74

Auto Logout Overview

Auto logout is an optional configuration for DHCP local server and DHCP relay agent that improves the efficiency of DHCP IP address assignment. Auto logout enables IP addresses to be immediately released and returned to the address pool when the addresses are no longer used by DHCP clients. DHCP can then assign the addresses to other clients. Without auto logout, an IP address is blocked for the entire lease period, and DHCP must wait until the address lease time expires before reusing the address.

Auto logout is particularly useful when DHCP uses long lease times for IP address assignments and to help avoid allocating duplicate IP addresses for a single client. For example, you might have an environment that includes set-top boxes (STB) that are often upgraded or replaced. Each time a STB is changed, the new STB repeats the DHCP discover process to obtain client configuration information and an IP address. DHCP views the new STB as a completely new client and assigns a new IP address—the previous IP address assigned to the client (the old STB) remains blocked and unavailable until the lease expires. If auto logout is configured in this situation, DHCP recognizes that the new STB is actually the same client and then immediately releases the original IP address. DHCP relay agent acts as a proxy client for auto logout and sends a DHCP release message to the DHCP server.

How DHCP Identifies and Releases Clients

The auto logout feature requires that DHCP explicitly identify clients. By default, DHCP local server and DHCP relay agent identify clients based on MAC address or Client Identifier. However, in some cases this type of identification might not be sufficient. For example, in the previous STB example, each STB has a different MAC address, so DHCP incorrectly assumes that an upgraded or replacement STB is a new client.

In order to explicitly identify clients, auto logout uses a secondary identification method when the primary identification method is unsuccessful—the primary method is considered unsuccessful if the MAC address or Client Identifier does not match that of an existing client. The secondary identification method is based on the DHCP option 60 and option 82 information in DHCP discover messages.

Both the primary and secondary identification methods use subnet information to differentiate between clients. The primary identification method differentiates between two clients with the same MAC address (or same Client Identifier) if the clients are on different subnets. Similarly, the secondary identification method considers two

clients as different if they have the same option 60 and option 82 information, but different subnets.

DHCP local server and DHCP relay agent perform the following operations when auto logout is enabled and the secondary identification method identifies a duplicate client (that is, the discovery packet is from an existing client).

- DHCP local server immediately releases the existing address.
- DHCP relay agent immediately releases the existing client and then sends a DHCP release packet to the DHCP server. Sending the release packet ensures that DHCP relay and the DHCP server are synchronized.



NOTE: If the DHCP relay agent is in snoop mode, DHCP relay releases the client but does not send a release packet to the DHCP server if the discover packet is for a passive client (a client added as a result of snooped packets) or if the discover packet is a snooped packet.

Option 60 and Option 82 Requirements

DHCP local server requires that the received discover packet include both DHCP option 60 and option 82. If either option is missing, DHCP local server cannot perform the secondary identification method and auto logout is not used.

DHCP relay agent requires that the received discover packet contain DHCP option 60. DHCP relay determines the option 82 value based on the guidelines provided in “DHCP Relay Agent Option 82 Value for Auto Logout” on page 111.

- Related Topics**
- Automatically Logging Out DHCP Clients on page 74
 - DHCP Relay Agent Option 82 Value for Auto Logout on page 111

Automatically Logging Out DHCP Clients

You can configure the extended DHCP local server and extended DHCP relay to automatically log out DHCP clients. Auto logout immediately releases an existing client when DHCP receives a discover packet that has the same DHCP option 60 and DHCP option 82 information as the existing client. DHCP then releases the existing client IP address without waiting for the normal lease expiration.



NOTE: When the existing client is released, the new client undergoes the normal authentication process. The new client might not receive the same IP address as the original client.

To configure DHCP client auto logout:

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. Enable auto logout. (DHCP local server and DHCP relay agent both support the `client-discover-match` statement.)

- For DHCP local server:

```
[edit system services dhcp-local-server overrides]
user@host# set client-discover-match
```

- For DHCP relay:

```
[edit forwarding-options dhcp-relay overrides]
user@host# set client-discover-match
```



NOTE: If you change the auto logout configuration, existing clients continue to use the auto logout setting that was configured when they logged in. New clients use the new setting.

-
- Related Topics**
- DHCP Auto Logout Overview on page 73
 - Extended DHCP Local Server Overview on page 58
 - Extended DHCP Relay Agent Overview on page 94

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 75
- Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces on page 76

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 **aggregate-clients** option does not apply to IP demux subscriber interfaces. The two options are mutually exclusive.

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

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

- To use the primary dynamic profile:

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

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

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 68.

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 **aggregate-clients** option does not apply to IP demux subscriber interfaces. The two options are mutually exclusive.

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

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

- To use the primary dynamic profile:

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

- Related Topics**
- Dynamic Profiles Overview on page 467
 - Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64
 - Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 548

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 DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
user@host# edit authentication
```

- For DHCP relay agent:

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

2. Configure the password. (DHCP local server, DHCPv6 local server, and DHCP relay agent all 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 58
 - DHCPv6 Local Server Overview on page 63

- Extended DHCP Relay Agent Overview on page 94
- Using External AAA Authentication Services with DHCP on page 66
- 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.

When you use the DHCPv6 local server, you must configure authentication and the client username; otherwise client login fails.

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**.
- **client-id**—The client identifier option (option 1). (DHCPv6 local server only)
- **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 a 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**. (Not supported for DHCPv6 local server)
- **option-60**—The portion of the option 60 payload that follows the length field. (Not supported for DHCPv6 local server)
- **option-82 <circuit-id> <remote-id>**—The specified contents of the option 82 payload. (Not supported for DHCPv6 local server)
 - **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.



NOTE: For DHCP relay agent, the option 82 value used in creating the username is based on the option 82 value that is encoded in the outgoing (relayed) PDU.

- **relay-agent-interface-id**—The Interface-ID option (option 18). (DHCPv6 local server only)
- **relay-agent-remote-id**—The DHCPv6 Relay Agent Remote-ID option (option 37). (DHCPv6 local server only)
- **relay-agent-subscriber-id**—The DHCPv6 Relay Agent Subscriber-ID option (option 38). (DHCPv6 local server only)
- **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.

For DHCP local server and DHCP relay agent:

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

For DHCPv6 local server:

```
user-prefix[delimiter]mac-address[delimiter]logical-system-name[delimiter]
routing-instance-name[delimiter]circuit-type[delimiter]relay-agent-remote-id[delimiter]
relay-agent-subscriber-id@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 DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
user@host# edit authentication
```

- For DHCP relay agent:

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

```
user@host# edit authentication
```

- Specify that you want to include optional information in the username. (DHCP local server, DHCPv6 local server, and DHCP relay agent all support the `username-include` statement.)

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

- (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 58
 - DHCPv6 Local Server Overview on page 63
 - Extended DHCP Relay Agent Overview on page 94
 - Using External AAA Authentication Services with DHCP on page 66

Understanding Dynamic Reconfiguration of Extended DHCP Local Server Clients

Dynamic reconfiguration of clients enables the extended DHCP local server to initiate a client update without waiting for the client to initiate a request.

Default Client/Server Interaction

Typically the DHCP client initiates all of the basic DHCP client/server interactions. The DHCP server sends information to a client only in response to a request from that client. In subscriber management scenarios, this behavior does not enable a client to be quickly updated with its network address and configuration in the event of server changes.

For example, suppose a service provider restructured its addressing scheme or changed the server IP addresses that it provided to clients. Without dynamic reconfiguration, the service provider typically clears the DHCP server binding table, but cannot inform the DHCP clients that their bindings have been cleared. Consequently, the DHCP client operates as though its IP address is still valid, but it is now unable to communicate over the access network, resulting in an outage. The DHCP local server has to wait for the client to send a message to renew its lease or rebind to the server. In response, the server sends a NAK message to the client to force it to begin the DHCP connection process again. Alternatively, the provider can wait for customers to make a service call about the network failures and then instruct

them to power cycle their customer premises equipment to reinitiate the connection. Neither of these actions is timely or convenient for customers.

Dynamic Client/Server Interaction

Dynamic reconfiguration, available through a partial implementation of RFC 3203, *DHCP Reconfigure Extension*, enables the DHCP local server to send a message to the client to force lease renewal. Clients that support the `forcerenew` message then send a lease renewal message to the server. The server rejects the lease renewal request and sends a NAK to the client, causing the client to reinitiate the DHCP connection. A successful reconnection results in the reconfiguration of the DHCP client. Only the exchange of `forcerenew`, `renew`, and NAK messages is supported from RFC 3202. DHCP relay and DHCP relay proxy do not participate in the client reconfiguration or react to `forcerenew` messages other than to forward them to the client.

When the local server state machine starts the reconfiguration process on a bound client, the client transitions to the reconfiguring state and the local server sends a `forcerenew` message to the client. Because the client was in the bound state before entering the reconfiguring state, all subscriber services, such as forwarding and statistics, continue to work. Client statistics are not maintained in the interval between a successful reconfiguration and the subsequent client binding. When the server responds to the client renewal request with a NAK, the client entry is removed from the binding table and final statistics are reported. New statistics are collected when the client sends a discover message to establish a new session.

Dynamic Configuration Options

You can enable dynamic reconfiguration for all DHCP clients or only the DHCP clients serviced by a specified group of interfaces, and you can modify the behavior accordingly.

- To enable dynamic reconfiguration with default reconfiguration values for all DHCP clients, include the `reconfigure` statement at the `[edit system services dhcp-local-server]` hierarchy level.
- Alternatively, to enable dynamic reconfiguration for only the DHCP clients serviced by a specified group of interfaces, include the `reconfigure` statement at the `[edit system services dhcp-local-server group group-name]` hierarchy level

You can optionally modify the behavior of the reconfiguration process by including the appropriate statements at the `[edit system services dhcp-local-server reconfigure]` hierarchy level for all DHCP clients. To override this global configuration for only the DHCP clients serviced by a specified group of interfaces, you can include the statements with different values at the `[edit system services dhcp-local-server group group-name reconfigure]` hierarchy level.

Include the `attempts` statement to specify how many times the local server sends the `forcerenew` message to initiate client reconfiguration. Include the `timeout` statement to set the interval between the first and second attempts. The interval between each subsequent attempt doubles the previous value. For example, if the first value is 2, the first retry is attempted 2 seconds after the first attempt fails. The second retry is attempted 4 seconds after the first retry fails. The third retry is attempted 8 seconds after the second retry fails, and so on.

By default, the DHCP client's original configuration is restored if all of the reconfiguration attempts fail. Include the **clear-on-abort** statement to delete the client instead.

You can configure an authentication token by including the **token** statement. The DHCP local server then includes this token inside the authentication option when it sends **forcerenew** messages. If the service provider has previously configured the DHCP client with this token, then the client can compare that token against the newly received token, and reject the message if the tokens do not match. This functionality corresponds to RFC 3118, *Authentication for DHCP Messages*, section 4.

In the event of a RADIUS-initiated disconnect (RID), the client is deleted by default. You can configure the client to be reconfigured instead of deleted by including the **radius-disconnect** statement at the **[edit system services dhcp-local-server reconfigure trigger]** hierarchy level for all clients or the **[edit system services dhcp-local-server group group-name reconfigure trigger]** hierarchy level for only the DHCP clients serviced by a specified group of interfaces. The client is deleted if all attempts to reconfigure the client fail.

You can force the local server to initiate the reconfiguration process for clients by issuing the **request dhcp server reconfigure** command. Command options determine whether reconfiguration is then attempted for all clients or specified clients.

Events that take place while a reconfiguration is in process take precedence over the reconfiguration. Table 15 on page 82 lists the actions taken in response to several different events.

Table 15: Action Taken for Events That Occur During a Reconfiguration

Event	Action
Server receives a discover message from the client.	Server drops packet and deletes client.
Server receives a request, renew, rebind, or init-reboot message from the client.	Server sends NAK message and deletes client.
Server receives a release message from the client.	Client is deleted.
The client lease times out.	Client is deleted.
The clear dhcp server binding command is issued.	Client is deleted.

Related Topics ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82

Configuring Extended DHCP Local Server Dynamic Client Reconfiguration

The DHCP local server can initiate reconfiguration of its clients to avoid extended outages because of server configuration changes. In addition to requesting that the DHCP local server initiate reconfiguration, you can specify the reconfiguration behavior.

To configure dynamic reconfiguration of DHCP clients:

1. Enable dynamic reconfiguration with default values for all clients.

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

To override the global configuration for a particular group of clients, include the statement at the `[edit system services dhcp-local-server group group-name]` hierarchy level.

2. (Optional) Configure how the server attempts reconfiguration.

See “Configuring Dynamic Reconfiguration Attempts for DHCP Clients” on page 83.

3. (Optional) Configure the response to a failed reconfiguration.

See “Configuring Deletion of the Client When Dynamic Reconfiguration Fails” on page 84.

4. (Optional) Configure the behavior in response to a RADIUS-initiated disconnect.

See “Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect” on page 84.

5. (Optional) Configure a token for rudimentary server authentication.

See “Configuring a Token for DHCP Local Server Authentication” on page 85.

6. (Optional) Initiate reconfiguration of some or all client bindings.

See “Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings” on page 85.

Configuring Dynamic Reconfiguration Attempts for DHCP Clients

You can configure how many attempts the local server makes to initiate reconfiguration of the DHCP client by sending `forcerenew` messages. You can also specify how long the server waits between attempts. By default, eight attempts are made and the initial interval is two seconds.

(Optional) To configure DHCP local server reconfiguration behavior for all DHCP clients:

1. Specify the number of reconfiguration attempts.

```
[edit system services dhcp-local-server reconfigure]
user@host# set attempts 5
```

2. Specify the interval between reconfiguration attempts.

```
[edit system services dhcp-local-server reconfigure]
user@host# set timeout 8
```

To override the global configuration for a particular group of clients, include the statements at the [edit system services dhcp-local-server group *group-name* reconfigure] hierarchy level.

- Related Topics**
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
 - attempts
 - timeout

Configuring Deletion of the Client When Dynamic Reconfiguration Fails

You can configure the local server to delete the client when the maximum number of reconfiguration attempts has been made without success. By default, the client's original configuration is restored.

(Optional) To configure the DHCP local server to delete the client when reconfiguration is not successful, for all clients:

- Specify the client deletion.

```
[edit system services dhcp-local-server reconfigure]
user@host# set clear-on-abort
```

To override the global configuration for a particular group of clients, include the statement at the [edit system services dhcp-local-server group *group-name* reconfigure] hierarchy level.

- Related Topics**
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
 - clear-on-abort

Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect

You can configure the local server to reconfigure the client when the client receives a RADIUS-initiated disconnect. By default, the client is deleted when a RADIUS-initiated disconnect is received.

(Optional) To configure the DHCP local server to reconfigure the client instead of deleting the client when a RADIUS-initiated disconnect is received, for all clients:

- Specify the RADIUS-initiated disconnect trigger.

```
[edit system services dhcp-local-server reconfigure trigger]
user@host# set radius-disconnect
```

To override the global configuration for a particular group of clients, include the statements at the [edit system services dhcp-local-server group *group-name* reconfigure trigger] hierarchy level.

- Related Topics**
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
 - radius-disconnect
 - trigger

Configuring a Token for DHCP Local Server Authentication

You can configure the local server to include a constant, unencoded token in the DHCP forcerenew message as part of the authentication option it sends to clients. The client compares the received token with a token already configured on the client. If the tokens do not match, the DHCP client discards the forcerenew message. Use of the token provides rudimentary protection against inadvertently instantiated DHCP servers.

(Optional) To configure the DHCP local server to include a token in the forcerenew message sent to the client, for all clients:

- Specify the token

```
[edit system services dhcp-local-server reconfigure]
user@host# set token 8ysIU9E32k8r
```

To override the global configuration for a particular group of clients, include the statement at the [edit system services dhcp-local-server group *group-name* reconfigure] hierarchy level.

- Related Topics**
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
 - token

Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings

You can request that the DHCP local server initiate reconfiguration of all of clients or only specified clients.

To request reconfiguration of all clients:

- Specify the all option.

```
user@host> request dhcp server reconfigure all
```

To request reconfiguration of only certain clients:

- Specify the IP address of the DHCP client.

```
user@host> request dhcp server reconfigure 192.168.27.3
```

- Specify the MAC address of the DHCP client.

```
user@host> request dhcp server reconfigure 12:23:34:45:56:67
```

- Specify an interface; reconfiguration is attempted for all clients on this interface.

```
user@host> request dhcp server reconfigure interface fe-0/0/0.100
```

- Specify a logical system; reconfiguration is attempted for all clients or the specified clients in this logical system.

```
user@host> request dhcp server reconfigure all logical-system ls-bldg5
```

- Specify a routing instance; reconfiguration is attempted for all clients or the specified clients in this routing instance.

```
user@host> request dhcp server reconfigure all routing-instance ri-boston
```

- Related Topics**
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
 - request dhcp server reconfigure

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*

Graceful Routing Engine Switchover

The extended DHCP local server and the DHCP relay agent applications both maintain the state of active DHCP client leases in the session database. The extended DHCP application can recover this state if the DHCP process fails or is manually restarted,

thus preventing the loss of active DHCP clients in either of these circumstances. However, the state of active DHCP client leases is lost if a power failure occurs or if the kernel stops operating (for example, when the router is reloaded) on a single Routing Engine.

The extended DHCP local server and the DHCP relay agent support graceful Routing Engine switchover on all routing platforms that contain dual Routing Engines. To support graceful Routing Engine switchover, the extended DHCP application 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 local server or 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 application 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**
- Extended DHCP Local Server Overview on page 58
 - Extended DHCP Relay Agent Overview on page 94

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 88.

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

See “Configuring the Number and Size of Extended DHCP Log Files” on page 89.

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

See “Configuring Access to the Extended DHCP Log File” on page 89.

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

See “Configuring a Regular Expression for Extended DHCP Lines to Be Logged” on page 90.

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

See “Configuring the Extended DHCP Tracing Flags” on page 90.

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

- Configuring the Extended DHCP Log Filename on page 88
- Configuring the Number and Size of Extended DHCP Log Files on page 89
- Configuring Access to the Extended DHCP Log File on page 89
- Configuring a Regular Expression for Extended DHCP Lines to Be Logged on page 90
- Configuring the Extended DHCP Tracing Flags on page 90

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
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 on page 94
- DHCP Relay Proxy Overview on page 96
- Configuring Dynamic Access Routes for Subscriber Management on page 97
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 99
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 100
- Using External AAA Authentication Services with DHCP on page 101
- Grouping Interfaces with Common DHCP Configurations on page 102
- Group-Specific DHCP Relay Options on page 103
- Overriding the Default DHCP Relay Configuration on page 104
- DHCP Auto Logout Overview on page 110
- DHCP Relay Agent Option 82 Value for Auto Logout on page 111
- Automatically Logging Out DHCP Clients on page 112
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113
- Enabling and Disabling Insertion of Option 82 Information on page 117
- Configuring Server Groups on page 121
- Configuring Active Server Groups on page 121
- Enabling DHCP Relay Proxy Mode on page 122
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 122
- Verifying and Managing DHCP Relay Configuration on page 124
- Tracing Extended DHCP Operations on page 125

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 777 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 on page 94

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.

- Related Topics**
- Access and Access-Internal Routes for Subscriber Management on page 15
 - Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64
 - Using External AAA Authentication Services with DHCP on page 66
 - DHCP Relay Proxy Overview on page 96
 - Graceful Routing Engine Switchover on page 86
 - Verifying and Managing DHCP Relay Configuration on page 124
 - Tracing Extended DHCP Operations on page 87
 - Example: Minimum DHCP Relay Agent Configuration on page 151
 - Example: DHCP Relay Agent Configuration with Multiple Clients and Servers on page 151

- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 153
- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 155

DHCP Relay Proxy Overview

DHCP relay proxy mode is an enhancement to extended DHCP relay. DHCP relay proxy supports all DHCP relay features while providing additional features and benefits.

Normally, extended DHCP relay operates as a helper application for DHCP operations. Except for the ability to add DHCP relay agent options and the gateway address (giaddr) to DHCP packets, DHCP relay is transparent to DHCP clients and DHCP servers, and simply forwards messages between DHCP clients and servers.

When you configure DHCP relay to operate in proxy mode, the relay is no longer transparent. In proxy mode, DHCP relay conceals DHCP server details from DHCP clients, which interact with a DHCP relay in proxy mode as though it is the DHCP server. For DHCP servers there is no change, because proxy mode has no effect on how the DHCP server interacts with the DHCP relay.

DHCP relay proxy provides the following benefits:

- DHCP server isolation and DoS protection—DHCP clients are unable to see the DHCP servers, learn DHCP server addresses, or determine the number of servers that are providing DHCP support. Server isolation also provides denial-of-service (DoS) protection for the DHCP servers.
- Multiple lease offer selection—DHCP relay proxy receives lease offers from multiple DHCP servers and selects a single offer to send to the DHCP client, thereby reducing traffic in the network. Currently, the DHCP relay proxy selects the first offer received.
- Support for both numbered and unnumbered Ethernet interfaces—For DHCP clients connected through Ethernet interfaces, when the DHCP client obtains an address, the DHCP relay proxy adds an access internal host route specifying that interface as the outbound interface. The route is automatically removed when the lease time expires or when the client releases the address.
- Logical system support—DHCP relay proxy can be configured in a logical system, whereas a non-proxy mode DHCP relay cannot.



NOTE: Extended DHCP relay proxy is not supported for the J Series Services Routers DHCP server. Also, you cannot configure both DHCP relay proxy and extended DHCP local server on the same interface.

Interaction Among DHCP Relay Proxy, DHCP Client, and DHCP Servers

The DHCP relay agent is configured on the router, which operates between the DHCP client and one or more DHCP servers.

The following steps provide a high level description of how DHCP relay proxy interacts with DHCP clients and DHCP servers.

1. The DHCP client sends a discover packet to locate a DHCP server in the network from which to obtain configuration parameters for the subscriber.
2. The DHCP relay proxy receives the discover packet from the DHCP client and forwards copies of the packet to each supporting DHCP server. The DHCP relay proxy then creates a client table entry to keep track of the client state.
3. In response to the discover packet, each DHCP server sends an offer packet to the client, which the DHCP relay proxy receives. The DHCP relay proxy does the following:
 - a. Selects the first offer received as the offer to sent to the client
 - b. Replaces the DHCP server address with the address of the DHCP relay proxy
 - c. Forwards the offer to the DHCP client.
4. The DHCP client receives the offer from the DHCP relay proxy.
5. The DHCP client sends a request packet that indicates the DHCP server from which to obtain configuration information—the request packet specifies the address of the DHCP relay proxy.
6. The DHCP relay proxy receives the request packet and forwards copies, which include the address of selected server, to all supporting DHCP servers.
7. The DHCP server requested by the client sends an acknowledgement (ACK) packet that contains the client configuration parameters.
8. The DHCP relay proxy receives the ACK packet, replaces the DHCP server address with its own address, and forwards the packet 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 proxy installs a host route and Address Resolution Protocol (ARP) entry for the DHCP client.
11. After the initial DHCP lease is established, the DHCP relay proxy receives all lease renewals and lease releases from the DHCP client and forwards them to the DHCP server.

- Related Topics**
- Extended DHCP Relay Agent Overview on page 94
 - Enabling DHCP Relay Proxy Mode on page 122

Configuring Dynamic Access Routes for Subscriber Management

You can dynamically configure access routes for DHCP and PPP subscribers based on the values specified in RADIUS Framed-Route Attribute [22].

To dynamically configure access routes:

1. Configure the route prefix for the access route as a variable.

[edit dynamic-profiles *profile-name* routing-options]

```
user@host# edit access route $junos-framed-route-ip-address-prefix
```

2. Configure the next-hop address as a variable.

```
[edit dynamic-profiles profile-name routing-options access route
 "$junos-framed-route-ip-address-prefix"]
user@host# set next-hop $junos-framed-route-nexthop
```

3. Configure the metric as a variable.

```
user@host# set metric $junos-framed-route-cost
```

4. Configure the preference as a variable.

```
user@host# set preference $junos-framed-route-distance
```

- Related Topics**
- Access and Access-Internal Routes for Subscriber Management on page 15
 - RADIUS IETF Attributes Supported by the AAA Service Framework on page 35
 - Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
 - Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131
 - Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 99

Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management

You can dynamically configure access-internal routes. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes Attribute [22], values from the access-internal variables are used instead.

DHCP subscriber interfaces require the qualified-next-hop to identify the interface and the MAC address.

To dynamically configure access-internal routes:

1. Specify that you want to configure the access-internal route.

```
user@host# edit dynamic-profiles profile-name routing-options
```

2. Configure the IP address and the qualified next-hop address as variables.

```
[edit dynamic-profiles profile-name routing-options]
user@host# edit access-internal route $junos-subscriber-ip-address
 qualified-next-hop $junos-interface-name
```



NOTE: Prior to JUNOS Software Release 10.0, the variable used for qualified-next-hop was \$junos-underlying-interface. It is now \$junos-interface-name.

3. Configure the MAC address for the qualified next-hop as a variable.

```
[edit dynamic-profiles profile-name routing-options access-internal route
$junos-subscriber-ip-address qualified-next-hop $junos-underlying-interface]
user@host# set mac-address $junos-subscriber-mac-address
```

- Related Topics**
- Access and Access-Internal Routes for Subscriber Management on page 15
 - Configuring Dynamic Access Routes for Subscriber Management on page 97
 - Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 99

Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management

Purpose View configuration information for access routes and access-internal routes on DHCP and PPP subscribers.

Action

- To display extensive information about access routes and access-internal routes:

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

- To display the configuration for access routes:

```
user@host>show route protocol access
```

- To display the configuration for access-internal routes:

```
user@host> show route protocol access-internal
```

- Related Topics**
- Configuring Dynamic Access Routes for Subscriber Management on page 97
 - Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
 - Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

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

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

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

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

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

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

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

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

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

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



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

Primary Dynamic Profile

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

This feature can conserve logical interfaces in a network where dynamic 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 75

Using External AAA Authentication Services with DHCP

The extended DHCP local server, including DHCPv6 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 responds as though it were 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
```

- For DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
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 77.

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

See “Creating Unique Usernames for DHCP Clients” on page 78.

- Related Topics**
- Extended DHCP Local Server Overview on page 58
 - Extended DHCP Relay Agent Overview on page 94
 - DHCPv6 Local Server Overview on page 63

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, including the DHCPv6 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 the DHCPv6 local server, and 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 58
 - Extended DHCP Relay Agent Overview on page 94
 - DHCPv6 Local Server Overview on page 63
 - Group-Specific DHCP Local Server Options on page 69
 - Group-Specific DHCP Relay Options on page 103

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 121.
- **authentication**—Configure the parameters the router sends to the external AAA server.
- **dynamic-profile**—Specify the dynamic profile that is attached to a group of interfaces.
- **interface**—Specify one or more interfaces, or a range of interfaces, that are within the specified group.
- **overrides**—Override the default configuration settings for the extended DHCP relay agent. For information, see “Overriding the Default DHCP Relay Configuration” on page 104.
- **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 113.

- **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 117.

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 68

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) Enable DHCP relay proxy mode.

See “Enabling DHCP Relay Proxy Mode” on page 122.

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

See “Overwriting giaddr Information” on page 105.

4. (Optional) Replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).

See “Replacing the DHCP Relay Request and Release Packet Source Address” on page 106.

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

See “Overriding Option 82 Information” on page 106.

6. (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 107.

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

See “Trusting Option 82 Information” on page 107.

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

See “Disabling ARP Table Population” on page 71.

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

See “Specifying the Maximum Number of DHCP Clients Per Interface” on page 70.

10. (Optional) Configure client auto logout.

See “DHCP Auto Logout Overview” on page 73.

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

See “Disabling DHCP Relay” on page 109.

This topic contains the following sections:

- Overwriting giaddr Information on page 105
- Replacing the DHCP Relay Request and Release Packet Source Address on page 106
- Overriding Option 82 Information on page 106
- Using Layer 2 Unicast Transmission for DHCP Packets on page 107
- Trusting Option 82 Information on page 107
- Disabling ARP Table Population on page 107
- Specifying the Maximum Number of DHCP Clients Per Interface on page 109
- Disabling DHCP Relay on page 109

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
```

Replacing the DHCP Relay Request and Release Packet Source Address

You can configure the DHCP relay agent to replace request and release packets with the gateway IP address (giaddr) before forwarding the packet to the DHCP server.

To replace the source address with giaddr:

1. Specify that you want to configure override options.

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

2. Specify that you want to replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).

```
[edit forwarding-options dhcp-relay overrides]
user@host# set replace-ip-source-with 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 layer2-unicast-replies
```

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 trust-option-82
```

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 16: 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 17: 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:

- 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
```
- 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 through 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs or DHCPv6 Solicit PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.



NOTE: The maximum number of DHCP (and DHCPv6) 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 DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
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, DHCPv6 local server, and DHCP relay agent all 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 disable-relay
```

DHCP Auto Logout Overview

This topic provides an introduction to the optional DHCP auto logout feature and includes the following sections:

- Auto Logout Overview on page 110
- How DHCP Identifies and Releases Clients on page 110
- Option 60 and Option 82 Requirements on page 111

Auto Logout Overview

Auto logout is an optional configuration for DHCP local server and DHCP relay agent that improves the efficiency of DHCP IP address assignment. Auto logout enables IP addresses to be immediately released and returned to the address pool when the addresses are no longer used by DHCP clients. DHCP can then assign the addresses to other clients. Without auto logout, an IP address is blocked for the entire lease period, and DHCP must wait until the address lease time expires before reusing the address.

Auto logout is particularly useful when DHCP uses long lease times for IP address assignments and to help avoid allocating duplicate IP addresses for a single client. For example, you might have an environment that includes set-top boxes (STB) that are often upgraded or replaced. Each time a STB is changed, the new STB repeats the DHCP discover process to obtain client configuration information and an IP address. DHCP views the new STB as a completely new client and assigns a new IP address—the previous IP address assigned to the client (the old STB) remains blocked and unavailable until the lease expires. If auto logout is configured in this situation, DHCP recognizes that the new STB is actually the same client and then immediately releases the original IP address. DHCP relay agent acts as a proxy client for auto logout and sends a DHCP release message to the DHCP server.

How DHCP Identifies and Releases Clients

The auto logout feature requires that DHCP explicitly identify clients. By default, DHCP local server and DHCP relay agent identify clients based on MAC address or Client Identifier. However, in some cases this type of identification might not be sufficient. For example, in the previous STB example, each STB has a different MAC address, so DHCP incorrectly assumes that an upgraded or replacement STB is a new client.

In order to explicitly identify clients, auto logout uses a secondary identification method when the primary identification method is unsuccessful—the primary method is considered unsuccessful if the MAC address or Client Identifier does not match that of an existing client. The secondary identification method is based on the DHCP option 60 and option 82 information in DHCP discover messages.

Both the primary and secondary identification methods use subnet information to differentiate between clients. The primary identification method differentiates between two clients with the same MAC address (or same Client Identifier) if the clients are on different subnets. Similarly, the secondary identification method considers two clients as different if they have the same option 60 and option 82 information, but different subnets.

DHCP local server and DHCP relay agent perform the following operations when auto logout is enabled and the secondary identification method identifies a duplicate client (that is, the discovery packet is from an existing client).

- DHCP local server immediately releases the existing address.
- DHCP relay agent immediately releases the existing client and then sends a DHCP release packet to the DHCP server. Sending the release packet ensures that DHCP relay and the DHCP server are synchronized.



NOTE: If the DHCP relay agent is in snoop mode, DHCP relay releases the client but does not send a release packet to the DHCP server if the discover packet is for a passive client (a client added as a result of snooped packets) or if the discover packet is a snooped packet.

Option 60 and Option 82 Requirements

DHCP local server requires that the received discover packet include both DHCP option 60 and option 82. If either option is missing, DHCP local server cannot perform the secondary identification method and auto logout is not used.

DHCP relay agent requires that the received discover packet contain DHCP option 60. DHCP relay determines the option 82 value based on the guidelines provided in “DHCP Relay Agent Option 82 Value for Auto Logout” on page 111.

Related Topics

- Automatically Logging Out DHCP Clients on page 74
- DHCP Relay Agent Option 82 Value for Auto Logout on page 111

DHCP Relay Agent Option 82 Value for Auto Logout

Table 18 on page 112 indicates how the DHCP relay agent determines the option 82 value used for the client auto logout feature. Depending on the configuration settings, DHCP relay agent takes the action indicated in the right column.

Table 18: DHCP Relay Agent Option 82 Value for Auto Logout

DHCP Relay Agent Configuration Settings					Action Taken
DHCP Relay Configured with Option 82	Discover Packet Contains Option 82	Override "trust-option-82"	Override "always-write-option-82"	giaddr in non-snooped packet	
No	No	–	–	–	No secondary search performed
No	Yes	Yes	–	–	Use option 82 from packet
No	Yes	No	–	Zero	Drop packet
No	Yes	No	–	Non-zero	Use option 82 from packet
Yes	No	–	–	–	Use configured option 82
Yes	Yes	No	–	Zero	Drop packet
Yes	Yes	No	No	Non-zero	Use option 82 from packet
Yes	Yes	No	Yes	Non-zero	Overwrite the configured option 82
Yes	Yes	Yes	No	–	Use option 82 from packet
Yes	Yes	Yes	Yes	–	Overwrite the configured option 82

- Related Topics**
- DHCP Auto Logout Overview on page 73
 - Automatically Logging Out DHCP Clients on page 74

Automatically Logging Out DHCP Clients

You can configure the extended DHCP local server and extended DHCP relay to automatically log out DHCP clients. Auto logout immediately releases an existing client when DHCP receives a discover packet that has the same DHCP option 60 and DHCP option 82 information as the existing client. DHCP then releases the existing client IP address without waiting for the normal lease expiration.



NOTE: When the existing client is released, the new client undergoes the normal authentication process. The new client might not receive the same IP address as the original client.

To configure DHCP client auto logout:

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. Enable auto logout. (DHCP local server and DHCP relay agent both support the `client-discover-match` statement.)

- For DHCP local server:

```
[edit system services dhcp-local-server overrides]
user@host# set client-discover-match
```

- For DHCP relay:

```
[edit forwarding-options dhcp-relay overrides]
user@host# set client-discover-match
```



NOTE: If you change the auto logout configuration, existing clients continue to use the auto logout setting that was configured when they logged in. New clients use the new setting.

- Related Topics**
- DHCP Auto Logout Overview on page 73
 - Extended DHCP Local Server Overview on page 58
 - Extended DHCP Relay Agent Overview on page 94

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 114.

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 117.

This topic includes the following sections:

- Using Matching Option 60 Strings to Process DHCP Client Traffic on page 114
- Using Nonmatching Option 60 Strings to Process DHCP Client Traffic on page 117
- Displaying a Count of Discarded DHCP Packets with Option 60 Information on page 117

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 121.

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 “Extended DHCP Local Server Overview” on page 58.

- 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 153 and “Example: Using Option 60 Strings to Drop DHCP Client Traffic” on page 155.

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 nonmatching 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 153 and “Example: Using Option 60 Strings to Drop DHCP Client Traffic” on page 155.

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 118.

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

See “Configuring an Option 82 Prefix” on page 119.

4. (Optional) Include the textual description for the interface in the option 82 suboption.

See “Using a Textual Description in Option 82” on page 120.

5. (Optional) To restore the default behavior (option 82 information is not inserted into DHCP packets), delete the **relay-option-82** statement.

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

This topic includes the following sections:

- Configuring Agent Circuit ID Information on page 118
- Configuring an Option 82 Prefix on page 119
- Using a Textual Description in Option 82 on page 120

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:svlan-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 suboption.

```
[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:svlan-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:svlan-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:svlan-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:svlan-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:svlan-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:svlan-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 information.

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

Using a Textual Description in Option 82

By default, when DHCP option 82 is inserted into client packets, the Agent Circuit ID suboption includes the interface identifier. You can optionally configure that the Agent Circuit ID suboption include the textual description that is configured for the interface instead of the interface identifier. You can use the textual description for either the logical interface or the device interface.

You can include the textual interface description in the Agent Circuit ID suboption for static interfaces. The textual description is configured using the **description**

statement at the [edit interfaces *interface-name*] hierarchy level. If you specify that the textual description is used and no description is configured for the interface, DHCP relay defaults to using the interface identifier.

To configure the DHCP relay option 82 suboption to include the textual interface description:

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 information.

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

3. Specify that the textual description is included in the option 82 information. In this example, the option 82 information includes the description used for the device interface.

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

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.

Enabling DHCP Relay Proxy Mode

You can enable DHCP relay proxy mode on all interfaces or a group of interfaces.

To enable DHCP relay proxy mode:

1. Specify that you want to configure override options.

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

2. Enable DHCP relay proxy mode.

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

- Related Topics**
- DHCP Relay Proxy Overview on page 96
 - Overriding the Default DHCP Relay Configuration on page 104

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 123
- Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces on page 123

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 **aggregate-clients** option does not apply to IP demux subscriber interfaces. The two options are mutually exclusive.

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

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

- To use the primary dynamic profile:

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

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

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 68.

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 **aggregate-clients** option does not apply to IP demux subscriber interfaces. The two options are mutually exclusive.

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

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

- To use the primary dynamic profile:

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

- Related Topics**
- Dynamic Profiles Overview on page 467
 - Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64
 - Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 548

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 88.

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

See “Configuring the Number and Size of Extended DHCP Log Files” on page 89.

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

See “Configuring Access to the Extended DHCP Log File” on page 89.

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

See “Configuring a Regular Expression for Extended DHCP Lines to Be Logged” on page 90.

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

See “Configuring the Extended DHCP Tracing Flags” on page 90.

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

- Configuring the Extended DHCP Log Filename on page 126
- Configuring the Number and Size of Extended DHCP Log Files on page 126
- Configuring Access to the Extended DHCP Log File on page 127
- Configuring a Regular Expression for Extended DHCP Lines to Be Logged on page 127
- Configuring the Extended DHCP Tracing Flags on page 128

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
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

Configuring PPP for Subscriber Access

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 129
- Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130
- Configuring Dynamic Access Routes for Subscriber Management on page 131
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132
- Verifying and Managing PPP Configuration for Subscriber Management on page 132
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 133

Dynamic Profiles for PPP Subscriber Interfaces Overview

Subscriber management PPP support enables you to create and attach dynamic profiles for PPP subscriber interfaces. When the PPP subscriber logs in, the router instantiates the specified dynamic profile and then applies the services defined in the profile to the interface.

Dynamic profiles are used for both static and dynamic PPP interfaces. For static PPP interfaces, you use the CLI to attach dynamic profiles, which specify PPP options. For dynamic PPP interfaces, the dynamic profile creates the interface, including the PPP options.



NOTE: Dynamically-created interfaces are supported only on PPPoE interfaces.

Unlike traditional PPP support, subscriber management does not allow bi-directional PPP authentication—authentication is performed only by the router, never by the remote peer. Also, other PPP options, which are mandatory for a traditional PPP interface configuration, are not used by subscriber management. When you configure PPP options for a dynamic profile, you can configure either CHAP or PAP authentication. You do not configure any additional options under either the CHAP or PAP stanza.

Related Topics

- Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

- Example: Minimum PPPoE Dynamic Profile on page 492
- Verifying and Managing PPP Configuration for Subscriber Management on page 132

Creating Dynamic Profiles for PPP Subscriber Interfaces

This topic describes how to create a dynamic profile that enables PPP clients to dynamically access the network.

To configure a dynamic profile for PPP subscriber interfaces:

1. Name the dynamic profile.

```
[edit]
user@host# edit dynamic-profiles vod-profile-25
```

2. Configure the interfaces and unit for the dynamic profile.

```
[edit dynamic-profiles vod-profile-25]
user@host# edit interfaces pp0 unit $junos-interface-unit
```

3. Configure PPP options.

```
[edit dynamic-profiles vod-profile-25 interfaces pp0 unit "$junos-interface-unit"]
user@host# edit interfaces pp0 unit 0 ppp-options
```

4. Specify the authentication protocol used in the dynamic profile. You can configure either CHAP or PAP. You do not configure any additional options for either protocol.

```
[edit dynamic-profiles vod-profile-25 interfaces pp0 unit "$junos-interface-unit"
 ppp-options]
user@host# set chap
```

Related Topics

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 129
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132
- Dynamic Profiles Overview on page 467
- Configuring a Basic Dynamic Profile on page 481
- Example: Minimum PPPoE Dynamic Profile on page 492
- Verifying and Managing PPP Configuration for Subscriber Management on page 132

Configuring Dynamic Access Routes for Subscriber Management

You can dynamically configure access routes for DHCP and PPP subscribers based on the values specified in RADIUS Framed-Route Attribute [22].

To dynamically configure access routes:

1. Configure the route prefix for the access route as a variable.

```
[edit dynamic-profiles profile-name routing-options]
user@host# edit access route $junos-framed-route-ip-address-prefix
```

2. Configure the next-hop address as a variable.

```
[edit dynamic-profiles profile-name routing-options access route
"$junos-framed-route-ip-address-prefix"]
user@host# set next-hop $junos-framed-route-nexthop
```

3. Configure the metric as a variable.

```
user@host# set metric $junos-framed-route-cost
```

4. Configure the preference as a variable.

```
user@host# set preference $junos-framed-route-distance
```

- Related Topics**
- Access and Access-Internal Routes for Subscriber Management on page 15
 - RADIUS IETF Attributes Supported by the AAA Service Framework on page 35
 - Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
 - Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131
 - Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 99

Configuring Dynamic Access-Internal Routes for PPP Subscriber Management

You can dynamically configure access-internal routes for PPP subscribers. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes Attribute [22], values from the access-internal variables are used instead.

For PPP subscriber interfaces, you do not need to specify the MAC address for access-internal routes.

To dynamically configure access-internal routes for PPP:

1. Specify that you want to configure the access-internal route.

```
user@host# edit dynamic-profiles profile-name routing-options
```

2. Specify the IP address as a variable.

```
[edit dynamic-profiles profile-name routing-options]
user@host# edit access-internal route $junos-subscriber-ip-address
```

3. Specify the qualified-next-hop as a variable.

```
[edit dynamic-profiles profile-name routing-options access-internal route
$junos-subscriber-ip-address]
user@host# set qualified-next-hop $junos-interface-name
```

- Related Topics**
- Access and Access-Internal Routes for Subscriber Management on page 15
 - Configuring Dynamic Access Routes for Subscriber Management on page 97
 - Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 99

Attaching Dynamic Profiles to Static PPP Subscriber Interfaces

You can attach a dynamic profile to a static PPP subscriber interface. When a PPP subscriber logs in, the specified dynamic profile is instantiated and the services defined in the profile are applied to the interface.

To attach a dynamic profile to a static PPP subscriber interface:

1. Specify that you want to configure PPP options.

```
[edit interfaces pp0 unit 0]
user@host# edit ppp-options
```

2. Specify the dynamic profile you want to associate with the interface.

```
[edit interfaces pp0 unit 0 ppp-options]
user@host# set dynamic-profile vod-profile-50
```

- Related Topics**
- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 129
 - Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130
 - Dynamic Profiles Overview on page 467
 - Configuring a Basic Dynamic Profile on page 481
 - Example: Minimum PPPoE Dynamic Profile on page 492
 - Verifying and Managing PPP Configuration for Subscriber Management on page 132

Verifying and Managing PPP Configuration for Subscriber Management

Purpose View or clear information about PPP configuration for subscriber management.

Action ■ To display information about PPP interfaces:

user@host> **show ppp interface**

- To display PPP statistics information:

user@host> **show ppp statistics**

- To display PPP session summary information:

user@host> **show ppp summary**

- Related Topics**
- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 129
 - For more information, see the *JUNOS System Basics and Services Command Reference*

Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management

Purpose View configuration information for access routes and access-internal routes on DHCP and PPP subscribers.

Action ■ To display extensive information about access routes and access-internal routes:

user@host>**show route extensive**

- To display the configuration for access routes:

user@host>**show route protocol access**

- To display the configuration for access-internal routes:

user@host> **show route protocol access-internal**

- Related Topics**
- Configuring Dynamic Access Routes for Subscriber Management on page 97
 - Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98
 - Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131

Chapter 8

Configuring Subscriber Secure Policy Traffic Mirroring

- Subscriber Secure Policy Overview on page 136
- Subscriber Secure Policy Licensing Requirements on page 137
- Subscriber Secure Policy Traffic Mirroring Architecture on page 137
- RADIUS Attributes Used for Subscriber Secure Policy on page 140
- Configuring Subscriber Secure Policy Mirroring Overview on page 142
- Guidelines for Configuring Subscriber Secure Policy Mirroring on the Flow-Tap Service on page 143
- Configuring Flow-Tap Service Support for Subscriber Secure Policy Mirroring on page 144
- Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring on page 145
- Terminating Subscriber Secure Policy Mirroring Sessions on page 146

Subscriber Secure Policy Overview

Subscriber secure policy provides RADIUS-initiated traffic mirroring on a per-subscriber basis. RADIUS-initiated mirroring creates secure policies based on certain RADIUS VSAs and uses RADIUS attributes to identify the subscriber whose traffic is to be mirrored. The traffic mirroring operation is triggered by the attributes received in RADIUS messages. Both the subscriber's ingress and egress traffic are mirrored. The original traffic is sent to its intended destination and the mirrored traffic is sent to a mediation device for analysis.

There are two variations of RADIUS-initiated mirroring. For both types, the mirroring operation is initiated without regard to the subscriber location, router, interface, or type of traffic.

- **Subscriber log in**—The mirroring operation starts when the subscriber logs in and the trigger is received in a RADIUS Access-Accept message. Using triggers in RADIUS Access-Accept messages enables you to mirror per-subscriber traffic without regard to how often the subscriber logs in or out, or which router or interface the subscriber uses.
- **In-session**—The mirroring operation starts when the trigger is received in a RADIUS Change-of-Authorization-Request (CoA-Request) message. Using triggers in CoA messages enables you to immediately mirror traffic of a subscriber who is already logged in.

Configuration of RADIUS-based mirroring is independent of the actual mirroring session—you can configure the mirroring parameters at any time. Also, you can use a single RADIUS server to provision mirroring operations on multiple routers in a service provider's network. To provide security, the ability to configure, access, and view the subscriber secure policy components and configuration is restricted to authorized users. The actual mirroring operation is transparent to subscribers whose traffic is being mirrored.

Traffic mirroring has many uses, such as debugging network problems, troubleshooting specific user issues, and lawful intercept. For example, you might use RADIUS-based mirroring when debugging network problems related to mobile users, who do not always log in to the same router. RADIUS-based mirroring is particularly useful for large networks, in which you can use a single RADIUS server to provision the mirroring operation.

Subscriber Secure Policy Terms

Table 19 on page 137 defines terms that are used in the discussion of subscriber secure policy.

Table 19: Subscriber Secure Policy Terms

Term	Definition
Flow-tap service	The application that extends the Dynamic Tasking Control Protocol (DTCP) for active traffic monitoring. The subscriber secure policy service runs on top of the flow-tap service.
Intercept access point	Device that requests and configures the subscriber secure policy service. The Juniper Networks router performs this function.
Mediation device	Location to which the mirrored traffic is sent. Also called an analyzer device.
Mirrored subscriber	Subscriber whose traffic is mirrored.
Mirror trigger	RADIUS attribute that identifies a subscriber whose traffic is to be mirrored. Mirroring starts when the trigger is detected.
Requesting authority	Authorized group that requests or conducts traffic mirroring.
Salt encryption	Random string of data used to modify a password hash. The mirroring VSAs sent to the router by the RADIUS server are Salt-encrypted.
Target system	The system on which the subscriber secure policy service (and flow-tap service) is configured.

- Related Topics**
- Subscriber Secure Policy Traffic Mirroring Architecture on page 137
 - RADIUS Attributes Used for Subscriber Secure Policy on page 140
 - Configuring Subscriber Secure Policy Mirroring Overview on page 142
 - Subscriber Secure Policy Licensing Requirements on page 137

Subscriber Secure Policy Licensing Requirements

To enable and use subscriber secure policy, you must install and properly configure the Subscriber Secure Policy license.

- Related Topics**
- For information about installing and managing JUNOS licenses, see the “Installing and Managing JUNOS Licenses” chapter of the *JUNOS Software Installation and Upgrade Guide*

Subscriber Secure Policy Traffic Mirroring Architecture

This topic describes the subscriber secure policy architecture and includes a description of how mirrored traffic flows within the subscriber secure policy environment.

Figure 4 on page 138 illustrates the subscriber secure policy mirroring environment. The Juniper Networks router, functioning as an intercept access point, is the center piece of the subscriber secure policy architecture. The figure indicates the sequence

of events that are performed to configure mirroring operations and the traffic flow that occurs during mirroring. The tables after the figure describe the events indicated by the figure. Table 20 on page 138 describes the configuration sequence. Table 21 on page 139 and Table 22 on page 139 describe the sequence of events that occur during mirroring operations.



NOTE: A special UDP/IP header is prepended to each mirrored packet sent to the mediation device. The prepended header is used as a demultiplexer, enabling the mediation device to differentiate the multiple mirrored streams that arrive from different sources.

Figure 4: Subscriber Secure Policy Architecture

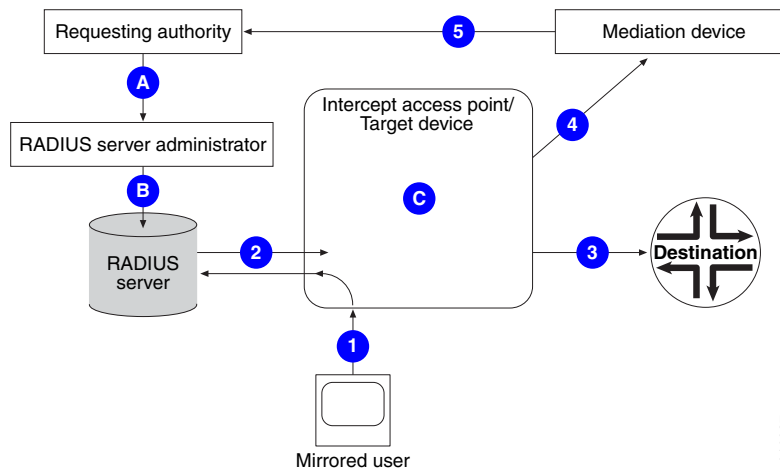


Table 20 on page 138 lists the high-level steps that are required to configure the subscriber secure policy traffic mirroring environment.

Table 20: Subscriber Secure Policy Configuration Steps

Step	Description
A	An authorized individual or group requests traffic mirroring. This group also ensures that the mediation device is configured to receive and analyze mirrored traffic.
B	The RADIUS server administrator configures the subscriber RADIUS record to include the mirroring-related RADIUS attributes and VSAs.
C	The Juniper Networks router administrator configures the subscriber secure policy service on the router, including the flow-tap service configuration, RADIUS server information, and mediation device information.

Table 21 on page 139 shows the process for a subscriber login mirroring operation, which is initiated when the mirrored subscriber logs in.

Table 21: RADIUS-Initiated Mirroring at Subscriber Login

Step	Description
1	The subscriber logs in, requesting authentication by the RADIUS server.
2	<ul style="list-style-type: none"> ■ The RADIUS server authenticates the subscriber and sends an Access-Accept message containing the mirroring-related RADIUS attributes and VSAs to the router (intercept access point). ■ The mirroring trigger in the RADIUS Access-Accept message initiates the mirroring operation. ■ The intercept access point creates the subscriber secure policy based on the mirroring VSAs and begins mirroring the subscriber's traffic.
3	The intercept access point sends the original subscriber traffic to its intended destination.
4	The intercept access point sends the mirrored subscriber traffic to the mediation device.
5	The mediation device provides information about the mirrored traffic to the requesting authority.

Table 22 on page 139 shows the mirroring procedure for an in-session mirroring operation, in which the subscriber is already logged in.

Table 22: RADIUS-Initiated Mirroring for Current Subscriber

Step	Description
1	The subscriber logs in, requesting authentication by the RADIUS server. The RADIUS server authenticates the subscriber (no mirroring activity occurs).
2	<ul style="list-style-type: none"> ■ Subscriber-based mirroring is later requested by the requesting authority and then enabled on the RADIUS server. ■ The RADIUS server sends a CoA message containing the mirroring-related RADIUS attributes and VSAs to the router (intercept access point). ■ The mirroring trigger in the RADIUS CoA message initiates the mirroring operation. ■ The intercept access point creates the subscriber secure policy based on the mirroring VSAs and immediately begins mirroring subscriber traffic.
3	The intercept access point sends the original subscriber traffic to its intended destination.
4	The intercept access point sends the mirrored subscriber traffic to the mediation device.
5	The mediation device provides information about the mirrored traffic to the requesting authority.

- Related Topics**
- Subscriber Secure Policy Overview on page 136
 - RADIUS Attributes Used for Subscriber Secure Policy on page 140
 - Configuring Subscriber Secure Policy Mirroring Overview on page 142

RADIUS Attributes Used for Subscriber Secure Policy

Subscriber secure policy mirroring triggers are RADIUS attributes that identify a subscriber whose traffic is to be mirrored. The actual traffic mirroring session starts when the router (intercept access point) receives a RADIUS packet that contains a trigger and then applies the subscriber secure policy configuration to the appropriate interface.

The router receives subscriber secure policy triggers in the following types of RADIUS messages:

- RADIUS Access-Accept—Used to start a mirroring session when the specified subscriber logs in.
- RADIUS Change-of-Authorization-Request (CoA-Request)—Used to immediately begin mirroring traffic of the specified subscriber, who is already logged in.

Table 23 on page 140 lists the mirroring triggers that the RADIUS server administrator adds to the RADIUS record of the subscriber whose traffic is to be mirrored. In addition, the RADIUS VSAs listed in Table 24 on page 141 must be included in the mirrored subscriber's RADIUS record.

RADIUS Attributes Used as Traffic Mirroring Triggers

Table 23 on page 140 lists the subscriber secure policy mirroring triggers (RADIUS attributes) that can be present in RADIUS Access-Accept and CoA messages. The attributes identify the subscriber whose traffic is to be mirrored.

Table 23: RADIUS Attributes Used as Traffic Mirroring Triggers

Attribute Number	Attribute Name
[1]	User-Name
[8]	Framed-IP-Address
[31]	Calling-Station-ID
[44]	Acct-Session-ID
[87]	Nas-Port-ID

RADIUS-Based Mirroring Attributes

Table 24 on page 141 lists the RADIUS VSAs that you must include in the RADIUS record of the subscriber whose traffic is to be mirrored. The VSAs carry mirroring-related information.

The AAA Service Framework uses vendor ID 4874, which is assigned to Juniper Networks by the Internet Assigned Numbers Authority (IANA).



NOTE: VSA 26-10 uses vendor ID 2636.

Table 24: RADIUS-Based Mirroring Attributes

Attribute Number	Attribute Name	Description	Value
[26-10] This attribute uses vendor ID 2636.	Juniper-User-Permissions	Information that specifies user permissions. This attribute is used only in Access-Accept packets.	String
[26-58]	LI-Action	Traffic mirroring action	<ul style="list-style-type: none"> ■ 0 = stop mirroring ■ 1 = start mirroring ■ 2 = no action
[26-59]	Med-Dev-Handle	Link to which traffic mirroring is applied	Salt-encrypted string
[26-60]	MD-Ip-Address	IP address of mediation device to which mirrored traffic is forwarded	Salt-encrypted IP address
[26-61]	MD-Port-Number	UDP port in the mediation device to which mirrored traffic is forwarded	Salt-encrypted integer

Considerations When Using RADIUS Attributes for Subscriber Secure Policy

When using RADIUS attributes and VSAs for the subscriber secure policy service, keep the following considerations in mind:

- A dynamic profile must exist for a subscriber whose traffic is to be mirrored. Otherwise, the subscriber is unable to log in when the mirroring-related VSAs are received in RADIUS Access-Accept or CoA messages. See “Dynamic Profiles Overview” on page 467 for information about dynamic profiles.
- VSA 26-60 must always be present in the RADIUS Access-Accept or CoA message, or the instantiation of the mirroring session will fail. The presence of VSA 26-60 triggers the prepending operation—all mirrored packets must be prepended with both the UDP/IP header and the MD header.
- VSA 26-58 (LI-Action) specifies the action taken by the router. The action differs if the VSA is received in an Access-Accept message or a CoA message, as indicated in Table 25 on page 142.

Table 25: LI-Action VSA Action

LI-Action Value	Access-Accept Message Action	CoA Message Action
0	Prevents subscriber from logging in	Immediately stops mirroring subscriber traffic; subscriber remains logged in
1	Starts mirroring subscriber traffic when subscriber logs in	Immediately starts mirroring subscriber traffic
2	No action	No action

- A VSA 26–58 value of 2 specifies that the router does not perform any traffic mirroring-related action. This setting can provide additional security by confusing unauthorized users who attempt to access traffic mirroring communication between the router and the RADIUS server.

Related Topics

- Subscriber Secure Policy Overview on page 136
- Subscriber Secure Policy Traffic Mirroring Architecture on page 137
- Configuring Subscriber Secure Policy Mirroring Overview on page 142
- Dynamic Profiles Overview on page 467
- Example: Subscriber Secure Policy Dynamic Profile on page 493

Configuring Subscriber Secure Policy Mirroring Overview

You can configure subscriber secure policy mirroring to mirror the traffic of a particular subscriber.



NOTE: Subscriber secure policy RADIUS-initiated mirroring runs on the flow-tap service infrastructure. To configure the subscriber secure policy service, you must have the same privileges that are required to configure the flow-tap service.

To configure the subscriber secure policy service:

1. Configure the flow-tap service.

See the *JUNOS Services Interfaces Configuration Guide* for information about configuring the flow-tap service.

2. Configure additional secure subscriber policy support for the flow-tap service. This support includes configuring the tunnels and optional forwarding-class information that the subscriber secure policy service uses to send mirrored traffic to the content destination device.

See “Configuring Flow-Tap Service Support for Subscriber Secure Policy Mirroring” on page 144.

3. Configure an access profile that specifies the RADIUS-related support for subscriber secure policy on the router, including a list of one or more RADIUS authentication servers. The router uses the list of specified servers for both authentication and dynamic request operations. You must also configure the RADIUS dynamic request feature, which provides the CoA message support used in-session traffic mirroring.

See “Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring” on page 145.

See “Using RADIUS Dynamic Requests for Subscriber Access Management” on page 30.

4. Ensure that the following support is also configured:
 - The RADIUS record of the mirrored subscriber must include the RADIUS attributes and VSAs required for subscriber secure policy mirroring. See “RADIUS Attributes Used for Subscriber Secure Policy” on page 140 for descriptions of the supported attributes used in RADIUS Accept-Accept and CoA messages.
 - The content destination device must be configured to accept the mirrored data from the mediation device.

The descriptions of these configurations are beyond the scope of this document.

5. You can terminate an active subscriber mirroring session at any time. See “Terminating Subscriber Secure Policy Mirroring Sessions” on page 146.



NOTE: The subscriber secure policy feature requires some system resources while mirroring, encrypting, and sending traffic to the mediation device. We recommend that you consider this requirement when you configure subscriber secure policy. For example, you might elect to use a 10-Gigabit Ethernet interface for the tunnel and mediation device if you expect the amount of traffic you plan to mirror to approach 1 Gps of actual user data.

-
- Related Topics**
- RADIUS Attributes Used for Subscriber Secure Policy on page 140
 - Terminating Subscriber Secure Policy Mirroring Sessions on page 146

Guidelines for Configuring Subscriber Secure Policy Mirroring on the Flow-Tap Service

The subscriber secure policy service runs on the flow-tap service infrastructure. When configuring subscriber secure policy mirroring, consider the following guidelines regarding the relationship between subscriber secure policy service and the flow-tap service:

- Subscriber secure policy inherits the limitations of the flow-tap service. For example, port mirroring and the flow-tap service cannot run simultaneously on the router. Therefore, port mirroring and subscriber secure policy mirroring cannot run simultaneously on the same router.
- You can configure one instance of the flow-tap service on the router. Both subscriber secure policy RADIUS-initiated mirroring and DTCP-initiated mirroring use the flow-tap service.
- If you configure both RADIUS-initiated mirroring and DTCP-initiated mirroring, and the two mirroring requests are the same, duplicate mirrored traffic is sent to the mediation device.
- You cannot delete the flow-tap service configuration while a subscriber secure policy mirroring session is active on the service.

Related Topics

- Subscriber Secure Policy Overview on page 136
- Configuring Subscriber Secure Policy Mirroring Overview on page 142
- Configuring Flow-Tap Service Support for Subscriber Secure Policy Mirroring on page 144

Configuring Flow-Tap Service Support for Subscriber Secure Policy Mirroring

The RADIUS-initiated mirroring provided by the subscriber secure policy service runs on the flow-tap service infrastructure. This topic describes the steps to enable flow-tap support for subscriber secure policy mirroring.



NOTE: To configure the subscriber secure policy service, you must have the same privileges that are required to configure the flow-tap service.

To configure the flow-tap service to support subscriber secure policy mirroring:

1. Configure the standard flow-tap service.

```
[edit services]
user@host# set flow-tap interface sp-1/2/0.100
```

See “Flow-Tap Configuration Guidelines” in the *JUNOS Services Interfaces Configuration Guide* for details on configuring the flow-tap service.

2. Allocate a pool of tunnel interfaces that the flow-tap service can use for subscriber secure policy mirroring. The intercept access point uses these interfaces to send mirrored traffic to the mediation device. The intercept access point equally distributes the mirrored traffic across the available tunnel interfaces.

You can configure a maximum of 2048 mirrored subscriber sessions per chassis.

```
[edit chassis]
user@host# set fpc 4 pic 1 tunnel-services bandwidth 1g
```

3. Configure the tunnel interfaces.

```
[edit interfaces]
user@host# set vt-4/1/10.0
user@host# set vt-4/2/10.0
```

4. Assign the tunnel interfaces that the flow-tap service uses for RADIUS-initiated subscriber secure policy mirroring.



NOTE: If a currently used tunnel interface is deleted from the pool of interfaces, the subscriber secure policy service redistributes the active mirroring sessions from the deleted interface to other tunnel interfaces in the pool. Also, when a new tunnel interface is added into the pool, the service adds the new interface to the list of available interfaces—the new interface is used for new mirroring sessions or for existing sessions transferred from a failed interface.

```
[edit services]
user@host# set radius-flow-tap interfaces vt-4/1/10.0
user@host# set radius-flow-tap interfaces vt-4/2/10.0
```

5. Specify the source IP address that the flow-tap service uses for RADIUS-initiated mirroring. This address is used in the IP header prepended to mirrored packets that are sent to the content destination device.

```
[edit services]
user@host# set radius-flow-tap source-ipv4-address 192.168.100.33
```

6. (Optional) Specify the forwarding class that is applied to the mirrored packets sent to the mediation device.

If you do not specify a forwarding class, the mirrored packets inherit the forwarding class from the original packet (which is the forwarding class set by default classification that CoS applies to the packet on the ingress interface).

```
[edit services]
user@host# set radius-flow-tap forwarding-class best-effort
```

- Related Topics**
- Subscriber Secure Policy Overview on page 136
 - Configuring Subscriber Secure Policy Mirroring Overview on page 142
 - Guidelines for Configuring Subscriber Secure Policy Mirroring on the Flow-Tap Service on page 143

Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring

This topic describes how to configure RADIUS server support for the subscriber secure policy service. The RADIUS server can then initiate subscriber-based traffic mirroring. You create an access profile to specify the RADIUS server support.

To configure the router's interaction with the RADIUS server in support of subscriber secure policy mirroring:

1. Create the access profile and assign a name.

```
[edit access]
user@host# edit profile ssp-server
```

2. Specify RADIUS as the authentication method.

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

3. Specify the IP address of the RADIUS server that performs authentication. This server also performs dynamic request (CoA) functions.

```
[edit access profile ssp-server]
user@host# set radius authentication-server 192.168.53.105
```

4. Specify the secret to use when communicating with the RADIUS server.

```
[edit access profile ssp-server]
user@host# set radius-server 192.168.53.105 secret mysecret42
```

5. Specify other optional RADIUS configuration settings as needed, such as accounting support.

- Related Topics**
- Subscriber Secure Policy Overview on page 136
 - Configuring Subscriber Secure Policy Mirroring Overview on page 142
 - RADIUS Attributes Used for Subscriber Secure Policy on page 140

Terminating Subscriber Secure Policy Mirroring Sessions

This topic describes how active subscriber secure policy mirroring operations might be terminated. The RADIUS-initiated mirroring sessions can be explicitly terminated upon receipt of a RADIUS dynamic request or passively terminated as a result of a timeout or disconnection.

A RADIUS-initiated traffic mirroring session is terminated by the following actions:

- RADIUS CoA message receipt—Mirroring is terminated upon receipt of a CoA message with a VSA 26-58 (LI-Action) value of 0. The RADIUS administrator configures the LI-Action of 0 in the mirrored subscriber's RADIUS record.
- Subscriber logout—Mirroring is terminated when the mirrored subscriber logs out.
- Session timeout—Mirroring is terminated when the current subscriber session times out.
- Session disconnect—Mirroring is terminated when the current subscriber session is disconnected.

- Related Topics**
- Subscriber Secure Policy Overview on page 136
 - Configuring Subscriber Secure Policy Mirroring Overview on page 142
 - RADIUS Attributes Used for Subscriber Secure Policy on page 140

Chapter 9

AAA and Remote Subscriber Access Configuration Examples

- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 147
- Example: Configuring an Address-Assignment Pool on page 149
- Example: Minimum Extended DHCP Local Server Configuration on page 150
- Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 150
- Example: Minimum DHCP Relay Agent Configuration on page 151
- Example: DHCP Relay Agent Configuration with Multiple Clients and Servers on page 151
- Example: Extended DHCPv6 Local Server Configuration on page 152
- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 153
- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 155

Example: Configuring RADIUS-Based Subscriber Authentication and Accounting

This example shows a 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;
      client-accounting-algorithm round-robin
      client-authentication-algorithm round-robin
      nas-identifier 56;
    }
    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;
        }
    }
}

```

Related Topics ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19

Example: Configuring an Address-Assignment Pool

This example shows an IPv4 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 sval6.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 IPv4 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.

- Related Topics**
- Address-Assignment Pools Overview on page 47
 - Configuring Address-Assignment Pools on page 48

Example: Minimum Extended DHCP Local Server Configuration

This example shows the minimum configuration you need to use for 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**.

- Related Topics**
- Extended DHCP Local Server Overview on page 58

Example: Extended DHCP Local Server Configuration with Optional Pool Matching

This example shows an extended DHCP local server configuration that includes optional IPv4 address-assignment pool matching and interface groups. For pool matching, this configuration specifies that the DHCP local server first check the response from an external authentication authority (for example, RADIUS) and use the Framed-IPv6-Pool attribute to determine the address-assignment pool to use for the client address. If no external authority match is found, the DHCP local server then uses **ip-address-first** matching together with the option 82 information to match the named address range for client IPv4 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 {
    external-authority
    ip-address-first;
    option-82;
  }
}
```

- Related Topics**
- Extended DHCP Local Server Overview on page 58

- Address-Assignment Pools Overview on page 47

Example: Minimum DHCP Relay Agent Configuration

This 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`.

- Related Topics**
- Extended DHCP Relay Agent Overview on page 94

Example: DHCP Relay Agent Configuration with Multiple Clients and Servers

This example shows an extended DHCP relay agent configuration for a network that includes multiple DHCP clients and DHCP servers. Additional details follow 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.

Related Topics ■ Extended DHCP Relay Agent Overview on page 94

Example: Extended DHCPv6 Local Server Configuration

This example shows a sample extended DHCPv6 local server configuration. The second part of the example shows a sample RADIUS authentication configuration—authentication must be configured for DHCPv6 local server operations.

```

[edit system services]
dhcp-local-server {
    dhcpv6 {

```

```

authentication {
    password v679M8vt;
    username-include {
        user-prefix wallybrown;
        domain-name isp55.com;
    }
}
group group_two {
    authentication {
        password P$55qw4$$;
        username-include {
            user-prefix south5;
            domain-name isp55.com;
        }
    }
}
interface ge-1/0/3.0;
}
}
}

```

The following is a sample RADIUS authentication configuration.

```

[edit access]
radius-server {
    192.168.1.250 {
        port 1812;
        secret &tIUeI*7688+;
    }
}
profile isp-bos-metro-fiber-basic {
    accounting-order radius;
    authentication-order radius;
    radius {
        authentication-server 192.168.1.250;
        accounting-server 192.168.1.250;
    }
    accounting {
        order radius;
        accounting-stop-on-failure;
        accounting-stop-on-access-deny;
        update-interval 10;
        statistics time;
    }
}
}

```

Related Topics ■ DHCPv6 Local Server Overview on page 63

Example: Using Option 60 Strings to Forward DHCP Client Traffic

This example 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.

Related Topics ■ Extended DHCP Relay Agent Overview on page 94

- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

Example: Using Option 60 Strings to Drop DHCP Client Traffic

This example 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**.

- Related Topics**
- Extended DHCP Relay Agent Overview on page 94
 - Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

Chapter 10

Summary of AAA and Remote Subscriber Access Statements

access

Syntax access {
 route *prefix* {
 next-hop *next-hop*;
 metric *route-cost*;
 preference *route-distance*;
 }

Hierarchy Level [edit dynamic-profiles routing-options]

Release Information Statement introduced in JUNOS Release 9.5.

Description Dynamically configure access routes.

Options 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 Access Routes for Subscriber Management on page 97

access-internal

Syntax `access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }`

Hierarchy Level [edit dynamic-profiles routing-options]

Release Information Statement introduced in JUNOS Release 9.5.

Description Dynamically configure access-internal routes. Access-internal routes are optional, but are used instead of access routes if the next-hop address is not specified in the Framed-Route Attribute [22].

Options 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 Access-Internal Routes for DHCP Subscriber Management on page 98
 ■ Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131

accounting

Syntax accounting {
 accounting-stop-on-access-deny;
 accounting-stop-on-failure;
 coa-immediate-update;
 immediate-update;
 order [*accounting-method*];
 statistics (time | volume-time);
 update-interval *minutes*;
 }

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

Release Information Statement introduced in JUNOS Release 9.1.
 Statement introduced in JUNOS Release 9.1 for EX Series switches.

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 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
 ■ Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21

accounting-port

Syntax	<code>accounting-port <i>port-number</i>;</code>
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4.
Description	Configure the port number on which to contact the accounting server.
Options	<i>port-number</i> —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	<ul style="list-style-type: none">■ Configuring Router or Switch Interaction with RADIUS Servers on page 19■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20■ Configuring RADIUS Authentication for L2TP

accounting-server

Syntax	accounting-server [<i>ip-address</i>];
Hierarchy Level	[edit access profile <i>profile-name</i> radius]
Release Information	Statement introduced in JUNOS Release 9.1.
Description	Specify a list of the RADIUS accounting servers used for accounting for DHCP, L2TP, and PPP clients.
Options	<i>ip-address</i> —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	<ul style="list-style-type: none"> ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-session-id-format

Syntax	accounting-session-id-format (decimal description);
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure the format the router or switch uses to identify the accounting session.
Default	decimal
Options	decimal—Use the decimal format. description—Use the generic format, in the form: <i>jnpr interface-specifier:subscriber-session-id</i> .
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring RADIUS Server Options for Subscriber Access on page 25 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-stop-on-access-deny

Syntax	accounting-stop-on-access-deny;
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure RADIUS accounting to send an Acct-Stop message when the AAA server refuses a client request for access.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-stop-on-failure

Syntax	accounting-stop-on-failure;
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
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	■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

active-server-group

Syntax	<code>active-server-group server-group-name;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay], [edit forwarding-options dhcp-relay group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 8.3.
Description	<p>Apply a DHCP relay agent configuration to the named group of DHCP server addresses.</p> <p>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 <i>group-name</i>] hierarchy level as a DHCP relay agent configuration option that applies only to a named group of interfaces.</p> <p>Including the active-server-group statement at the [edit forwarding-options dhcp-relay group <i>group-name</i>] 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.</p>
Options	<i>server-group-name</i> —Name of the group of DHCP server addresses to which the DHCP relay agent configuration applies.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	■ Extended DHCP Relay Agent Overview on page 94

address-assignment (Address-Assignment Pools)

Syntax

```

address-assignment {
  pool pool-name {
    family family {
      dhcp-attributes {
        protocol-specific attributes;
      }
      host hostname {
        hardware-address mac-address;
        ip-address ip-address;
      }
      network ip-prefix/<prefix-length>;
      prefix ipv6-prefix;
      range range-name {
        high upper-limit;
        low lower-limit;
        prefix-length prefix-length;
      }
    }
  }
}

```

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

- Address-Assignment Pools Overview on page 47
- Configuring Address-Assignment Pools on page 48

aggregate-clients

Syntax	aggregate-clients (merge replace);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit system services dhcp-local-server dynamic-profile <i>profile-name</i>]</p> <p>[edit system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>merge and replace options were added in JUNOS Release 9.5.</p>
Description	<p>Specify that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple client sessions exist on the same underlying VLAN.</p> <p>Not supported for IP demux subscriber interfaces.</p>
Options	<p>merge—Aggregate multiple clients attributes for the same subscriber (logical interface)</p> <p>replace—Replace the entire logical interface whenever a new client logs into the network using the same VLAN logical interface</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

aggregate-clients

Syntax	aggregate-clients (merge replace);
Hierarchy Level	<p>[edit forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>merge and replace options were added in JUNOS Release 9.5.</p>
Description	<p>Specify that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple client sessions exist on the same underlying VLAN.</p> <p>Not supported for IP demux subscriber interfaces.</p>
Options	<p>merge—Aggregate multiple client attributes for the same subscriber (logical interface)</p> <p>replace—Replace the entire logical interface whenever a new client logs into the network using the same VLAN logical interface</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

always-write-giaddr

Syntax	always-write-giaddr;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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 58

always-write-option-82

Syntax	always-write-option-82;
Hierarchy Level	<p>[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides]</p>
Release Information	Statement introduced in JUNOS Release 8.3.
Description	<p>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:</p> <ul style="list-style-type: none"> ■ 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	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Local Server Overview on page 58

attempts

Syntax	<code>attempts attempt-count;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit system services dhcp-local-server reconfigure],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> reconfigure]</p>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure how many attempts are made to reconfigure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces before reconfiguration is considered to have failed. A group configuration takes precedence over a DHCP local server configuration.
Options	<p><i>attempt-count</i>—Maximum number of attempts.</p> <p>Range: 1 through 10</p> <p>Default: 8</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82 ■ Configuring Dynamic Reconfiguration Attempts for DHCP Clients on page 83

attributes

Syntax

```

attributes {
  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 ];
  }
  ignore {
    framed-ip-netmask;
    input-filter;
    logical-system-routing-instance;
    output-filter;
  }
}

```

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

Release Information Statement introduced in JUNOS Release 9.1.
Statement introduced in JUNOS Release 9.1 for EX Series switches.

Description Specify how the router or switch 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 27

authentication (DHCP Local Server)

Syntax

```
authentication {
  password password-string;
  username-include {
    circuit-type;
    client-id;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 <circuit-id> <remote-id>;
    relay-agent-interface-id;
    relay-agent-remote-id;
    relay-agent-subscriber-id;
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
```

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 dhcpv6],
[edit logical-systems logical-system-name routing-instances routing-instance-name system
services dhcp-local-server dhcpv6 group group-name],
[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 dhcpv6],
[edit logical-systems logical-system-name system services dhcp-local-server dhcpv6 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],
[edit routing-instances routing-instance-name system services dhcp-local-server dhcpv6],
[edit routing-instances routing-instance-name system services dhcp-local-server dhcpv6
group group-name],
[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 dhcpv6],
[edit system services dhcp-local-server dhcpv6 group group-name],
[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. The `client-id`, `relay-agent-interface-id`, `relay-agent-remote-id` and `relay-agent-subscriber-id` statements are supported in the DHCPv6 hierarchy levels only.

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 66

authentication (DHCP Relay Agent)

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 66

authentication-order

Syntax authentication-order [*authentication-methods*];

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

Release Information Statement introduced before JUNOS Release 7.4.
Statement introduced in JUNOS Release 9.0 for EX Series switches.

Description Set the order in which the JUNOS Software tries different authentication methods when verifying that a client can access the router or switch. For each login attempt, the software tries the authentication methods in order, from first to last.

Options password—Verify the client using the information configured at the [edit access profile *profile-name* client *client-name*] hierarchy level.

radius—Verify the client using RADIUS authentication services.



NOTE: The password keyword is not supported by the subscriber access management feature.

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 20
- Configuring Access Profiles for L2TP or PPP Parameters
- Example: Configuring CHAP Authentication with RADIUS

authentication-server

Syntax	authentication-server [<i>ip-address</i>];
Hierarchy Level	[edit access profile <i>profile-name</i> radius]
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	<i>ip-address</i> —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 22

boot-file

Syntax	boot-file <i>filename</i> ;
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family inetdhcp-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	<i>filename</i> —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 48 ■ boot-server

boot-server

Syntax	<code>boot-server (address hostname);</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<ul style="list-style-type: none"> ■ <i>address</i>—The IPv4 address of a boot server. ■ <i>hostname</i>—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	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48 ■ boot-file

chap (Dynamic Profiles)

Syntax	<code>chap;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.5.
Description	Specify CHAP authentication in a PPP dynamic profile. For the unit <i>logical-unit-number</i> , you must use the \$junos-interface-unit JUNOS predefined variable.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Dynamic Profiles Overview on page 467 ■ Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130 ■ Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

circuit-id

Syntax	circuit-id <i>value</i> range <i>named-range</i> ;
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family inet 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	<ul style="list-style-type: none">■ <i>value</i>—The string for the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option (option 82) in DHCP packets.■ range <i>named-range</i>—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 48

circuit-id

Syntax circuit-id {
 prefix *prefix*;
 use-interface-description (logical | device);
 }

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. Optionally specify that the suboption include a prefix or textual description, or both, instead of the circuit-id.

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:svlan-id-vlan-id

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**
- Enabling and Disabling Insertion of Option 82 Information on page 117
 - Configuring Agent Circuit ID Information on page 118

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 66

circuit-type

Syntax	circuit-type;
Hierarchy Level	[edit forwarding-options dhcp-relay authentication username-include], [edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

clear-on-abort

Syntax	clear-on-abort;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit system services dhcp-local-server reconfigure],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> reconfigure]</p>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Delete all DHCP clients or only the DHCP clients serviced by the specified group of interfaces when reconfiguration fails; that is, when the maximum number of retry attempts have been made without success. A group configuration takes precedence over a DHCP local server configuration.
Default	Restores the original client configuration when reconfiguration fails.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82 ■ Configuring Deletion of the Client When Dynamic Reconfiguration Fails on page 84

client-accounting-algorithm

Syntax	client-accounting-algorithm (direct round-robin);
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure the access method the router uses to access RADIUS accounting servers.
Default	direct
Options	direct—Use the direct method. round-robin—Use the round-robin method.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring RADIUS Server Parameters for Subscriber Access on page 22 ■ Configuring RADIUS Server Options for Subscriber Access on page 25

client-authentication-algorithm

Syntax	client-authentication-algorithm (direct round-robin);
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure the access method the router uses to access RADIUS authentication servers.
Default	direct
Options	direct—Use the direct method. round-robin—Use the round-robin method.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring RADIUS Server Parameters for Subscriber Access on page 22 ■ Configuring RADIUS Server Options for Subscriber Access on page 25

client-discover-match

Syntax	client-discover-match;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit system services dhcp-local-server overrides],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> overrides]</p>
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Configure DHCP local server to use option 60 and option 82 information to uniquely identify DHCP subscribers when primary subscriber identification fails.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Local Server Overview on page 58 ■ Overriding Default DHCP Local Server Configuration Settings on page 70

client-discover-match

Syntax	client-discover-match;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Configure DHCP relay to use option 60 and option 82 information to uniquely identify DHCP subscribers when primary subscriber identification fails.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Relay Agent Overview on page 94 ■ Overriding the Default DHCP Relay Configuration on page 104

client-id

Syntax client-id;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit system services dhcp-local-server dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.6.**Description** Specify that the DHCPv6 Client-ID option (option 1) in the client PDU name 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 ■ Creating Unique Usernames for DHCP Clients on page 78

coa-immediate-update

Syntax	coa-immediate-update;
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure the router to send an Acct-Update message to the RADIUS accounting server immediately following a CoA operation.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring RADIUS Server Parameters for Subscriber Access on page 22■ Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21

default-local-server-group

Syntax	default-local-server-group <i>local-server-group-name</i> ;
Hierarchy Level	<p>[edit forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option]</p>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	<p>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.</p> <p>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 <code>dhcp-local-server</code> statement at the [edit system services] hierarchy level.</p>
Options	<i>local-server-group-name</i> —Name of the default extended DHCP local server group.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

default-relay-server-group

Syntax	<code>default-relay-server-group <i>server-group-name</i>;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option]</p>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	<p>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.</p> <p>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.</p>
Options	<i>server-group-name</i> —Name of the default DHCP relay server group.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 66

delimiter

Syntax	<code>delimiter <i>delimiter-character</i>;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay authentication username-include], [edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include]</p>
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	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

dhcp-attributes (Address-Assignment Pools)

Syntax dhcp-attributes {
 boot-file *filename*;
 boot-server (*address* | *hostname*);
 dns-server [*ipv6-address*];
 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*)];
 }
 option-match {
 option-82 {
 circuit-id *value* *range* *named-range*;
 remote-id *value* *range* *named-range*;
 }
 }
 router [*router-list*];
 sip-server-address [*ipv6-address*];
 sip-server-domain-name *domain-name*;
 tftp-server *address*;
 wins-server [*servers*];
 }

Hierarchy Level [edit access address-assignment pool *pool-name* family *family*]

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

- Address-Assignment Pools Overview on page 47
- Configuring Address-Assignment Pools on page 48

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;
                }
            }
            dhcpv6 {
                authentication {
                    password password-string;
                    username-include {
                        circuit-type;
                        client-id;
                        delimiter delimiter-character;
                        domain-name domain-name-string;
                        logical-system-name;
                        relay-agent-interface-id;
                        relay-agent-remote-id;
                        relay-agent-subscriber-id;
                        routing-instance-name;
                        user-prefix user-prefix-string;
                    }
                }
            }
            group group-name {
                authentication {
                    password password-string;
                    username-include {
                        circuit-type;
                        client-id;
                        delimiter delimiter-character;
                        domain-name domain-name-string;
                        logical-system-name;
                        relay-agent-interface-id;
                        relay-agent-remote-id;
                        relay-agent-subscriber-id;
                        routing-instance-name;
                        user-prefix user-prefix-string;
                    }
                }
            }
            interface interface-name <upto upto-interface-name> <exclude>;
            overrides {
                interface-client-limit number;
            }
        }

```

```

    }
  }
  overrides {
    interface-client-limit number;
  }
}
dynamic-profile profile-name <aggregate-clients (merge | replace) |
  use-primaryprimary-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 (merge | replace) |
    use-primaryprimary-profile-name>;
  interface interface-name <upto upto-interface-name> <exclude>;
  overrides {
    client-discover-match;
    interface-client-limit number;
    no-arp;
  }
}
overrides {
  client-discover-match;
  interface-client-limit number;
  no-arp;
}
pool-match-order {
  external-authority;
  ip-address-first;
  option-82;
}
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable
    | no-world-readable>;
  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.
The `dhcpv6` stanza added in JUNOS Release 9.6.

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 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 DHCP server on J Series routers and so is not supported on J Series routers. Also, the DHCP local server and the DHCP/BOOTP relay server, 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.

The `dhcpv6` stanza configures the router to support Dynamic Host Configuration Protocol for IPv6 (DHCPv6). The DHCPv6 local server is fully compatible with the extended DHCP local server and 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 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

- Extended DHCP Local Server Overview on page 58
- DHCPv6 Local Server Overview on page 63

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 (merge | replace) | use-primary
                primary-profile-name>;
            overrides {
                always-write-giaddr;
                always-write-option-82;
                client-discover-match;
                disable-relay;
                interface-client-limit number;
                layer2-unicast-replies;
                no-arp;
                proxy-mode;
                replace-ip-source-with;
                trust-option-82;
            }
            relay-option-60 {
                vendor-option {
                    (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
                        default-local-server-group local-server-group-name |
                        (default-relay-server-group server-group-name |
                        drop);
                    }
                    default-local-server-group local-server-group-name |
                    (default-relay-server-group server-group-name |
                    drop);
                }
            }
            relay-option-82 {
                circuit-id {
                    prefix prefix;
                    use-interface-description (logical | device);
                }
            }
            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 (merge | replace) | use-primary
  primary-profile-name>;
overrides {
  always-write-giaddr;
  always-write-option-82;
  client-discover-match;
  disable-relay;
  interface-client-limit number;
  layer2-unicast-replies;
  no-arp;
  proxy-mode;
  trust-option-82;
}
relay-option-60 {
  vendor-option {
    (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
      default-local-server-group local-server-group-name |
      (default-relay-server-group server-group-name |
      drop);
    }
    default-local-server-group local-server-group-name |
    (default-relay-server-group server-group-name |
    drop);
  }
}
relay-option-82 {
  circuit-id {
    prefix prefix;
    use-interface-description (logical | device);
  }
}
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 <i>logical-system-name</i> forwarding-options], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options], [edit routing-instances <i>routing-instance-name</i> 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	<p>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.</p> <p>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.</p> <p>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.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Local Server Overview on page 58 ■ DHCP Relay Proxy Overview on page 96 ■ Using External AAA Authentication Services with DHCP on page 66

dhcpv6

Syntax

```

dhcpv6 {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      client-id;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      relay-agent-interface-id;
      relay-agent-remote-id;
      relay-agent-subscriber-id;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  group group-name {
    authentication {
      password password-string;
      username-include {
        circuit-type;
        client-id;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        relay-agent-interface-id;
        relay-agent-remote-id;
        relay-agent-subscriber-id;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
    interface interface-name [upto upto-interface-name] [exclude];
    overrides {
      interface-client-limit number;
    }
  }
  overrides {
    interface-client-limit number;
  }
}

```

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 9.6.

Description Configure DHCPv6 local server options on the router and enable the router to function as a server for the DHCP protocol for IP version 6 (IPv6). The DHCPv6 local server sends and receives packets using the IPv6 protocol and informs IPv6 of the routing requirements of router clients. The local server works together with the AAA service framework to control subscriber access and accounting.

The DHCPv6 local server is fully compatible with the extended DHCP local server and DHCP relay agent.

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 ■ DHCPv6 Local Server Overview on page 63

disable-relay

Syntax	disable-relay;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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	■ Extended DHCP Relay Agent Overview on page 94

dns-server

Syntax	dns-server [<i>ipv6-address</i>];
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family <i>family</i> dhcp-attributes]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Specify one or more DNS servers to which clients can send DNS queries. This is equivalent to DHCPv6 option 23.
Options	<i>ipv6-address</i> —IPv6 addresses of the DNS 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	■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

domain-name

Syntax	<code>domain-name <i>domain-name</i>;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<i>domain-name</i> —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 48

domain-name (Subscriber Access Management)

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 66

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 *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 66

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	<ul style="list-style-type: none"> ■ Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

dynamic-profile

Syntax	dynamic-profile <i>profile-name</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Specify the dynamic profile that is attached to the interface. This statement is currently supported on PPPoE interfaces only.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Dynamic Profiles Overview on page 467 ■ Configuring a Basic Dynamic Profile on page 481 ■ Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

dynamic-profile

Syntax	<code>dynamic-profile <i>profile-name</i> <aggregate-clients (merge replace) use-primary <i>primary-profile-name</i>>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i>],</p> <p>[edit system services dhcp-local-server],</p> <p>[edit system services dhcp-local-server group <i>group-name</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.2.</p> <p><code>aggregate-clients</code> and <code>use-primary</code> options introduced in JUNOS Release 9.3.</p>
Description	<p>Specify the dynamic profile that is attached to a group of interfaces or to all interfaces.</p> <p>The remaining statements are explained separately.</p>
Options	<i>profile-name</i> —Name of the dynamic profile.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

dynamic-profile

Syntax	dynamic-profile <i>profile-name</i> <aggregate-clients (merge replace) use-primary <i>primary-profile-name</i> >;
Hierarchy Level	[edit forwarding-options dhcp-relay], [edit forwarding-options dhcp-relay group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> forwarding-options group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i>]
Release Information	Statement introduced in JUNOS Release 9.2. aggregate-clients and use-primary statements introduced in JUNOS Release 9.3.
Description	Specify the dynamic profile that is attached to a group of interfaces or to all interfaces. The statements are explained separately.
Options	<i>profile-name</i> —Name of the 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 75

external-authority

Syntax	external-authority;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server pool-match-order], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit system services dhcp-local-server pool-match-order]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Specify that an external authority (for example, RADIUS or Diameter) provides the address assignment. When RADIUS is the external authority, the router uses the Framed-IPv6-Pool attribute (RADIUS attribute 100) to select the pool. When Diameter is the external authority, the router uses the Diameter counterpart of RADIUS Framed-IPv6-Pool attribute.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67 ■ Extended DHCP Local Server Overview on page 58 ■ Address-Assignment Pools Overview on page 47

ethernet-port-type-virtual

Syntax	ethernet-port-type-virtual;
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Specifies the physical port type the router or switch 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 or switch 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	<ul style="list-style-type: none"> ■ Configuring RADIUS Server Options for Subscriber Access on page 25 ■ Configuring RADIUS Server Parameters for Subscriber Access on page 22

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.
 Statement introduced in JUNOS Release 9.1 for EX Series switches.

Description Configure the router or switch 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 or switch 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 22

family (Address-Assignment Pools)

Syntax family *family* {
 dhcp-attributes {
 [*protocol-specific attributes*]
 }
 host *hostname* {
 hardware-address *mac-address*;
 ip-address *ip-address*;
 }
 network *address-or-prefix*</*subnet-mask*>;
 range *range-name* {
 high *upper-limit*;
 low *lower-limit*;
 prefix-length *prefix-length*;
 }
 }

Hierarchy Level [edit address-assignment pool *pool-name*]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the protocol family for the address-assignment pool.

Options *family*—Protocol family:

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

The remaining statements are explained separately.

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

Related Topics ■ Address-Assignment Pools Overview on page 47
 ■ Configuring Address-Assignment Pools on page 48

forwarding-class

Syntax	forwarding-class <i>class-name</i> ;
Hierarchy Level	[edit services radius-flow-tap]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify forwarding class that is applied to mirrored packets sent to a mediation device.
Options	<i>class-name</i> —Name of the forwarding class.
Required Privilege Level	flow-tap—To view this statement in the configuration. flow-tap-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Subscriber Secure Policy Overview on page 136■ Configuring Subscriber Secure Policy Mirroring Overview on page 142

grace-period

Syntax	<code>grace-period seconds;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6) 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	<i>seconds</i> —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 48

group (DHCP Local Server)

Syntax

```
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>;
      relay-agent-remote-id;
      relay-agent-subscriber-id;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name <aggregate-clients (merge | replace) |
    use-primary primary-profile-name>;
  interface interface-name <upto upto-interface-name><exclude>;
  overrides {
    client-discover-match;
    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 dhcpv6],
[edit logical-systems logical-system-name system services dhcp-local-server],
[edit logical-systems logical-system-name system services dhcp-local-server dhcpv6],
[edit routing-instances routing-instance-name system services dhcp-local-server],
[edit routing-instances routing-instance-name system services dhcp-local-server dhcpv6],
[edit system services dhcp-local-server]
[edit system services dhcp-local-server dhcpv6]
```

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.

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 ■ Extended DHCP Local Server Overview on page 58

- Using External AAA Authentication Services with DHCP on page 66
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

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 (merge | replace) | use-primary`
 `primary-profile-name>;`
 `overrides {`
 `always-write-giaddr;`
 `always-write-option-82;`
 `client-discover-match;`
 `interface-client-limit number;`
 `layer2-unicast-replies;`
 `no-arp;`
 `proxy-mode;`
 `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 prefix;`
 `use-interface-description (logical | device);`
 `}`
 `}`
 `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

- Extended DHCP Relay Agent Overview on page 94
- Using External AAA Authentication Services with DHCP on page 66
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

hardware-address

Syntax	hardware-address <i>mac-address</i> ;
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6) host <i>hostname</i>]
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	<i>mac-address</i> —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 48

host (Address-Assignment Pools)

Syntax	host <i>hostname</i> { hardware-address <i>mac-address</i> ; ip-address <i>ip-address</i> ; }
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6)]
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Configure a static binding for the specified client.
Options	<i>hostname</i> —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	■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

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.
 Statement introduced in JUNOS Release 9.1 for EX Series switches.

Description Configure the router or switch to ignore the specified attributes in RADIUS Access-Accept messages. By default, the router or switch 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 22

immediate-update

Syntax	immediate-update;
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure the router or switch 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	<ul style="list-style-type: none">■ Configuring RADIUS Server Parameters for Subscriber Access on page 22■ Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21

interface (DHCP Local Server)

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* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [edit system services dhcp-local-server group *group-name*]
 [edit system services dhcp-local-server dhcpv6 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.



NOTE: DHCP values are supported in Integrated Routing and Bridging (IRB) configurations. When you configure an IRB interface in a network that is using DHCP, the DHCP information (for example, authentication, address assignment, and so on) is propagated in the associated bridge domain. This enables the DHCP server to configure client IP addresses residing within the bridge domain. IRB currently only supports static DHCP configurations. For additional information about how to configure IRB, see the *JUNOS MX Series Ethernet Services Routers Solutions Guide*.

Options **exclude**—Exclude an interface or a range of interfaces from the group.

interface-name—Name of the interface. You can repeat this keyword multiple times.

upto upto-interface-name—The upper end of the range of interfaces; the lower end of the range is set by the value of the **interface-name** variable. 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 58

- Using External AAA Authentication Services with DHCP on page 66

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 relay agent 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 local server.



NOTE: DHCP values are supported in Integrated Routing and Bridging (IRB) configurations. When you configure an IRB interface in a network that is using DHCP, the DHCP information (for example, authentication, address assignment, and so on) is propagated in the associated bridge domain. This enables the DHCP server to configure client IP addresses residing within the bridge domain. IRB currently only supports static DHCP configurations. For additional information about how to configure IRB, see the *JUNOS MX Series Ethernet Services Routers Solutions Guide*.

Options `exclude`—Exclude an interface or a range of interfaces from the group.

interface-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

- Extended DHCP Relay Agent Overview on page 94
- Using External AAA Authentication Services with DHCP on page 66

interface-client-limit

Syntax	interface-client-limit <i>number</i> ;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group <i>group-name</i> overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group <i>group-name</i> overrides],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides],</p> <p>[edit system services dhcp-local-server overrides],</p> <p>[edit system services dhcp-local-server dhcpv6 overrides],</p> <p>[edit system services dhcp-local-server dhcpv6 group <i>group-name</i> overrides]</p> <p>[edit system services dhcp-local-server group <i>group-name</i> overrides]</p>
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.
Default	No limit
Options	<p><i>number</i>—Maximum number of clients allowed.</p> <p>Range: 1 through 500,000</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>

- Related Topics**
- Extended DHCP Local Server Overview on page 58
 - Overriding Default DHCP Local Server Configuration Settings on page 70

interface-client-limit

Syntax	interface-client-limit <i>number</i> ;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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.
Default	No limit
Options	<i>number</i> —Maximum number of clients allowed. Range: 1 through 500,000
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Relay Agent Overview on page 94 ■ Overriding the Default DHCP Relay Configuration on page 104

interface-description-format

Syntax	interface-description-format (adapter sub-interface);
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Specify the information that is included in or omitted from the interface description that the router or switch passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the router or switch includes both the subinterface and the adapter in the interface description.
Options	adapter—Include only the adapter in the interface description. sub-interface—Include only the subinterface in the interface description.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring RADIUS Server Options for Subscriber Access on page 25 ■ Configuring RADIUS Server Parameters for Subscriber Access on page 22

interfaces

Syntax	interfaces <i>interface-name</i> ;
Hierarchy Level	[edit services radius-flow-tap]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify tunnel interfaces that are used to send mirrored packets to a mediation device.
Options	<i>interface-name</i> —Name of the interface.
Required Privilege Level	flow-tap—To view this statement in the configuration. flow-tap-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Subscriber Secure Policy Overview on page 136 ■ Configuring Subscriber Secure Policy Mirroring Overview on page 142

ip-address

Syntax	<code>ip-address <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit access address-assignment pool <i>pool-name</i> family inet host <i>hostname</i>]</code>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Specify the reserved IP address assigned to the client.
Options	<i>ip-address</i> —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	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48 ■ Configuring Static Address Assignment on page 50

ip-address-first

Syntax	<code>ip-address-first;</code>
Hierarchy Level	<code>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server pool-match-order],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order],</code> <code>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order],</code> <code>[edit system services dhcp-local-server pool-match-order]</code>
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 gateway IP address if one is present in the DHCP client PDU. If no gateway IP address 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	<ul style="list-style-type: none"> ■ Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67 ■ Extended DHCP Local Server Overview on page 58 ■ Address-Assignment Pools Overview on page 47

ipv6-address (Address-Assignment Pools)

Syntax	<code>ipv6-address <i>ipv6-address</i>;</code>
Hierarchy Level	<code>[edit access address-assignment pool <i>pool-name</i> family <i>family</i> host <i>hostname</i>]</code>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Specify the reserved IPv6 address assigned to the client.
Options	<i>ipv6-address</i> —IPv6 address.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48

keepalives (Dynamic Profiles)

Syntax	<code>keepalives { interval <i>seconds</i>; }</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before JUNOS Release 7.4. The <code>[edit dynamic-profiles <i>profile-name</i>]</code> hierarchy added in JUNOS Release 9.5.
Description	Specify the keepalive interval in a PPP dynamic profile.
Default	Sending of keepalives is enabled by default. The default keepalive interval is 10 seconds for PPP.
Options	<i>interval seconds</i> —The time in seconds between successive keepalive requests. Range: 1 through 32767 seconds Default: 10 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Dynamic Profiles Overview on page 467 ■ Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130

layer2-unicast-replies

Syntax	layer2-unicast-replies;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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	<ul style="list-style-type: none"> Extended DHCP Relay Agent Overview on page 94

local-server-group

Syntax	<code>local-server-group local-server-group-name;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)]</p>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	<p>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.</p> <p>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 <code>dhcp-local-server</code> statement at the [edit system services] hierarchy level.</p>
Options	<i>local-server-group-name</i> —Name of the extended DHCP local server group.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

logical-system-name

Syntax	logical-system-name;
Hierarchy Level	<p>[edit forwarding-options dhcp-relay authentication username-include], [edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include]</p>
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	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 logical system name be 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 66

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 66

mac-address

Syntax	mac-address;
Hierarchy Level	<p>[edit forwarding-options dhcp-relay authentication username-include],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include]</p>
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	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

mac-address

Syntax	<code>mac-address address;</code>
Hierarchy Level	[edit dynamic-profiles routing-options access-internal route <i>subscriber-ip-address</i> qualified-next-hop <i>underlying-interface</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Dynamically configure the MAC address variable for an access-internal route for unnumbered interfaces such as DHCP subscriber interfaces.
Options	<i>address</i> —Either the specific MAC address you want to assign to the access-internal route or the MAC address variable (\$junos-subscriber-mac-address). The MAC address variable is dynamically replaced with the value supplied by DHCP when a subscriber logs in.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98

maximum-lease-time

Syntax	<code>maximum-lease-time seconds;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6) 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	<i>seconds</i> —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 48

metric

Syntax	<code>metric route-cost;</code>
Hierarchy Level	[edit dynamic-profiles routing-options access route <i>prefix</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Dynamically configure the cost for an access route.
Options	<i>route-cost</i> —Either the specific cost you want to assign to the access route or the cost variable (<code>\$junos-framed-route-cost</code>). The cost variable is dynamically replaced with the value in Framed-Route Attribute [22].
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring Dynamic Access Routes for Subscriber Management on page 97

name-server

Syntax	<code>name-server [<i>server-names</i>];</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<i>server-names</i> —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 48

nas-identifier

Syntax	nas-identifier <i>identifier-value</i> ;
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure the value for the client RADIUS attribute 32 (NAS-Identifier). This attribute is used for authentication and accounting requests.
Options	<i>identifier-value</i> —String to use for authentication and accounting requests. Range: 1 to 64 characters
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring RADIUS Server Options for Subscriber Access on page 25■ Configuring RADIUS Server Parameters for Subscriber Access on page 22

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.
 Statement introduced in JUNOS Release 9.1 for EX Series switches.

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 Options for Subscriber Access on page 25
 ■ Configuring RADIUS Server Parameters for Subscriber Access on page 22

netbios-node-type

Syntax	<code>netbios-node-type <i>node-type</i>;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<i>node-type</i> —One of the following node types: <ul style="list-style-type: none"> ■ <i>b-node</i>—Broadcast node ■ <i>h-node</i>—Hybrid node ■ <i>m-node</i>—Mixed node ■ <i>p-node</i>—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	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48

network

Syntax	<code>network <i>ip-prefix</i></<i>prefix-length</i>>;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family inet]
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Configure subnet information for an IPv4 address-assignment pool.
Options	<ul style="list-style-type: none"> ■ <i>ip-prefix</i>—IP version 4 address or prefix value. ■ <i>prefix-length</i>—Subnet mask.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48

next-hop

Syntax	next-hop <i>next-hop</i> ;
Hierarchy Level	[edit dynamic-profiles routing-options access route <i>prefix</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Dynamically configure the next-hop address for an access route. Access routes are typically unnumbered interfaces.
Options	<i>next-hop</i> —Either the specific next-hop address you want to assign to the access route or the next-hop address variable (\$junos-framed-route-nexthop). The next-hop address variable is dynamically replaced with the value in Framed-Route Attribute [22].
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring Dynamic Access Routes for Subscriber Management on page 97

no-arp

Syntax	no-arp;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server overrides], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server overrides], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> overrides], [edit system services dhcp-local-server overrides], [edit system services dhcp-local-server group <i>group-name</i> 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.

Related Topics ■ Extended DHCP Relay Agent Overview on page 94
 ■ Overriding the Default DHCP Relay Configuration on page 104

option

Syntax	<pre>option <i>option-index</i> (array (byte flag integer ip-address short string unsigned-integer unsigned-short) [<i>type-values</i>] byte <i>8-bit-value</i> flag (false off on true) integer <i>signed-32-bit-value</i> ip-address <i>address</i> short <i>signed-16-bit-value</i> string <i>text-string</i> unsigned-integer <i>32-bit-value</i> unsigned-short <i>16-bit-value</i>); option { [(<i>id-number</i> <i>option-type</i> <i>option-value</i>) (<i>id-number</i> <i>array</i> <i>option-type</i> <i>option-value</i>)]; }</pre>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6) dhcp-attributes]
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Specify user-defined options that are added to client packets.
Options	<p><i>option-index</i>—Any whole number. The ID number is used to index the option and must be unique across a DHCP server.</p> <p><i>type-values</i>—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).</p>
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 48

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 be 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 66

option-60

Syntax	option-60;
Hierarchy Level	[edit forwarding-options dhcp-relay authentication username-include], [edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

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 48

option-82 (DHCP Local Server Authentication)

Syntax	option-82 <circuit-id> <remote-id>;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> authentication username-include]</p>
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	<p>circuit-id—Agent Circuit ID suboption (suboption 1).</p> <p>remote-id—Agent Remote ID suboption (suboption 2).</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	■ Using External AAA Authentication Services with DHCP on page 66

option-82 (DHCP Local Server Pool Matching)

Syntax	option-82;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server pool-match-order],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order],</p> <p>[edit system services dhcp-local-server pool-match-order]</p>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	<p>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. This statement is supported for IPv4 address-assignment pools only.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67 ■ Extended DHCP Local Server Overview on page 58 ■ Address-Assignment Pools Overview on page 47

option-82

Syntax option-82 <circuit-id> <remote-id>;

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 option 82 that is concatenated with the username during the subscriber authentication process. You can specify either, both, or neither the Agent Circuit ID and 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 neither suboption is supplied, the raw payload of option 82 is concatenated to the username.



NOTE: The option 82 value used in creating the username is based on the option 82 value that is encoded in the outgoing (relayed) PDU.

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 66

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 48

options

Syntax options {
 accounting-session-id-format (decimal | description);
 client-accounting-algorithm (direct | round-robin);
 client-authentication-algorithm (direct | round-robin);
 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*;
 }
 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.
 Statement introduced in JUNOS Release 9.1 for EX Series switches.

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 22
 ■ RADIUS Server Options for Subscriber Access on page 24

order

Syntax	<code>order [<i>accounting-method</i>];</code>
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
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.
Options	<i>accounting-method</i> —One or more accounting methods. When a client logs in, the software tries the accounting methods in the following order, from first to last. The only valid value is radius for RADIUS accounting.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

overrides

Syntax overrides {
 client-discover-match;
 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 dhcpv6],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [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 dhcpv6],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [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 dhcpv6],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [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 dhcpv6],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name*],
 [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 dhcpv6],
 [edit system services dhcp-local-server dhcpv6 group *group-name*],
 [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 configuration options for a named group of interfaces, include the statements at the [edit system services dhcp-local-server group *group-name*]

hierarchy level. Use the DHCPv6 hierarchy levels to override DHCPv6 configuration options.

The statements are explained separately. The **interface-client-limit** and **no-arp** statements are not supported in DHCPv6 hierarchies.

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 58
 ■ Overriding Default DHCP Local Server Configuration Settings on page 70

overrides

Syntax `overrides {
always-write-giaddr;
always-write-option-82;
client-discover-match;
interface-client-limit number;
layer2-unicast-replies;
no-arp;
proxy-mode;
replace-ip-source-with;
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

- Extended DHCP Relay Agent Overview on page 94
- Overriding the Default DHCP Relay Configuration on page 104

pap (Dynamic Profiles)

Syntax	pap;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.5.
Description	Specify PAP authentication in a PPP dynamic profile. For the unit <i>logical-unit-number</i> , you must use the \$junos-interface-unit JUNOS predefined variable.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Dynamic Profiles Overview on page 467 ■ Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130 ■ Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

password (DHCP Local Server)

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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 66

password

Syntax	<code>password <i>password-string</i>;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay authentication], [edit forwarding-options dhcp-relay group <i>group-name</i> authentication], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication]</p>
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	<i>password-string</i> —Authentication password.
Required Privilege Level	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using External AAA Authentication Services with DHCP on page 66

pool (Address-Assignment Pools)

Syntax

```
pool pool-name {
  family family {
    dhcp-attributes {
      [protocol-specific attributes]
    }
    host hostname {
      hardware-address mac-address;
      ip-address ip-address;
    }
    network address-or-prefix</subnet-mask>;
    prefix ipv6-prefix;
    range range-name {
      high upper-limit;
      low lower-limit;
      prefix-length prefix-length;
    }
  }
}
```

Hierarchy Level [edit access address-assignment]

Release Information Statement introduced in JUNOS Release 9.0.

Description Configure the name of an address-assignment pool.

The remaining statements are explained separately.

Options *pool-name*—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

- Address-Assignment Pools Overview on page 47
- Configuring Address-Assignment Pools on page 48

pool-match-order

Syntax pool-match-order {
 external-authority;
 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**
- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 67
 - Extended DHCP Local Server Overview on page 58

port

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Configure the port number on which to contact the RADIUS server.
Options	<i>port-number</i> —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	<ul style="list-style-type: none"> ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

ppp-options (Dynamic Profiles)

Syntax	<code>ppp-options { chap; pap; }</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.5.
Description	Configure PPP-specific interface properties in a dynamic profile. For the unit <i>logical-unit-number</i> , you must use the \$junos-interface-unit JUNOS predefined variable.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Dynamic Profiles Overview on page 467 ■ Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130 ■ Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

preference

Syntax	<code>preference route-distance;</code>
Hierarchy Level	[edit dynamic-profiles routing-options access route <i>prefix</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Dynamically configure the distance for an access route.
Options	<i>route-distance</i> —Either the specific distance you want to assign to the access route or the distance variable (\$junos-framed-route-distance). The distance variable is dynamically replaced with the value in Framed-Route Attribute [22].
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring Dynamic Access Routes for Subscriber Management on page 97

prefix (Address-Assignment Pools)

Syntax	<code>prefix ipv6-prefix;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family inet6]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Specify the IPv6 prefix for the IPv6 address-assignment pool. This statement is mandatory for IPv6 address-assignment pools.
Options	<i>ipv6-prefix</i> —IPv6 prefix.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

prefix

Syntax	<code>prefix <i>prefix</i>;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay relay-option-82 circuit-id],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> relay-option-82 circuit-id],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay relay-option-82 circuit-id],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-82 circuit-id],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-82 circuit-id],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-82 circuit-id],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-82 circuit-id],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-82 circuit-id]</p>
Release Information	Statement introduced in JUNOS Release 8.3.
Description	<p>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.</p> <p>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:</p> <pre> host-name:(fe ge)-fpc/pic/port:svlan-id-vlan-id logical-system-name:(fe ge)-fpc/pic/port:svlan-id-vlan-id routing-instance-name:(fe ge)-fpc/pic/port:svlan-id-vlan-id </pre> <p>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:</p> <pre> logical-system-name;routing-instance-name:(fe ge)-fpc/pic/port:svlan-id-vlan-id </pre> <p>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:</p> <pre> host-name/logical-system-name;routing-instance-name:(fe ge)-fpc/pic/port:svlan-id-vlan-id </pre> <p>For Fast Ethernet or Gigabit Ethernet interfaces that use virtual LANs (VLANs) but not S-VLANs, only the <i>vlan-id</i> 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 <i>vlan-id</i> value nor the <i>svlan-id</i> value appears.</p>

Options *prefix*—Any combination of the following:

- **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**
- Enabling and Disabling Insertion of Option 82 Information on page 117
 - Configuring an Option 82 Prefix on page 119

profile

```

Syntax  profile profile-name {
    accounting {
        accounting-stop-on-access-deny;
        accounting-stop-on-failure;
        coa-immediate-update
        immediate-update;
        order [ accounting-method ];
        statistics (time | volume-time);
        update-interval minutes;
    }
    authentication-order [ authentication-methods ];
    client client-name {
        chap-secret chap-secret;
        group-profile profile-name;
        ike {
            allowed-proxy-pair {
                remote remote-proxy-address local local-proxy-address;
            }
            pre-shared-key (ascii-text character-string | hexadecimal hexadecimal-digits);
            ike-policy policy-name;
            interface-id string-value;
        }
        l2tp {
            interface-id interface-id;
            lcp-renegotiation;
            local-chap;
            maximum-sessions-per-tunnel number;
            multilink {
                drop-timeout milliseconds;
                fragmentation-threshold bytes;
            }
            ppp-authentication (chap | pap);
            ppp-profile profile-name;
            shared-secret shared-secret;
        }
        pap-password pap-password;
        ppp {
            cell-overhead;
            encapsulation-overhead bytes;
            framed-ip-address ip-address;
            framed-pool framed-pool;
            idle-timeout seconds;
            interface-id interface-id;
            keepalive seconds;
            primary-dns primary-dns;
            primary-wins primary-wins;
            secondary-dns secondary-dns;
            secondary-wins secondary-wins;
        }
        user-group-profile profile-name;
    }
}

```

```

radius {
  authentication-server [ ip-address ];
  accounting-server [ ip-address ];
  options {
    accounting-session-id-format (decimal | description);
    client-accounting-algorithm (direct | round-robin);
    client-authentication-algorithm (direct | round-robin);
    ethernet-port-type-virtual;
    interface-description-format (adapter | sub-interface);
    nas-identifier identifier-value;
    nas-port-extended-format {
      adapter-width width;
      port-width width;
      slot-width width;
      stacked-vlan-width width;
      vlan-width width;
    }
    revert-interval interval;
    vlan-nas-port-stacked-format;
  }
  attributes {
    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 ];
      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-filter [ accounting-start | accounting-stop ];
      output-gigapackets [ accounting-stop ];
      output-gigawords [ accounting-stop ];
    }
    ignore {
      framed-ip-netmask;
      input-filter;
      logical-system:routing-instance;
      output-filter;
    }
  }
}

```

```

    }
    radius-server server-address {
        accounting-port port-number;
        port port-number;
        retry attempts;
        routing-instance routing-instance-name;
        secret password;
        source-address source-address;
        timeout seconds;
    }
}

```

Hierarchy Level [edit access]

Release Information Statement introduced before JUNOS Release 7.4.

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

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

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

The remaining statements are explained separately.

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

Related Topics

- Configuring the PPP Authentication Protocol
- Configuring Access Profiles for L2TP or PPP Parameters
- Configuring L2TP Properties for a Client-Specific Profile
- Configuring PPP Properties for a Client-Specific Profile
- AAA Service Framework Overview on page 18

proxy-mode

Syntax	proxy-mode;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	<p>Enable DHCP relay proxy mode on the extended DHCP relay. Proxy mode supports all extended DHCP relay functionality.</p> <p>The extended DHCP relay proxy is not supported for the J Series routers DHCP server. Also, you cannot configure both the DHCP relay proxy and the extended DHCP local server on the same interface.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ DHCP Relay Proxy Overview on page 96 ■ Extended DHCP Relay Agent Overview on page 94 ■ Enabling DHCP Relay Proxy Mode on page 122

qualified-next-hop

Syntax	qualified-next-hop <i>interface-name</i> { mac-address <i>address</i> ; }
Hierarchy Level	[edit dynamic-profiles routing-options access-internal route <i>subscriber-ip-address</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Dynamically configure the qualified next-hop and the MAC address for an access-internal route for DHCP and PPP subscriber interfaces.
Options	<p><i>interface-name</i>—Either the specific interface you want to assign to the access route or the variable, or the \$junos-interface-name variable. The variable is dynamically replaced with the value supplied by DHCP or PPP when a subscriber logs in.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 98

radius

```

Syntax  radius {
    accounting-server [ ip-address ];
    attributes {
        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 ];
        }
    ignore {
        framed-ip-netmask;
        input-filter;
        logical-system-routing-instance;
        output-filter;
    }
}
authentication-server [ ip-address ];
options {
    accounting-session-id-format (decimal | description);
    client-accounting-algorithm (direct | round-robin);
    client-authentication-algorithm (direct | round-robin);
    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;
    }
    revert-interval interval;
    vlan-nas-port-stacked-format;
}

```

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

Release Information Statement introduced in JUNOS Release 9.1.
Statement introduced in JUNOS Release 9.1 for EX Series switches.

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 22
- RADIUS Server Options for Subscriber Access on page 24

radius-disconnect

Syntax	radius-disconnect;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure trigger],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure trigger],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server reconfigure trigger],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure trigger],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure trigger],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure trigger],</p> <p>[edit system services dhcp-local-server reconfigure trigger],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> reconfigure trigger]</p>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces to be reconfigured when a RADIUS-initiated disconnect is received by the DHCP client or group of clients. A group configuration takes precedence over a DHCP local server configuration.
Default	The client is deleted when a RADIUS-initiated disconnect is received.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82 ■ Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect on page 84

radius-flow-tap

Syntax	<pre>radius-flow-tap { forwarding-class <i>class-name</i>; interfaces <i>interface-name</i>; source-ipv4-address <i>ipv4-address</i>; }</pre>
Hierarchy Level	[edit services]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	<p>Assign parameters that are used with subscriber secure policy mirroring.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none">■ Subscriber Secure Policy Overview on page 136■ Configuring Subscriber Secure Policy Mirroring Overview on page 142

radius-server

Syntax `radius-server server-address {
 accounting-port port-number;
 port port-number;
 retry attempts;
 routing-instance routing-instance-name;
 secret password;
 source-address source-address;
 timeout seconds;
 }`

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

Release Information Statement introduced before JUNOS Release 7.4.
 Statement introduced in JUNOS Release 9.0 for EX Series switches.

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.

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

- Configuring RADIUS Authentication for L2TP
- Configuring the PPP Authentication Protocol
- Configuring RADIUS Authentication
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

range (Address-Assignment Pools)

Syntax	<pre>range range-name { high upper-limit; low lower-limit; prefix-length prefix-length; }</pre>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family (inet inet6)]
Release Information	Statement introduced in JUNOS Release 9.0. IPv6 support introduced in JUNOS Release 10.0.
Description	Configure a named range of IPv4 addresses or IPv6 prefixes, used within an address-assignment pool.
Options	<p><i>high upper-limit</i>—Upper limit of an address range or IPv6 prefix range.</p> <p><i>low lower-limit</i>—Lower limit of an address range or IPv6 prefix range.</p> <p><i>prefix-length prefix-length</i>—Assigned length of the IPv6 prefix.</p> <p><i>range-name</i>—Name assigned to the range of IPv4 addresses or IPv6 prefixes.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

reconfigure

Syntax reconfigure {
 attempts *attempt-count*;
 clear-on-abort;
 timeout *timeout-value*;
 token *token-value*;
 trigger {
 radius-disconnect;
 }
 }

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 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 10.0.

Description Enable dynamic reconfiguration triggered by the DHCP local server of all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. A group configuration takes precedence over a DHCP local server configuration.

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 ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82

relay-agent-interface-id

Syntax relay-agent-interface-id;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit system services dhcp-local-server dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Interface-ID option (option 18) in the client PDU name 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 ■ Creating Unique Usernames for DHCP Clients on page 78

relay-agent-remote-id

Syntax relay-agent-remote-id;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit system services dhcp-local-server dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Remote-ID option (option 37) in the client PDU name 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 ■ Creating Unique Usernames for DHCP Clients on page 78

relay-agent-subscriber-id

Syntax relay-agent-subscriber-id;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication username-include],
 [edit system services dhcp-local-server dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Subscriber-ID option (option 38) in the client PDU name 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 ■ Creating Unique Usernames for DHCP Clients on page 78

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 113

relay-option-82

Syntax relay-option-82 {
 circuit-id {
 prefix *prefix*;
 use-interface-description (logical | device);
 }
 }

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.

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.

To restore the default behavior (option 82 information is not inserted into DHCP packets), use the `delete relay-option-82` statement.

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 117

relay-server-group

Syntax	<code>relay-server-group server-group-name;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> relay-option-60 vendor-option (equals starts-with) (ascii <i>match-string</i> hexadecimal <i>match-hex</i>)]</p>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	<p>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.</p> <p>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.</p>
Options	<i>server-group-name</i> —Name of the extended DHCP relay server group.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 113

remote-id

Syntax	<code>remote-id value range named-range;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<p><i>range named-range</i>—Name of the address-assignment pool range to use.</p> <p><i>value</i>—The string for Agent Remote ID suboption (suboption 2) of the DHCP relay agent information option (option 82) in DHCP packets.</p>
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 48

replace-ip-source-with

Syntax	replace-ip-source-with giaddr;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Extended DHCP Relay Agent Overview on page 94 ■ Replacing the DHCP Relay Request and Release Packet Source Address on page 106

retry

Syntax	<code>retry attempts;</code>
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Specify the number of times that the router or switch is allowed to attempt to contact a RADIUS authentication or accounting server.
Options	<i>attempts</i> —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	<ul style="list-style-type: none"> ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20 ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19 ■ Example: Configuring CHAP Authentication with RADIUS ■ Configuring RADIUS Authentication for L2TP ■ timeout

revert-interval

Syntax	<code>revert-interval <i>interval</i>;</code>
Hierarchy Level	[edit access profile <i>profile-name</i> radius options]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure the amount of time the router or switch waits after a server has become unreachable. The router or switch rechecks the connection to the server when the specified interval expires. If the server is then reachable, it is used in accordance with the order of the server list.
Options	<i>interval</i> —Amount of time to wait. Range: 60 through 4294967295 seconds Default: 600 seconds
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring RADIUS Server Options for Subscriber Access on page 25■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

route

Syntax `route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 }`

Hierarchy Level [edit dynamic-profiles routing-options access]

Release Information Statement introduced in JUNOS Release 9.5.

Description Dynamically configure the parameters for access routes.

Options *prefix*—Either the specific route prefix that you want to assign to the access route or the route prefix variable (\$junos-framed-route-ip-address-prefix). The route prefix variable is dynamically replaced with the value in Framed-Route Attribute [22].

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 Access Routes for Subscriber Management on page 97

route

Syntax `route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }`

Hierarchy Level [edit dynamic-profiles routing-options access-internal]

Release Information Statement introduced in JUNOS Release 9.5.

Description Dynamically configure parameters for an access-internal route.

Options *subscriber-ip-address*—Either the specific IP address you want to assign to the access-internal route or the subscriber IP address variable (\$junos-subscriber-ip-address). The subscriber IP address variable is dynamically replaced with the value supplied by DHCP or PPP when a subscriber logs in.

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 Access-Internal Routes for DHCP Subscriber Management on page 98
 ■ Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 131

router

Syntax	router { <i>ipv4-address</i> ; }
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family inet dhcp-attributes]
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Specify one or more routers located on the client's subnet. This statement is the equivalent of DHCP option 3.
Options	<i>ipv4-address</i> —IP address of each router.
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 48

routing-instance

Syntax	routing-instance <i>routing-instance-name</i> ;
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Configure the routing instance used to send RADIUS packets to the RADIUS server.
Options	<i>routing-instance-name</i> —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	■ Configuring the PPP Authentication Protocol ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 routing instance name be 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 66

routing-instance-name

Syntax	routing-instance-name;
Hierarchy Level	<p>[edit forwarding-options dhcp-relay authentication username-include],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> authentication username-include]</p>
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	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	■ Using External AAA Authentication Services with DHCP on page 66

secret

Syntax	<code>secret password;</code>
Hierarchy Level	[edit access profile <i>profile-name</i> radius-server <i>server-address</i>], [edit access radius-disconnect <i>client-address</i>], [edit access radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Configure the password to use with the RADIUS server. The secret password used by the local router or switch must match that used by the server.
Options	<i>password</i> —Password to use; it can include spaces if the character string is enclosed in quotation marks.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20 ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19 ■ Example: Configuring CHAP Authentication with RADIUS ■ Configuring RADIUS Authentication for L2TP ■ Configuring the RADIUS Disconnect Server for L2TP

server-group

Syntax	server-group { server-group-name { server-ip-address; } }
Hierarchy Level	[edit forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit routing-instances <i>routing-instance-name</i> 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	<i>server-group-name</i> —Name of the group of DHCP server addresses. <i>server-ip-address</i> —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	■ Extended DHCP Relay Agent Overview on page 94

sip-server-address

Syntax	sip-server-address [<i>ipv6-address</i>];
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family <i>family</i> dhcp-attributes]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Specify one or more SIP outbound proxy servers that DHCPv6 local server clients can use. This is equivalent to DHCPv6 option 22.
Options	<i>ipv6-address</i> —IPv6 addresses of the SIP outbound proxy 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	■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

sip-server-domain-name

Syntax	sip-server-domain-name <i>domain-name</i> ;
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> family <i>family</i> dhcp-attributes]
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure the domain name of the SIP outbound proxy server that DHCPv6 local server clients can use. This is equivalent to DHCPv6 option 21.
Options	<i>domain-name</i> —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	<ul style="list-style-type: none"> ■ Address-Assignment Pools Overview on page 47 ■ Configuring Address-Assignment Pools on page 48

source-address

Syntax	source-address <i>source-address</i> ;
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Configure a source address for each configured RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address.
Options	<i>source-address</i> —A valid IPv4 address configured on one of the router or switch 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	<ul style="list-style-type: none"> ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20 ■ Example: Configuring CHAP Authentication with RADIUS ■ Configuring RADIUS Authentication for L2TP

source-ipv4-address

Syntax	source-ipv4-address <i>ipv4-address</i> ;
Hierarchy Level	[edit services radius-flow-tap]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify the source IP address used in the IP header that is prepended to mirrored packets sent to a mediation device.
Options	<i>ipv4-address</i> —IPv4 address.
Required Privilege Level	flow-tap—To view this statement in the configuration. flow-tap-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Subscriber Secure Policy Overview on page 136 ■ Configuring Subscriber Secure Policy Mirroring Overview on page 142

statistics

Syntax	statistics (time volume-time);
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches. volume-time option introduced in JUNOS Release 9.4.
Description	Configure the router or switch to collect time statistics, or both volume and time statistics, for the sessions being managed by AAA.
Options	time—Collect uptime statistics only. volume-time—Collect both volume and uptime statistics. This option is not available for Mobile IP.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Mobile IP Home Agent Elements and Behavior on page 415 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

tftp-server

Syntax	<code>tftp-server ip-address;</code>
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<i>ip-address</i> —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	<ul style="list-style-type: none"> ■ Configuring Address-Assignment Pools on page 48

timeout

Syntax	<code>timeout seconds;</code>
Hierarchy Level	[edit access radius-server <i>server-address</i>], [edit access profile <i>profile-name</i> radius-server <i>server-address</i>]
Release Information	Statement introduced before JUNOS Release 7.4. Statement introduced in JUNOS Release 9.0 for EX Series switches.
Description	Configure the amount of time that the local router or switch waits to receive a response from a RADIUS server.
Options	<i>seconds</i> —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	<ul style="list-style-type: none"> ■ Configuring Router or Switch Interaction with RADIUS Servers on page 19 ■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20 ■ Example: Configuring CHAP Authentication with RADIUS ■ Configuring RADIUS Authentication for L2TP

timeout

Syntax	<code>timeout <i>timeout-value</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit system services dhcp-local-server reconfigure],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> reconfigure]</p>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	Configure the initial value in seconds between attempts to reconfigure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. Each successive attempts doubles the interval between attempts. For example, if the first value is 2, the first retry is attempted 2 seconds after the first attempt fails. The second retry is attempted 4 seconds after the first retry fails. The third retry is attempted 8 seconds after the second retry fails, and so on. A group configuration takes precedence over a DHCP local server configuration.
Options	<p><i>timeout-value</i>—Initial retry timeout value.</p> <p>Range: 1 through 10 seconds</p> <p>Default: 2 seconds</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82 ■ Configuring Dynamic Reconfiguration Attempts for DHCP Clients on page 83

token

Syntax	token <i>token-value</i> ;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server reconfigure],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> reconfigure],</p> <p>[edit system services dhcp-local-server reconfigure],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> reconfigure]</p>
Release Information	Statement introduced in JUNOS Release 10.0.
Description	<p>Configure a plain-text token for all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. The token enables rudimentary entity authentication to protect against inadvertently instantiated DHCP servers. A null token (empty string) indicates that the configuration token functionality is not enabled. A group configuration takes precedence over a DHCP local server configuration. For more information about tokens, see RFC 3118, <i>Authentication for DHCP Messages</i>, section 4.</p>
Options	<p><i>token-value</i>—Plain-text alphanumeric string.</p> <p>Default: null (empty string)</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82 ■ Configuring a Token for DHCP Local Server Authentication on page 85

traceoptions

Syntax	<pre> traceoptions { file <filename> <files number> <match regular-expression > <size maximum-file-size> <world-readable no-world-readable>; flag flag; no-remote-trace; } </pre>
Hierarchy Level	[edit system processes general-authentication-service]
Release Information	<p>Flag for tracing address-assignment pool operations introduced in JUNOS Release 9.0.</p> <p>option-name option introduced in JUNOS Release 8.3.</p>
Description	Configure tracing options.
Options	<p>file <i>filename</i>—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 <i>/var/log</i>.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named <i>trace-file</i> reaches its maximum size, it is renamed <i>trace-file.0</i>, then <i>trace-file.1</i>, 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 <i>size</i> option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple <i>flag</i> statements. You can include the following flags:</p> <ul style="list-style-type: none"> ■ address-assignment—All address-assignment events ■ all—All tracing operations ■ configuration—Configuration events ■ framework—Authentication framework events ■ jsrsrc—JSRC events ■ ldap—LDAP authentication events ■ local-authentication—Local authentication events ■ radius—RADIUS authentication events <p>match <i>regex</i>—(Optional) Refine the output to include lines that contain the regular expression.</p> <p>no-remote-trace—Disable remote tracing.</p> <p>no-world-readable—(Optional) Disable unrestricted file access.</p>

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.

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 52

traceoptions (DHCP Local Server)

Syntax	<pre> traceoptions { file <filename> <files number> <match regular-expression > <size maximum-file-size> <world-readable no-world-readable>; flag flag; no-remote-trace; } </pre>
Hierarchy Level	<pre> [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] </pre>
Release Information	Statement introduced in JUNOS Release 9.0.
Description	Define tracing operations for DHCP processes.
Options	<p>file <i>filename</i>—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 <code>/var/log</code>.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files to create before overwriting the oldest one. When a trace file named <i>trace-file</i> reaches the configured maximum size, it is renamed <i>trace-file.0</i> and a new <i>trace-file</i> is created. When the new <i>trace-file</i> reaches the maximum size, <i>trace-file.0</i> is renamed <i>trace-file.1</i>, <i>trace-file</i> is renamed <i>trace-file.0</i>, and a new <i>trace-file</i> is created. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten. To change the maximum file size from its default, include the size statement.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i>—Operation type for which to include a trace in the log. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none"> ■ all—Trace all operations. ■ auth—Trace authentication operations. ■ database—Trace database events. ■ dhcpv6-general—Trace miscellaneous DHCPv6 events. ■ dhcpv6-io—Trace I/O operations for DHCPv6. ■ dhcpv6-packet—Trace DHCPv6 packet decoding operations. ■ dhcpv6-packet-option—Trace DHCPv6 option decoding operations. ■ dhcpv6-rpd—Trace routing protocol process events for DHCPv6. ■ dhcpv6-session-db—Trace session database operations for DHCPv6.

- **dhcpv6-state**—Trace changes in state for DHCPv6 operations.
- **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.
- **performance**—Trace performance measurement operations.
- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process events.
- **rtsock**—Trace routing socket operations.
- **session-db**—Trace session database operations.
- **state**—Trace changes in state.
- **statistics**—Trace baseline statistics.
- **ui**—Trace user interface operations.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Allow only the user **root** and users who have the JUNOS **maintenance** permission to access the trace files.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). This setting interacts with the configured maximum number of trace files to determine the amount of tracing data that is saved before the oldest data is overwritten. To change the maximum number of files from its default, include the **files** statement.

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 all users to access the trace files.

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 87](#)

traceoptions (DHCP Relay Agent)

Syntax	<pre> traceoptions { file <filename> <files number> <match regular-expression > <size maximum-file-size> <world-readable no-world-readable>; flag flag; no-remote-trace; } </pre>
Hierarchy Level	<pre> [edit forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay] </pre>
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	<p>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.</p> <p>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.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none"> ■ all—Trace all events ■ auth—Trace authentication events ■ database—Trace database events ■ dhcpv6-general—Trace miscellaneous DHCPv6 events. ■ dhcpv6-io—Trace I/O operations for DHCPv6. ■ dhcpv6-packet—Trace DHCPv6 packet decoding operations. ■ dhcpv6-packet-option—Trace DHCPv6 option decoding operations. ■ dhcpv6-rpd—Trace routing protocol process events for DHCPv6. ■ dhcpv6-session-db—Trace session database operations for DHCPv6. ■ dhcpv6-state—Trace changes in state for DHCPv6 operations.

- **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
- **performance**—Trace performance measurement operations.
- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process events
- **rtsock**—Trace routing socket operations
- **session-db**—Trace session database operations
- **state**—Trace changes in state
- **statistics**—Trace baseline statistics.
- **ui**—Trace user interface operations

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

size *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.

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.

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 87

trigger

Syntax trigger {
radius-disconnect;
}

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server reconfigure],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* reconfigure],
[edit logical-systems *logical-system-name* system services dhcp-local-server reconfigure],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* reconfigure],
[edit routing-instances *routing-instance-name* system services dhcp-local-server reconfigure],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* reconfigure],
[edit system services dhcp-local-server reconfigure],
[edit system services dhcp-local-server group *group-name* reconfigure]

Release Information Statement introduced in JUNOS Release 10.0.

Description Configure behavior in response to a trigger for all DHCP clients or only the DHCP clients serviced by the specified group of interfaces.

The remaining statement is explained separately.

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

Related Topics ■ Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 82
■ Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect on page 84
■ radius-disconnect

trust-option-82

Syntax	trust-option-82;
Hierarchy Level	[edit forwarding-options dhcp-relay overrides], [edit forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay overrides], [edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> 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	■ Extended DHCP Relay Agent Overview on page 94

update-interval

Syntax	update-interval <i>minutes</i> ;
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches.
Description	Configure the amount of time that the router or switch waits before sending a new accounting update.
Options	<i>minutes</i> —Amount of time between updates, in minutes. Range: 10 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	■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

use-interface-description

Syntax use-interface-description (logical | device);

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 9.6.

Description Use the textual interface description instead of the interface identifier when creating the agent-circuit-id suboption of the DHCP relay agent option 82.

If you specify that the textual description is used and no description is configured for the interface, DHCP relay defaults to using the interface identifier. The textual description is configured using the **description** statement at the [edit interfaces *interface-name*] hierarchy level.



NOTE: By default, DHCP relay accepts a maximum of 253 ASCII characters. If the textual interface description is longer than 253 characters, DHCP relay drops the packet, which results in the DHCP client failing to bind.

Options logical—Use the textual description that is configured for the logical interface.
 device—Use the textual description that is configured for the device interface.

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 117
 ■ Using a Textual Description in Option 82 on page 120

use-primary

Syntax	<code>use-primary <i>primary-profile-name</i>;</code>
Hierarchy Level	<p>[edit forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group <i>group-name</i> dynamic-profile <i>profile-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 9.3.
Description	Specify 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.
Options	<i>primary-profile-name</i> —Name of the dynamic profile to configure as the primary dynamic profile
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

use-primary

Syntax	<code>use-primary <i>primary-profile-name</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit system services dhcp-local-server dynamic-profile <i>profile-name</i>]</p> <p>[edit system services dhcp-local-server group <i>group-name</i> dynamic-profile <i>profile-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 9.3.
Description	Specify 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.
Options	<i>primary-profile-name</i> —Name of the dynamic profile to configure as the primary dynamic profile
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	■ Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication username-include],
 [edit system services dhcp-local-server dhcpv6 group *group-name* 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 66

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 66

username-include

Syntax username-include {
 circuit-type;
 client-id;
 delimiter *delimiter-character*;
 domain-name *domain-name-string*;
 logical-system-name;
 mac-address;
 option-60;
 option-82 <circuit-id> <remote-id>;
 relay-agent-interface-id;
 relay-agent-remote-id;
 relay-agent-subscriber-id;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],
 [edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* 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 dhcpv6 authentication],

```
[edit system services dhcp-local-server dhcpv6 group group-name 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. The **option-60** and **option-82** statements are not supported in the DHCPv6 hierarchy levels. The **client-id**, **relay-agent-interface-id**, **relay-agent-remote-id** and **relay-agent-subscriber-id** statements are supported in the DHCPv6 hierarchy levels only.

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 66
- Creating Unique Usernames for DHCP Clients on page 78

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 66

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 113

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.
Statement introduced in JUNOS Release 9.1 for EX Series switches.

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 ■ Configuring RADIUS Server Options for Subscriber Access on page 25
■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

wins-server

Syntax	wins-server { <i>ipv4-address</i> ; }
Hierarchy Level	[edit access address-assignment pool <i>pool-name</i> 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	<i>ipv4-address</i> —IP address of each NetBIOS name server; add them to the configuration 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 48

Part 3

Diameter Base Protocol and Applications for Subscriber Access

- Diameter Base Protocol Overview on page 321
- Configuring Diameter Base Protocol on page 323
- Summary of Diameter Base Protocol Statements on page 335
- JSRC and Juniper Networks Session Resource Control (SRC) Overview on page 349
- Configuring JSRC for Subscriber Access on page 357
- Summary of JSRC Statements on page 361
- Subscribers on Static Interfaces on page 367
- Configuring Subscribers over Static Interfaces on page 371
- Static Subscribers for Subscriber Access Examples on page 385
- Summary of Static Subscriber Statements on page 387

Chapter 11

Diameter Base Protocol Overview

- Diameter Base Protocol Overview on page 321

Diameter Base Protocol Overview

The Diameter protocol is defined in *RFC 3588, Diameter Base Protocol*, and provides an alternative to RADIUS that is more flexible and extensible. The Diameter base protocol provides basic services to one or more applications (also called functions) that each runs in a different Diameter instance. The individual application provides the extended AAA functionality. JSRC is the first application that is supported.

Diameter peers communicate over a TCP transport layer connection by exchanging Diameter messages that convey status, requests, and acknowledgments by means of standard Diameter AVPs and application-specific AVPs. The Diameter transport layer configuration is based on Diameter network elements (DNEs); multiple DNEs per Diameter instance are supported. Currently only the predefined *master* Diameter instance is supported, but you can configure alternative values for many of the master Diameter instance values.

Each DNE consists of a prioritized list of peers and a set of routes that define how traffic is forwarded. Each route associates a destination with a function, a function partition, and a metric. When an application sends a message to a routed destination, all routes within the Diameter instance are examined for a match. When the best route to the destination has been selected, the message is forwarded by means of the DNE that includes that route.

Multiple routes to the same destination can exist within a given DNE and in different DNEs. In the case of multiple routes that match a request for forwarding, the best route is selected as follows:

1. The route with the lowest metric is selected.
2. In the event of a tie, the route with the highest specification score is selected.
3. In the event of another tie, then the names of the DNEs are compared in lexicographical order. The route in the DNE with the lowest value is selected. For example, dne-austin has a lower value than dne-boston.
4. If the routes are tied within the same DNE, then the route names are compared in lexicographical order. The route with the lowest value is selected.

The specification score of a route is 0 by default. Points are added to the score as follows:

- If the destination realm matches the request, add 1.
- If the destination host matches the request, add 2.
- If the function matches the request, add 3.
- If the function partition matches the request, add 4.

When the state of any DNE changes, the route lookup for all destinations is reevaluated. All outstanding messages to routed destinations are rerouted as needed, or discarded.

To configure a Diameter network element, include the **network-element** statement at the **[edit diameter]** hierarchy level. Include the **route** statement at the **[edit diameter network-element *element-name* forwarding]** hierarchy level. To configure a route for the DNE, include the **destination** (optional), **function** (optional), and **metric** statements at the **[edit diameter network-element *element-name* forwarding route *dne-route-name*]** hierarchy level. Specify the Diameter peers associated with the DNE by including one or more **peer** statements at the **[edit diameter network-element *element-name*]** hierarchy level. Set the priority for each peer with the **priority** statement at the **[edit diameter network-element *element-name* peer *peer-name*]** hierarchy level.

Diameter requires you to configure information about the origin node; this is the endpoint node that originates Diameter for the Diameter instance. Include the **host** and **realm** statements at the **[edit diameter]** hierarchy level to configure the Diameter origin.

Each Diameter peer is specified by a name. Peer attributes include address and the destination TCP port used by active connections to this peer. To configure a Diameter peer, include the **peer** statement at the **[edit diameter]** hierarchy level. Include the **address** and **connect-actively** statements at the **[edit diameter peer *peer-name*]** hierarchy level. To configure the active connection, include the **port** statement at the **[edit diameter peer *peer-name* connect-actively]** hierarchy level.

Related Topics

- Configuring Diameter on page 323
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349

Chapter 12

Configuring Diameter Base Protocol

- Configuring Diameter on page 323
- Configuring the Origin Attributes of the Diameter Instance on page 324
- Configuring Diameter Peers on page 324
- Configuring Diameter Network Elements on page 325
- Tracing Diameter Base Protocol Processes on page 326
- Troubleshooting Diameter Network Configuration on page 329
- Troubleshooting Diameter Network Connectivity on page 330
- Verifying Diameter Node, Instance, and Route Information on page 330
- Verifying and Managing Diameter Function Information on page 331
- Verifying and Managing Diameter Peer Information on page 332
- Verifying Diameter Network Element Information on page 333

Configuring Diameter

You configure Diameter by specifying the remote peers, the endpoint origin attributes, and network elements that associate routes with peers. Only the master Diameter instance is currently supported. You can configure alternative values for the master instance only in the context of the master routing instance.

To configure Diameter base protocol:

1. Configure the origin realm and origin host of the diameter master instance.

See “Configuring the Origin Attributes of the Diameter Instance” on page 324
2. Configure the Diameter peers.

See “Configuring Diameter Peers” on page 324
3. (Optional) Configure the Diameter network elements.

See “Configuring Diameter Network Elements” on page 325
4. (Optional) Configure trace options for troubleshooting the configuration.

See “Tracing Diameter Base Protocol Processes” on page 326.

Configuring the Origin Attributes of the Diameter Instance

You can configure the identifying characteristics of the endpoint node that originates Diameter messages for the Diameter instance. The hostname is supplied as the value for the Origin-Host AVP by the Diameter instance. The realm is supplied as the value for the Origin-Realm AVP by the Diameter instance.

To configure the origin attributes for a Diameter instance:

1. Specify the name of the host that originates the Diameter message.

```
[edit diameter origin]
user@host# set host host14
```

2. Specify the realm of the host that originates the Diameter message.

```
[edit diameter origin]
user@host# set realm example.com
```

- Related Topics**
- Configuring Diameter on page 323
 - origin

Configuring Diameter Peers

You can configure the peers to which Diameter sends messages. By default, logical system *default* and routing instance *master* are used. Port 3868 is used for active connections to peers by default.

To configure a remote peer for a Diameter instance:

1. Specify the name of the Diameter peer.

```
[edit diameter]
user@host# set peer p3
```

2. Specify the address of the Diameter peer.

```
[edit diameter peer p3]
user@host# set address 192.168.23.10
```

3. (Optional) Specify a routing instance, a logical system, or a logical system and routing instance for the Diameter peer.

```
[edit diameter peer p3]
user@host# set routing-instance ri8
```

```
[edit diameter peer p3]
user@host# set logical-system ls10
```

```
[edit diameter peer p3]
user@host# set logical-system ls10 routing-instance ri8
```

4. (Optional) Specify the port that Diameter uses for active connections to the peer.

```
[edit diameter peer p3]
user@host# set connect-actively port 49152
```

Related Topics ■ Configuring Diameter on page 323

Configuring Diameter Network Elements

A Diameter network element (DNE) consists of a list of prioritized peers and a set of forwarding rules. The forwarding rules define individual routes through a set of associated destinations, functions, and metrics.

Before you configure Diameter network elements, perform the following task:

- Define the Diameter peers. See “Configuring Diameter Peers” on page 324.

To configure a Diameter network element:

1. Specify the name of the network element.

```
[edit diameter]
user@host# set network-element dne25
```

2. Associate a Diameter peer with the network element and set the priority for the peer.

```
[edit diameter network-element dne25]
user@host# set peer peer1 priority 1
```

3. Specify a route that is reachable through the network element based on the forwarding rules that you define.

```
[edit diameter network-element dne25]
user@host# set forwarding route dne-route2
```

4. Specify a metric for the route.

```
[edit diameter network-element dne25 forwarding route dne-route2]
user@host# set metric 15
```

5. (Optional) Associate the route with a destination host and realm.

```
[edit diameter network-element dne25 forwarding route dne-route2]
user@host# set destination host host5 realm example.com
```

6. (Optional) Specify a function (application) associated with the route.

```
[edit diameter network-element dne25 forwarding route dne-route2]
user@host# set function jsrc
```

Related Topics ■ Configuring Diameter on page 323

Tracing Diameter Base Protocol Processes

The JUNOS Software trace operations feature tracks Diameter base protocol operations and records events in a log file. By default, the tracing operation is inactive. To trace Diameter base protocol processes, you specify flags in the `traceoptions` statement at the `[edit system processes diameter-service]` hierarchy level.

The default tracing behavior is the following:

1. Important events are logged in a file called `jdiameterd` located in the `/var/log` directory. You cannot change the directory (`/var/log`) in which trace files are located.
2. When the file `jdiameterd` reaches 128 kilobytes (KB), it is renamed `jdiameterd.0`, then `jdiameterd.1`, and so on, until there are three trace files. Then the oldest trace file (`jdiameterd2`) is overwritten. For more information about how log files are created, see the *JUNOS System Log Messages Reference*.

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

To configure Diameter base protocol tracing operations:

1. Specify that you want to configure tracing options.

```
[edit system processes diameter-service]
user@host# edit traceoptions
```

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

See “Configuring the Diameter Base Protocol Trace Log Filename” on page 327.

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

See “Configuring the Number and Size of Diameter Base Protocol IP Log Files” on page 327.

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

See “Configuring Access to the Diameter Base Protocol Log File” on page 328.

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

See “Configuring a Regular Expression for Diameter Base Protocol Lines to Be Logged” on page 328.

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

See “Configuring the Diameter Base Protocol Tracing Flags” on page 328.

The tracing options are described in the following sections:

- Configuring the Diameter Base Protocol Trace Log Filename on page 327
- Configuring the Number and Size of Diameter Base Protocol IP Log Files on page 327
- Configuring Access to the Diameter Base Protocol Log File on page 328
- Configuring a Regular Expression for Diameter Base Protocol Lines to Be Logged on page 328
- Configuring the Diameter Base Protocol Tracing Flags on page 328

Configuring the Diameter Base Protocol Trace Log Filename

By default, the name of the file that records trace output for Diameter base protocol is `jdiameterd`. You can specify a different name by including the `file` statement at the `[edit system processes diameter-service]` hierarchy level:

To configure the filename for Diameter base protocol tracing operations:

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

```
[edit system processes diameter-service traceoptions]
user@host# set file diam_logfile_1
```

Configuring the Number and Size of Diameter Base Protocol 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. (Diameter base protocol supports the `files` and `size` options for the `traceoptions` statement.)

```
[edit system processes diameter-service traceoptions]
user@host# set file diam_1_logfile_1 files 20 size 2097152
```

Configuring Access to the Diameter Base Protocol Log File

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

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit system processes diameter-service traceoptions]
user@host# set file diam_1 _logfile_1 world-readable
```

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

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

```
[edit system processes diameter-service traceoptions]
user@host# set file diam_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for Diameter Base Protocol 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 processes diameter-service traceoptions]
user@host# set file diam_1 _logfile_1 match regex
```

Configuring the Diameter Base Protocol 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
application	Trace Diameter application interface events
configuration	Trace configuration events
daemon	Trace daemon level events

Flag	Description
diameter-instance	Trace Diameter instance events
dne	Trace Diameter DNE events
framework	Trace Diameter framework
memory-management	Trace memory management events
messages	Trace Diameter messages
node	Trace Diameter node events
peer	Trace Diameter peer events

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit system processes diameter-service traceoptions]
user@host# set flag dne
```

Troubleshooting Diameter Network Configuration

Problem A misconfiguration of the network can prevent Diameter from functioning properly. Configuration options for the Diameter base protocol are simple in the current release; this should simplify discovering where a misconfiguration exists.

The output of the **show diameter peer** command indicates a peer is in the no-activation state. In this case issue the **show diameter peer map** and **show diameter network-element map** commands to determine which network elements use the peer. The output of these commands can indicate why the peer is not activated. For example, all the associated network elements might have higher-priority peers in the open state.

The failed-to-forward counters are increasing in the output of the **show diameter function statistics detail** command. this can indicate that the routes to the peer are incorrectly configured. Check the network connectivity, then use the **show diameter routes** command to determine whether application traffic is being correctly forwarded.

Cause Typical misconfigurations appear in the routes, peers, and network element configurations.

Solution Use the appropriate statements to correct the misconfiguration.

Related Topics

- **show diameter function statistics**
- **show diameter network-element map**
- **show diameter peer**
- **show diameter peer map**
- **show diameter route**

Troubleshooting Diameter Network Connectivity

Problem In some circumstances, problems can arise with network connectivity to Diameter peers. The problem may originate with the peer or the peer host.

The output of the **show diameter peer** command indicates a peer is in the suspended, rejected, or bad-peer state.

Cause The suspended state indicates that the peer is not responding or has some other malfunction, or the network path to the peer does not exist.

The rejected state indicates that the network connection has been rejected by the peer.

The bad-peer state indicates that the network connection has been rejected by the router on which the peer resides.

Solution Determine how persistent the problem is by issuing the **show diameter peer statistics peer-name brief** command to check the connectivity statistics.

Related Topics

- **show diameter peer**
- **show diameter peer statistics**

Verifying Diameter Node, Instance, and Route Information

Purpose View Diameter node information:

- Action**
- To display summary information about all Diameter nodes:

```
user@host> show diameter
```
 - To display the summary information about all Diameter nodes and add information about Diameter functions, instances, network elements, and peers:

```
user@host> show diameter brief
```
 - To display the brief information about all Diameter nodes and add information about Diameter routes:

```
user@host> show diameter detail
```
 - To display summary information about all Diameter instances:

```
user@host> show diameter instance
```
 - To display detailed information about all Diameter instances:

```
user@host> show diameter instance detail
```
 - To display information about a specific Diameter instance, add the instance name to the command:


```
user@host> show diameter instance master
```

```
user@host> show diameter instance detail master
```

- To display summary information about all Diameter routes:

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

- To display detailed information about all Diameter routes:

```
user@host> show diameter route detail
```

- To display information about a specific Diameter route, add the route name to the command:

```
user@host> show diameter route dne-route2
```

```
user@host> show diameter route detail dne-route2
```

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

Verifying and Managing Diameter Function Information

Purpose View or clear Diameter function information:

- Action** ■ To display summary information about all functions associated with Diameter:

```
user@host> show diameter function
```

- To display detailed information about all functions associated with Diameter:

```
user@host> show diameter function detail
```

- To display information about a specific function associated with Diameter, add the function name to the command:

```
user@host> show diameter function jsr
```

```
user@host> show diameter function detail jsr
```

- To display summary statistics about all functions associated with Diameter:

```
user@host> show diameter function statistics
```

- To display detailed statistics about all functions associated with Diameter:

```
user@host> show diameter function statistics detail
```

- To display statistics about a specific function associated with Diameter, add the function name to the command:

```
user@host> show diameter function statistics jsr
```

```
user@host> show diameter function statistics detail jsr
```

- To delete current statistics for all functions associated with Diameter:

```
user@host>clear diameter function statistics
```
- To delete current statistics for a specific function associated with Diameter:

```
user@host>clear diameter function jsrsc statistics
```

Related Topics ■ For more information, see the *JUNOS System Basics and Services Command Reference*

Verifying and Managing Diameter Peer Information

Purpose View or clear Diameter peer information:

- Action**
- To display summary information about all Diameter peers:

```
user@host> show diameter peer
```
 - To display detailed information about all Diameter peers:

```
user@host> show diameter peer detail
```
 - To display information about a specific Diameter peer, add the peer name to the command:

```
user@host> show diameter peer peer235
```

```
user@host> show diameter peer detail peer235
```
 - To display summary information about Diameter peer-to-network-element mapping for all peers:

```
user@host> show diameter peer map
```
 - To display detailed information about Diameter peer-to-network-element mapping for all peers:

```
user@host> show diameter peer map detail
```
 - To display information about Diameter peer-to-network-element mapping for a specified peer, add the peer name to the command:

```
user@host> show diameter peer map peer235
```

```
user@host> show diameter peer map detail peer235
```
 - To display summary statistics about all Diameter peers:

```
user@host> show diameter peer statistics
```
 - To display detailed statistics about all Diameter peers:

```
user@host> show diameter peer statistics detail
```

- To display summary statistics about a specified Diameter peer:

```
user@host> show diameter peer statistics peer235
```

- To display detailed statistics about a specified Diameter peer:

```
user@host> show diameter peer statistics detail peer235
```

- To delete the specified Diameter peer and all of its statistics.

```
user@host> clear diameter peer peer5 connection
```

- To delete the specified Diameter peer and its current statistics:

```
user@host> clear diameter peer peer5 statistics
```

Related Topics ■ For more information, see the *JUNOS System Basics and Services Command Reference*

Verifying Diameter Network Element Information

Purpose View Diameter network element information:

- Action** ■ To display summary information about Diameter network elements:

```
user@host> show diameter network-element
```

- To display detailed information about Diameter network elements:

```
user@host> show diameter network-element detail
```

- To display information about Diameter network elements for a specified network element, include the element name in the command:

```
user@host> show diameter network-element dne-1
```

```
user@host> show diameter network-element detail dne-1
```

- To display summary information about Diameter network-element-to-peer mapping for all network elements:

```
user@host> show diameter network-element map
```

- To display detailed information about Diameter network-element-to-peer mapping for all network elements:

```
user@host> show diameter network-element map detail
```

Related Topics ■ For more information, see the *JUNOS System Basics and Services Command Reference*

Chapter 13

Summary of Diameter Base Protocol Statements

address

Syntax address *ip-address*;

Hierarchy Level [edit diameter peer *peer-name*]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure the IP address for a Diameter remote peer.

Options *ip-address*—IP address of remote Diameter peer.

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

Related Topics ■ Configuring Diameter on page 323
 ■ Configuring Diameter Peers on page 324

connect-actively

Syntax	connect-actively { port <i>port-number</i> ; }
Hierarchy Level	[edit diameter peer <i>peer-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Define the destination port used to establish active connections to Diameter peer. The remaining statements are explained separately.
Default	By default, port 3868 and an automatically assigned local address are used to establish active connections to a peer.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Peers on page 324

destination

Syntax	destination realm <i>realm-name</i> <host <i>hostname</i> >;
Hierarchy Level	[edit diameter network-element <i>element-name</i> forwarding route <i>dne-route-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Associate the route with all hosts of the specified realm or with a specific host of the specified realm. Together with the function and metric, defines a route reachable through a Diameter network element.
Options	<p>host <i>hostname</i>—(Optional) Name of the destination host associated with the route.</p> <p>realm <i>realm-name</i>—Name of the destination realm associated with the route.</p>
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325

diameter

Syntax

```
diameter {
  network-element element-name {
    forwarding {
      route dne-route-name {
        destination realm realm-name <host hostname>;
        function function-name <partition partition-name>;
        metric route-metric;
      }
    }
    peer peer-name {
      priority priority-number;
    }
  }
  origin {
    host hostname;
    realm realm-name;
  }
  peer peer-name {
    address ip-address;
    connect-actively {
      port port-number;
    }
    logical-system logical-system-name <routing-instance routing-instance-name> ;
    routing-instance routing-instance-name;
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure the Diameter base protocol for subscriber management.

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 Diameter on page 323
- Configuring Diameter on page 323

forwarding

Syntax	<pre>forwarding { route <i>dne-route-name</i> { destination realm <i>realm-name</i> <host <i>hostname</i>>; function <i>function-name</i> <partition <i>partition-name</i>>; metric <i>route-metric</i>; } }</pre>
Hierarchy Level	[edit diameter network-element <i>element-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Define the criteria that specify which destinations are reachable through the Diameter network element.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325

function

Syntax	function <i>function-name</i> <partition <i>partition-name</i> >;
Hierarchy Level	[edit diameter network-element <i>element-name</i> forwarding route <i>dne-route-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the application (function) associated with a destination and metric. Together, these three elements define a route reachable through a Diameter network element.
Default	By default, all functions are associated with the route.
Options	<p><i>function-name</i>—Application (function) associated with the route. JSRC is the only application currently supported.</p> <p><i>partition partition-name</i>—(Optional) Partition associated with the application (function).</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325

host

Syntax	host <i>hostname</i> ;
Hierarchy Level	[edit diameter origin]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the name of the host that originates the Diameter message.
Options	<i>hostname</i> —Name of the message origin host. Supplied as the value of Origin-Host AVP for all messages sent by the Diameter master instance.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring the Origin Attributes of the Diameter Instance on page 324

logical-system

Syntax	logical-system <i>logical-system-name</i> <routing-instance <i>routing-instance-name</i> > ;
Hierarchy Level	[edit diameter peer <i>peer-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specifies a logical system and optionally a routing instance for a Diameter peer. Alternatively, you can include the routing-instance statement at the [edit diameter peer <i>peer-name</i>] hierarchy level to configure only a routing instance.
Options	<p><i>logical-system-name</i>—(Optional) Name of the logical system. Default: By default, the default logical system is used.</p> <p><i>routing-instance routing-instance-name</i>—(Optional) Name of the routing instance. Default: By default, the master routing instance is used.</p>
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Peers on page 324

metric

Syntax	<code>metric route-metric;</code>
Hierarchy Level	[edit diameter network-element <i>element-name</i> forwarding route <i>dne-route-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the metric associated with a destination and function. Together, these three elements define a route reachable through a Diameter network element. A lower metric makes a route more preferred.
Options	<i>route-metric</i> —Metric assigned to the route. Range: 0 through 255
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring Diameter on page 323■ Configuring Diameter Network Elements on page 325

network-element

Syntax network-element *element-name* {
 forwarding {
 route *dne-route-name* {
 destination realm *realm-name* <host *hostname*> ;
 function *function-name* <partition *partition-name*>;
 metric *route-metric*;
 }
 }
 peer *peer-name* {
 priority *priority-number*;
 }
 }

Hierarchy Level [edit diameter]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the transport layer Diameter configuration. The Diameter network element includes a list of routes reachable through the Diameter instance, associated functions, and prioritized Diameter peers.

The remaining statements are explained separately.

Options *element-name*—Name of the network element.

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

Related Topics ■ Configuring Diameter on page 323
 ■ Configuring Diameter Network Elements on page 325

origin

Syntax	<pre>origin { host <i>hostname</i>; realm <i>realm-name</i>; }</pre>
Hierarchy Level	[edit diameter]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Specify values of Origin-Realm-AVP and Origin-Host-AVP used in all messages sent by the Diameter instance.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring the Origin Attributes of the Diameter Instance on page 324

peer

Syntax	<pre>peer <i>peer-name</i> { address <i>ip-address</i>; connect-actively { port <i>port-number</i>; } logical-system <i>logical-system-name</i> <routing-instance <i>routing-instance-name</i>>; routing-instance <i>routing-instance-name</i>; }</pre>
Hierarchy Level	[edit diameter]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Configure a remote peer for the Diameter instance.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325 ■ Configuring Diameter Peers on page 324

peer

Syntax	<code>peer <i>peer-name</i> { priority <i>priority-value</i>; }</code>
Hierarchy Level	[edit diameter network-element <i>element-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Define and prioritize a peer associated with a Diameter network element. The remaining statements are explained separately.
Options	<i>peer-name</i> —Name of the peer.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325 ■ Configuring Diameter Peers on page 324

port

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit diameter peer <i>peer-name</i> connect-actively]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the destination TCP port used by the active connection to peer.
Options	<i>port-number</i> —Number of the TCP port. Default: 3868
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Peers on page 324

priority

Syntax	<code>priority <i>priority-value</i>;</code>
Hierarchy Level	[edit diameter network-element <i>element-name</i> peer <i>peer-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Set the priority for a peer within a Diameter network element. A peer with a lower number has a higher priority.
Options	<i>priority-value</i> —Priority for the peer within the network element. Range: 1 through 65535
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325

realm

Syntax	<code>realm <i>realm-name</i>;</code>
Hierarchy Level	[edit diameter origin]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the realm of the host that originates the Diameter message.
Options	<i>realm-name</i> —Name of the message origin realm. Supplied as the value of Origin-Realm AVP for all messages sent by the Diameter master instance.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring the Origin Attributes of the Diameter Instance on page 324

route

Syntax	route <i>dne-route-name</i> { destination realm <i>realm-name</i> <host <i>hostname</i> >; function <i>function-name</i> <partition <i>partition-name</i> >; metric <i>route-metric</i> ; }
Hierarchy Level	[edit diameter network-element <i>element-name</i> forwarding]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Define a route reachable through the Diameter network element by associating a metric with a combination of destination and function partition. The remaining statements are explained separately.
Options	<i>dne-route-name</i> —Route name defined for the Diameter network element.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Network Elements on page 325

routing-instance

Syntax	routing-instance <i>routing-instance-name</i> ;
Hierarchy Level	[edit diameter peer <i>peer-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify a routing instance for a Diameter peer. Alternatively, you can include the <i>logical-system</i> statement at the [edit diameter peer <i>peer-name</i>] hierarchy level to configure a logical and routing instance.
Default	By default, the master routing instance is used.
Options	<i>routing-instance-name</i> —Name of the routing instance.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Diameter on page 323 ■ Configuring Diameter Peers on page 324

traceoptions

Syntax traceoptions {
 file <filename> <files number> <match regular-expression > <size maximum-file-size>
 <world-readable | no-world-readable>;
 flag flag;
 level (all | error | info | notice | verbose | warning);
 no-remote-trace;
 }

Hierarchy Level [edit system processes diameter-service]

Release Information Statement introduced in JUNOS Release 9.6.

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.

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
- application—Trace Diameter application interface events
- configuration—Trace configuration events
- daemon—Trace Diameter daemon level events
- diameter-instance—Trace Diameter instance events
- dne—Trace Diameter network element events
- framework—Trace Diameter framework events
- memory-management—Trace memory management events
- messages—Trace Diameter messages
- node—Trace Diameter node events
- peer—Trace Diameter peer events

level—Level of tracing to perform. You can specify any of the following levels:

- all—Match all levels.

- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

size *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.

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 Diameter Base Protocol Processes on page 326

Chapter 14

JSRC and Juniper Networks Session Resource Control (SRC) Overview

- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349
- Diameter Messages Exchanged by JSRC and the SAE on page 350
- Understanding Diameter AVPs on page 351
- Understanding JSRC-SAE Interactions on page 354

Juniper Networks Session and Resource Control (SRC) and JSRC Overview

The Juniper Networks Session and Resource Control (SRC) environment provides a central administrative point for managing subscribers and their services. The SRC software runs on Juniper Networks C Series Controllers. The SRC software uses the Diameter protocol for communications between the local SRC peer on a Juniper Networks routing platform and the remote SRC peer on a C Series Controller. The local SRC peer is known as JSRC and is part of the AAA application. The remote SRC peer is the service activation engine (SAE); the SAE acts as the controlling agent in the SRC environment. JSRC and the SAE jointly provide the remote control enforcement functionality (RCEF).

JSRC has the following responsibilities:

- Request address authorization from the SAE.
- Request service activations from the SAE.
- Activate and deactivate services as specified by the SAE.
- Log out subscribers as specified by the SAE.
- Update the SAE with status of new service activations and deactivations.
- Synchronize subscriber state and service information with the SAE.
- Notify the SAE when subscribers log out.

The SRC software enables the SAE to activate and deactivate subscriber services (described by SRC policies) and log out subscribers. The SAE can control only those resources that have been provisioned through SAE. Therefore, the SAE receives information about only those subscribers for whom JSRC has requested provisioning from the SAE. For example, when a subscriber logs in, but the configuration did not

require the session activation path to include SAE provisioning, the SAE does not receive information about this subscriber and cannot control the subscriber session.

Similarly, the SAE can control only the subscriber services that it has activated. When a service is not activated from the SAE—a RADIUS-activated service, for example—the SAE receives no information about the service and has no control over it.

Hardware Requirements for JSRC for Subscriber Access

JSRC is supported on Juniper Networks MX Series Ethernet Services Routers. JSRC currently supports subscriber sessions on static and dynamic interfaces.

- Related Topics**
- Configuring JSRC on page 357
 - Diameter Messages Exchanged by JSRC and the SAE on page 350
 - Understanding JSRC-SAE Interactions on page 354

Diameter Messages Exchanged by JSRC and the SAE

JSRC is a Juniper Networks Diameter application registered with the IANA (<http://www.iana.org>) as Juniper Policy-Control-JSRC, with an ID of 16777244. JSRC and the SAE communicate by exchanging the Diameter messages described in Table 26 on page 350.

Table 26: Diameter Messages Used by JSRC and the SAE

Diameter Message	Code	Description
AA-Request (AAR)	265	Request from JSRC to the SAE at subscriber login or during SAE-JSRC synchronization. The request can be one of three types: address-authorization, provisioning-request, or synchronization.
AA-Answer (AAA)	265	Response from the SAE to the JSRC AA-Request message.
Abort-Session-Request (ASR)	274	Request from the SAE to JSRC to log out a provisioned subscriber.
Abort-Session-Answer (ASA)	274	Response from JSRC to the SAE ASR message. If the application sends the logout request to AAA, the ASA message includes a success notification (ACK). If the logout failed, the ASA message includes a failure notification (NAK).
Push-Profile-Request (PPR)	288	Request from the SAE to JSRC to activate or deactivate services after a subscriber logs in.
Push-Profile-Answer (PPA)	288	Response from JSRC to the SAE PPR message. Includes success or failure notification for each of the service activation or deactivation commands in the request.
Session-Resource-Query (SRQ)	277	Request from JSRC to the SAE or from the SAE to JSRC to initiate synchronization between JSRC and the SAE.
Session-Resource-Reply (SRR)	277	Response to the SRQ message to begin synchronization.

Table 26: Diameter Messages Used by JSRC and the SAE *(continued)*

Diameter Message	Code	Description
Session-Termination-Request (STR)	275	Notification from JSRC to the SAE that a provisioned subscriber has logged out.
Session-Termination-Answer (STA)	275	Response from the SAE to the JSRC STR message

- Related Topics**
- Configuring JSRC on page 357
 - Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349
 - Understanding Diameter AVPs on page 351
 - Understanding JSRC-SAE Interactions on page 354

Understanding Diameter AVPs

Diameter conveys information by including various attribute-value pairs (AVPs) in Diameter messages. Table 27 on page 351 lists the standard Diameter AVPs used in JSRC interactions.

Table 27: Standard Diameter AVPs

Code Number	Diameter AVP	Description	Type
1	User-Name	Specifies the username. For a subscriber managed by AAA, the value is the subscriber's login name. For a static interface, the value is the interface name, which is used as the subscriber's login name.	UTF8String
268	Result-Code	<p>Indicates whether a request completed successfully. Provides an error code if the request failed.</p> <p>The following classes are recognized by Diameter:</p> <ul style="list-style-type: none"> ■ 1xxx—Informational ■ 2xxx—Success ■ 3xxx—Protocol errors ■ 4xxx—Transient errors ■ 5xxx—Permanent failures <p>Unrecognized classes, which begin with numerals 6–9 or 0, are handled as permanent failures.</p> <p>JSRC supports the following values; all non-success values are treated as permanent failures:</p> <p>1001—DIAMETER_MULTI_ROUND_AUTH</p> <ul style="list-style-type: none"> ■ 2001—DIAMETER_SUCCESS ■ 5002—DIAMETER_UNKNOWN_SESSION_ID ■ 5012—DIAMETER_UNABLE_TO_COMPLY 	Unsigned32

Table 27: Standard Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
277	Auth-Session-State	Indicates whether AAA session state is maintained. <ul style="list-style-type: none"> ■ 0—STATE_MAINTAINED ■ 1—NO_STATE_MAINTAINED 	Enumerated
295	Termination-Cause	Indicates the reason why a session was terminated on the access device. <ul style="list-style-type: none"> ■ 1—DIAMETER_LOGOUT ■ 2—DIAMETER_SERVICE_NOT_PROVIDED ■ 3—DIAMETER_BAD_ANSWER ■ 4—DIAMETER_ADMINISTRATIVE ■ 5—DIAMETER_LINK_BROKEN ■ 6—DIAMETER_AUTH_EXPIRED ■ 7—DIAMETER_USER_MOVED ■ 8—DIAMETER_SESSION_TIMEOUT 	Enumerated

Juniper Networks AVPs are used in addition to the standard Diameter AVPs. These AVPs have an enterprise number of 2636. Table 28 on page 352 lists the Juniper Networks AVPs used in JSRC interactions.

Table 28: Juniper Networks Diameter AVPs

Code Number	Diameter AVP	Description	Type
2010	Juniper-DHCP-Options	Specifies the client's DHCP options.	OctetString
2011	Juniper-DHCP-Relay-Address	Specifies the DHCP relay agent's IP address.	OctetString
2020	Juniper-Policy-Install	Specifies policies to be activated for the subscriber. Includes Juniper-Policy-Name and Juniper-Policy-Definition	Grouped
2021	Juniper-Policy-Name	Defines the name of a policy decision.	OctetString
2022	Juniper-Policy-Definition	Defines a policy decision. Includes Juniper-Policy-Name, Juniper-Template-Name, and Juniper-Substitution.	Grouped
2023	Juniper-Template-Name	Profile name defined by the router.	UTF8String
2024	Juniper-Substitution	Defines the substitution attributes. Includes Juniper-Substitution-Name and Juniper-Substitution-Value.	OctetString
2025	Juniper-Substitution-Name	Defines the name of the variable to be replaced.	OctetString
2026	Juniper-Substitution-Value	Defines the value of the variable to be replaced.	OctetString
2027	Juniper-Policy-Remove	Specifies policies to be deactivated for the subscriber. Includes Juniper-Policy-Name.	Grouped

Table 28: Juniper Networks Diameter AVPs (continued)

Code Number	Diameter AVP	Description	Type
2035	Juniper-Policy-Failed	Specifies the name of the policy activation or deactivation that failed.	OctetString
2038	Juniper-Policy-Success	Specifies the name of the policy activation or deactivation that succeeded.	OctetString
2046	Juniper-Logical-System	Specifies the logical system.	UTF8String
2047	Juniper-Routing-Instance	Specifies the routing instance.	UTF8String
2048	Juniper-Jsrc-Partition	Specifies the logical system and routing instance for the subscriber or request. Includes Juniper-Logical-System and Juniper-Routing-Instance	Grouped
2050	Juniper-Request-Type	Describes the type of request: <ul style="list-style-type: none"> ■ 1—ADDRESS_AUTHORIZATION ■ 2—PROVISIONING_REQUEST ■ 3—SYNCHRONIZATION 	Enumerated
2051	Juniper-Synchronization-Type	Describes the type of synchronization: <ul style="list-style-type: none"> ■ 1—FULL-SYNC ■ 2—FAST-SYNC ■ 3—NO-STATE-TO-SYNC 	Enumerated
2052	Juniper-Synchronization	Describes the state of synchronization: <ul style="list-style-type: none"> ■ 1—NO-SYNC; this is the default state ■ 2—SYNC-IN-PROGRESS ■ 3—SYNC-COMPLETE 	Enumerated

- Related Topics**
- Diameter Messages Exchanged by JSRC and the SAE on page 350
 - Understanding JSRC-SAE Interactions on page 354

Understanding JSRC-SAE Interactions

This topic describes the sequences of Diameter messages exchanged between JSRC and the SAE as they interact to perform the following tasks for subscriber access:

- Subscriber login
- Service activation
- Service deactivation
- Resynchronization
- SAE-initiated subscriber logout
- Subscriber-initiated logout

Subscriber Login

JSRC authorization is enabled for DHCP subscribers when you include the `authorization-order jsrc` statement at the `[edit access profile profile-name]` hierarchy level. This setting causes AAA to ignore the authentication order setting in the access profile. As a result, AAA does not authenticate the DHCP subscribers. For non-DHCP subscribers, AAA ignores the `authorization-order` statement.

When a DHCP subscriber attempts to log in, DHCP sends an authentication request to AAA. In turn, JSRC sends a Diameter AA-Request message to the SAE. SAE returns a Diameter AA-Answer message that can include the Framed-IP-Address attribute and the Juniper-DHCP-Options AVP (AVP code 2010). JSRC ignores any other optional AVPs included in this AA-Answer message.

JSRC provisioning is enabled for DHCP (and SSC) subscribers when you include the `provisioning-order` statement at the `[edit access profile profile-name]` hierarchy level. When the application requests AAA to activate the subscriber's session, JSRC sends an AA-Request message to request service provisioning from the SAE.

The SAE returns a AA-Answer message that includes the Juniper-Request-Type AVP (AVP code 2050) with a value that indicates provisioning was requested. The message also contains an ACK if the request is accepted or a NAK if the request is denied.

The AA-Answer message can include the Juniper-Policy-Install AVP (AVP code 2020), which is used to specify a service to attach to the subscriber's interface. In this case, the AA-Answer message does not include a Framed-IP-Address attribute. JSRC ignores any other optional AVPs included in this AA-Answer message.

When the service is activated for the subscriber, JSRC sends an AA-Request message to the SAE to confirm activation. The SAE returns a AA-Answer message in acknowledgment.

Subscriber Service Activation and Deactivation

SAE policies provision subscriber services. After a subscriber is logged in, the SAE can send a PPR message to JSRC to activate or deactivate services. A given PPR can

include the Juniper-Policy-Install AVP (AVP code 2020) to activate a service, the Juniper-Policy-Remove AVP (AVP code 2027) to deactivate a service, or both (for different services). A PPR can include no more than three of these AVPs (install, remove, or mixed).

JSRC sends a PPA message to the SAE when it has completed the tasks requested in the PPR. The PPA indicates the success or failure of the actions requested in the PPR.



NOTE: If you use RADIUS or the CLI to deactivate a service that the SAE, the SAE becomes unsynchronized with the state of subscribers on the routing engine.

Subscriber Resynchronization

During resynchronization, JSRC informs the SAE about the services that are active for the provisioned subscribers. Either JSRC or the SAE initiates the resynchronization.

The SAE initiates resynchronization at startup or when a backup SAE takes over session control due to resource limits or conditions on the primary SAE. The SAE clears its database of all entries in preparation for the synchronization.

JSRC initiates resynchronization at JSRC startup, such as when AAA starts or restarts.

JSRC uses the Juniper-Last-Origin-Host AVP (AVP code 2055) to keep track of the active SAE host in a multi-SAE environment. When an SAE in a multi-SAE environment becomes active, it must send an SRQ to JSRC as its first message. JSRC initiates a synchronization when it receives any other message type from an SAE that is different from the SAE indicated in the Juniper-Last-Origin-Host AVP.

Both entities initiate a resynchronization by sending an SRQ message. The recipient responds with an SRR message. After the SRR is sent, regardless of whether the SAE or JSRC initiates the synchronization, JSRC sends an AA-Request message to the SAE for each provisioned subscriber present in the session database. The AA-Request message includes a Juniper-Policy-Install AVP for the active services. The SAE returns an AA-Answer message with an ACK to acknowledge receipt.

Subscriber Session Terminated by the SAE

When the SAE terminates a subscriber session, it sends an ASR message to JSRC. JSRC causes AAA to send a logout request to the DHCP (or SSC) client application. When the DHCP client application accepts the logout request, JSRC includes an ACK in the ASR message it sends to the SAE to signify success. If the DHCP client application does not accept the request, then JSRC includes a NAK in the ASR to signify failure. The DHCP client application is responsible for initiating the actual logout sequence with AAA.

Subscriber Logout

When the DHCP (or SSC) client application sends a subscriber logout notice to AAA, JSRC sends an STR message to notify the SAE that the provisioned subscriber session

is being terminated. The SAE returns an STA message to JSRC, and JSRC notifies DHCP that the logout is complete.

- Related Topics**
- Configuring JSRC on page 357
 - Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349
 - Diameter Messages Exchanged by JSRC and the SAE on page 350
 - Understanding Diameter AVPs on page 351

Chapter 15

Configuring JSRC for Subscriber Access

- Configuring JSRC on page 357
- Configuring the JSRC Partition on page 358
- Assigning a Partition to JSRC on page 359
- Authorizing Subscribers with JSRC on page 359
- Provisioning Subscribers with JSRC on page 360

Configuring JSRC

You can configure the JSRC client application to work with Session and Resource Control (SRC) to centrally manage subscribers and services. JSRC requests address and service authorizations from the remote SRC peer (the SAE), activates and deactivates services as specified by the SAE, logs out subscribers as specified by the SAE, and synchronizes subscriber state and service information with the SAE.

To configure JSRC:

1. Configure the JSRC partition.

See “Configuring the JSRC Partition” on page 358.

2. Assign the JSRC partition.

See “Assigning a Partition to JSRC” on page 359.

3. Configure JSRC authorization for subscribers.

See “Authorizing Subscribers with JSRC” on page 359.

4. Configure JSRC provisioning for subscribers.

See “Provisioning Subscribers with JSRC” on page 360.

- Related Topics** ■ Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349

Configuring the JSRC Partition

JSRC works within a specific logical system: routing instance context, called a partition.



NOTE: Currently, only a single partition is supported; you must configure it within the default logical system: routing instance context.

Before you configure the JSRC partition, perform the following task:

- Configure the Diameter instance at the [edit diameter] hierarchy level. See “Configuring Diameter” on page 323.

Configuration for the JSRC partition consists of naming the partition and then associating a Diameter instance, the SAE hostname, and the SAE realm with the partition.

To configure the JSRC partition:

1. Create the partition.

```
[edit jsrc]
user@host# set partition partition1
```

2. Specify the Diameter instance for the JSRC partition.



NOTE: Currently, only the default Diameter instance, *master*, is supported.

```
[edit jsrc partition partition1]
user@host# set diameter-instance master
```

3. Configure the destination host for the JSRC partition.

```
[edit jsrc partition partition1]
user@host# set destination-host sae1
```

4. Configure the destination realm for the JSRC partition.

```
[edit jsrc partition partition1]
user@host# set destination-realm generic.example.com
```

Related Topics ■ Configuring JSRC on page 357

Assigning a Partition to JSRC

You must associate a configured JSRC partition with the JSRC instance that you are configuring.

Before you assign a partition to JSRC, perform the following task:

- Configure the JSRC partition. See “Configuring the JSRC Partition” on page 358

To assign the JSRC partition:

- Specify the partition name.

```
[edit jsrc]
user@host# set jsrc-partition partition1
```

Related Topics ■ Configuring JSRC on page 357

Authorizing Subscribers with JSRC

You can configure AAA to use JSRC in an SRC environment to request authorization from the SAE when AAA is verifying whether a DHCP subscriber can access the router. When JSRC authorization is configured, AAA ignores any configured authentication order settings.

Before you configure JSRC authorization, perform the following tasks:

- Create the subscriber access profile at the [edit access profile] hierarchy level.
- Define the subscriber username with the `username-include` statement in the authentication configuration for DHCP local server or DHCP relay.

To configure JSRC authorization:

- Specify `jsrc` as the authorization method in the profile.

```
[edit access profile dhcpsub1]
user@host# set authorization-order jsrc
```

Related Topics ■ Configuring JSRC on page 357

- Creating Unique Usernames for DHCP Clients on page 78
- profile

Provisioning Subscribers with JSRC

You can configure AAA to use JSRC in an SRC environment to request provisioning from the SAE to instantiate services for an authenticated subscriber.

Before you configure JSRC provisioning for subscribers, perform the following task:

- Create the subscriber access profile at the [edit access profile] hierarchy level.

To configure JSRC provisioning:

- Specify `jsrc` as the provisioning method in the profile.

```
[edit access profile dhcpsub1]  
user@host# set provisioning-order jsrc
```

- Related Topics**
- [Configuring JSRC on page 357](#)

Chapter 16

Summary of JSRC Statements

authorization-order

Syntax	authorization-order jsrc;
Hierarchy Level	[edit access profile <i>profile-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Configure AAA to use JSRC in an SRC environment to request authorization from the SAE when verifying that a DHCP subscriber can access the router. When you include this statement, AAA ignores any configured authentication order settings. This statement is ignored for non-DHCP subscribers.
Options	jsrc—Application used to communicate with the SAE for subscriber authorization. JSRC is the only application that is currently available.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring JSRC on page 357■ Authorizing Subscribers with JSRC on page 359

destination-host

Syntax	destination-host <i>hostname</i>
Hierarchy Level	[edit jsrc partition <i>partition-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Configure the host on which the SAE application resides.
Options	<i>hostname</i> —Host on which the SAE is installed. JSRC places no limitation on the content of the <i>hostname</i> string.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring JSRC on page 357 ■ Configuring the JSRC Partition on page 358

destination-realm

Syntax	destination-realm <i>realm</i>
Hierarchy Level	[edit jsrc partition <i>partition-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Configure the realm in which the SAE host resides.
Options	<i>realm</i> —Realm in which the SAE host resides. JSRC places no limitation on the content of the <i>realm</i> string.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring JSRC on page 357 ■ Configuring the JSRC Partition on page 358

diameter-instance

Syntax	diameter-instance <i>instance-name</i>
Hierarchy Level	[edit jsrc partition <i>partition-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the Diameter instance associated with the JSRC partition.
Options	<i>instance-name</i> —Name of the Diameter instance. Currently, only master is supported.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring JSRC on page 357■ Configuring the JSRC Partition on page 358

jsrc

Syntax jsrc {
 partition *partition-name* {
 diameter-instance *instance-name*;
 destination-host *hostname*;
 destination-realm *realm*;
 }
 }

Hierarchy Level [edit]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure JSRC to interact with an SAE in an SRC environment to authorize and provision subscribers.

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 JSRC on page 357

jsrc-partition

Syntax jsrc-partition *partition-name*;

Hierarchy Level [edit]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the JSRC partition to use.

Options *partition-name*—Name of the JSRC partition that you want JSRC to use. The name is defined with the **partition** statement at the [edit jsrc] hierarchy level.

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

Related Topics ■ Configuring JSRC on page 357
 ■ Configuring the JSRC Partition on page 358

partition

Syntax	partition <i>partition-name</i> { diameter-instance <i>instance-name</i> ; destination-host <i>hostname</i> ; destination-realm <i>realm</i> ; }
Hierarchy Level	[edit jsrc]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Configure a JSRC partition.
Options	<i>partition-name</i> —Name of the JSRC partition. 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	<ul style="list-style-type: none"> ■ Configuring JSRC on page 357 ■ Configuring the JSRC Partition on page 358

provisioning-order

Syntax	provisioning-order jsrc;
Hierarchy Level	[edit access profile <i>profile-name</i>]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Configure AAA to use JSRC in an SRC environment to request services from the SAE for an authenticated subscriber. JSRC attempts to activate these services. If successful, JSRC returns an ACK message. If unsuccessful, the subscriber is denied access.
Options	jsrc—Application used to communicate with the SAE for subscriber service provisioning. JSRC is the only application that is currently available.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring JSRC on page 357 ■ Provisioning Subscribers with JSRC on page 360

Chapter 17

Subscribers on Static Interfaces

- Subscribers on Static Interfaces Overview on page 367

Subscribers on Static Interfaces Overview

You can associate subscribers with statically configured interfaces and provide dynamic service activation and activation for these subscribers. When the static interface comes up, the event is treated as a subscriber login. When the interface goes down, it is treated as a subscriber logout. After the subscribers are present in the session database (SDB), JSRC can report the subscribers to the SAE so that the SRC software can subsequently manage the subscribers.

Alternatively, you can configure the static subscribers to be authenticated and authorized by means of RADIUS. In this case, RADIUS can then activate and deactivate services with change of authorization (CoA) messages. However, this configuration does not prevent the interface from coming up and forwarding traffic. Further, authorization parameters are not imposed on the subscriber interface.

Currently, only Ethernet interfaces support static subscribers. Only one static subscriber can exist over a given interface. An interface cannot appear in more than one group. Static subscribers cannot be created over dynamic interfaces.

Static subscribers are intended to work with JSRC. Include the `provisioning-order jsrc` statement at the `[edit access profile profile-name]` hierarchy level to enable JSRC to handle the subscribers at the direction of the SRC software.

If the authentication request fails for a static subscriber, a 60-minute, nonconfigurable timer begins counting down. The request is reissued when the timer expires. This action repeats for as long as the interface is operationally up.

You can force a logout of the static subscriber by issuing the `request services static-subscribers logout interface interface-name` command. A static subscriber can also be logged out by AAA or an external policy manager. In both cases, no subsequent logins can take place on the underlying interface until you reset the state by issuing the `request services static-subscribers login interface interface-name` command or the router or process reboots.

You can log out an interface group by issuing the `request services static-subscriber logout group group-name` command. You can subsequently log in a group of interfaces by issuing the `request services static-subscriber login group group-name` command.

No new CLI statements are required to configure the dynamic profile for static subscribers. The dynamic profile can be very simple; it is activated at login and deactivated at logout. If you do not configure a profile, then the *junos-default-profile* is automatically activated.

During a graceful Routing Engine switchover (GRES) event, active static subscribers are recovered, inactive subscribers are cleaned up, and logout continues for subscribers that were in the process of logging out.

Include the **static-subscribers** statement at the **[edit system services]** hierarchy level to configure static subscribers. Include the **traceoptions** statement at the **[edit system processes static-subscribers]** hierarchy level to configure tracing operations for static subscribers.

You can configure the access profile, dynamic profile, and authentication parameters for all static subscribers or for a particular group of static subscribers:

- To configure the access profile that triggers AAA services for the static subscriber for all static subscribers, include the **access-profile** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to apply the profile to a specific group and override a top-level configuration.
- To configure the dynamic profile that is instantiated when the static subscriber logs in for all static subscribers, include the **dynamic-profile** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to apply the profile to a specific group and override a top-level configuration. Do not specify a dynamic profile that creates a dynamic interface.
- To configure the authentication parameters that trigger an Access-Request message to AAA for all static subscribers, include the **authentication** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include the statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to configure authentication for a specific group and override a top-level configuration. If you do not configure authentication, then by default the interface name is modified and used as the default username for the subscriber session and the authentication request.

The configurable authentication parameters include the password and details of how the username is formed. Include the **password** statement at the **[edit system services static-subscribers authentication]** hierarchy level to configure the authentication password for all static subscribers. Alternatively, include the statement at the **[edit system services static-subscribers group *group-name* authentication]** hierarchy level to configure authentication for a specific group and override a top-level configuration.

The username that is sent to AAA for authentication must include at least one of the following attributes:

- the domain name
- a user prefix
- the interface name

- a logical system name
- routing instance name

To configure how the username is formed for all static subscribers, include the desired statements at the `[edit system services static-subscribers authentication]` hierarchy level: `domain-name`, `user-prefix`, `logical-system-name`, or `routing-instance-name`. Alternatively, include the desired statements at the `[edit system services static-subscribers group group-name authentication]` hierarchy level to configure the username for a specific group and override a top-level configuration.

If you change the authentication configuration for an existing group or for static subscribers globally, the change has no effect on existing static subscribers. The changes are applied only to any new logins that are attempted after you commit the changes.

A group configuration must specify all the interfaces that you expect to support static subscribers. Include the `interface` statement at the `[edit system services static-subscribers group group-name]` hierarchy level to specify the interfaces. This statement enables you to specify a single interface or a range of interfaces.

You must also statically configure these interfaces before any static subscribers can be supported on them. You must configure the static interfaces in the same logical system and routing instance as the group that includes the interfaces.

If you change the interfaces that are included in an existing interface group, existing static subscribers are automatically logged out and then back in when you commit the changes. However, changes made to the configuration of the interface itself have no effect on the login or logout state of the static subscriber associated with that interface.

By default, multiple subscribers are not supported on top of the same VLAN logical interface. If you want to support this behavior, then you can manage multiple subscribers on a single logical interface in one of two ways. You can either merge attributes such as firewall filters and CoS attributes for the multiple subscribers, or you can replace the current attributes with those of a new subscriber whenever a new subscriber logs into the underlying VLAN logical interface.

- To enable attribute merging for all static interfaces, include the `aggregate-clients merge` statement at the `[edit system services static-subscribers]` hierarchy level. Alternatively, include this statement at the `[edit system services static-subscribers group group-name]` hierarchy level to enable attribute merging for a specific group of static interfaces and override a top-level configuration.
- To enable attribute replacement for all static interfaces, include the `aggregate-clients replace` statement at the `[edit system services static-subscribers]` hierarchy level. Alternatively, include this statement at the `[edit system services static-subscribers group group-name]` hierarchy level to enable attribute replacement for a specific group of static interfaces and override a top-level configuration.

Related Topics

- Configuring Subscribers over Static Interfaces on page 371
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 349

- Understanding JSRC-SAE Interactions on page 354

Chapter 18

Configuring Subscribers over Static Interfaces

- Configuring Subscribers over Static Interfaces on page 371
- Tracing Static Subscriber Operations on page 373
- Specifying the Static Subscriber Global Access Profile on page 376
- Specifying the Static Subscriber Global Dynamic Profile on page 377
- Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers on page 377
- Configuring the Static Subscriber Global Authentication Password on page 378
- Configuring the Static Subscriber Global Username on page 378
- Creating a Static Subscriber Group on page 379
- Specifying the Static Subscriber Group Access Profile on page 380
- Specifying the Static Subscriber Group Dynamic Profile on page 380
- Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group on page 381
- Configuring the Static Subscriber Group Authentication Password on page 382
- Configuring the Static Subscriber Group Username on page 382
- Forcing a Static Subscriber to Be Logged Out on page 383
- Resetting the State of an Interface for Static Subscriber Login on page 383
- Forcing a Group of Static Subscribers to Be Logged Out on page 384
- Resetting the State of an Interface Group for Static Subscriber Login on page 384

Configuring Subscribers over Static Interfaces

This topic describes the procedure for configuring subscribers over static interfaces (static subscribers).

Before you configure subscribers over static interfaces, perform the following tasks:

- Configure the static interfaces on which you want to create and manage subscribers.
- Create an access profile to trigger AAA services for static subscribers.

- Create a dynamic profile that is instantiated when static subscribers log in.

To configure static subscribers:

1. Configure trace options for troubleshooting the configuration.
See “Tracing Static Subscriber Operations” on page 373
2. Specify the global access profile that triggers AAA services for static subscribers.
See “Specifying the Static Subscriber Global Access Profile” on page 376.
3. Specify the global dynamic profile that is instantiated when static subscribers log in.
See “Specifying the Static Subscriber Global Dynamic Profile” on page 377.
4. Configure global method to handle multiple subscribers on a VLAN Logical Interface.
See “Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers” on page 377
5. Configure the global authentication password for static subscribers.
See “Configuring the Static Subscriber Global Authentication Password” on page 378.
6. Configure the global username for static subscribers.
See “Configuring the Static Subscriber Global Username” on page 378.
7. Configure a group of subscribers to share values different from the global configuration.
See “Creating a Static Subscriber Group” on page 379 .
8. Specify the access profile for the static subscriber group.
See “Specifying the Static Subscriber Group Access Profile” on page 380.
9. Specify the dynamic profile for the static subscriber group.
See “Specifying the Static Subscriber Group Dynamic Profile” on page 380.
10. Configure method to handle multiple subscribers on a VLAN Logical Interface for a static subscriber group.
See “Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group” on page 381
11. Configure the authentication password for the static subscriber group.
See “Configuring the Static Subscriber Group Authentication Password” on page 382.
12. Configure the username for the static subscriber group.
See “Configuring the Static Subscriber Group Username” on page 382.

13. (Optional) Force a static subscriber to be logged out from an interface.

See “Forcing a Static Subscriber to Be Logged Out” on page 383

14. (Optional) Enable an interface to accept static subscriber logins.

See “Resetting the State of an Interface for Static Subscriber Login” on page 383

15. (Optional) Force static subscribers to be logged out from a group of interfaces.

See “Forcing a Group of Static Subscribers to Be Logged Out” on page 384

16. (Optional) Enable a group of interfaces to accept static subscriber logins.

See “Resetting the State of an Interface Group for Static Subscriber Login” on page 384

17. Configure trace options for troubleshooting the configuration.

See “Tracing Static Subscriber Operations” on page 373

- Related Topics**
- Subscribers on Static Interfaces Overview on page 367
 - [edit system services static-subscribers] Hierarchy Level on page 783

Tracing Static Subscriber Operations

Static subscribers support tracing operations. Static subscriber tracing operations track static subscriber 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 `jsscd` located in the `/var/log` directory. You cannot change the directory (`/var/log`) in which trace files are located.
2. When the file `jsscd` reaches 128 kilobytes (KB), it is renamed `jsscd.0`, then `jsscd.1`, and so on, until there are three trace files. Then the oldest trace file (`jsscd.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*.)

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

To configure static subscriber tracing operations:

1. Specify that you want to configure tracing options.

```
[edit system processes static-subscribers]
user@host# edit traceoptions
```

2. (Optional) Configure the name for the file used for the trace output.
See “Configuring the Static Subscribers Trace Log Filename” on page 374.
3. (Optional) Configure the number and size of the log files.
See “Configuring the Number and Size of Static Subscribers Log Files” on page 374.
4. (Optional) Configure access to the log file.
See a “Configuring Access to the Static Subscribers Log File” on page 375.
5. (Optional) Configure a regular expression to filter logging events.
See “Configuring a Regular Expression for Static Subscriber Lines to Be Logged” on page 375.
6. (Optional) Configure flags to filter the operations to be logged.
See “Configuring the Static Subscribers Tracing Flags” on page 376.

The static subscriber traceoptions operations are described in the following sections:

- Configuring the Static Subscribers Trace Log Filename on page 374
- Configuring the Number and Size of Static Subscribers Log Files on page 374
- Configuring Access to the Static Subscribers Log File on page 375
- Configuring a Regular Expression for Static Subscriber Lines to Be Logged on page 375
- Configuring the Static Subscribers Tracing Flags on page 376

Configuring the Static Subscribers Trace Log Filename

By default, the name of the file that records trace output for static subscribers is `jsscd`. You can specify a different name with the `file` option.

To configure the filename for static subscribers tracing operations:

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

[edit system processes static-subscribers traceoptions]
user@host# **set file stat-subs_1**

Configuring the Number and Size of Static Subscribers 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.

```
[edit system processes static-subscribers traceoptions]
user@host# set file stat-subs_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the Static Subscribers Log File

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

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit system processes static-subscribers traceoptions]
user@host# set file stat-subs_1 _logfile_1 world-readable
```

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

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

```
[edit system processes static-subscribers traceoptions]
user@host# set file stat-subs_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for Static Subscriber 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 to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

```
[edit system processes static-subscribers traceoptions]
user@host# set file stat-subs_1 _logfile match regex
```

Configuring the Static Subscribers 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 events
configuration	Trace configuration events
database	Trace database events
general	Trace general flow.
gres	Trace GRES events
profile	Trace dynamic profile events
rtsock	Trace routing socket events
statistics	Trace statistics events
subscriber	Trace subscriber events

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit system processes static-subscribers traceoptions]
user@host# set flag authentication
```

Specifying the Static Subscriber Global Access Profile

You specify a previously created access profile that triggers AAA services for all static subscribers. This value can be overridden for a group of static subscribers when a different profile is configured for that group.

To specify the access profile used for all static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers]
user@host# set access-profile access5
```

- Related Topics**
- [Configuring Subscribers over Static Interfaces on page 371](#)
 - [Specifying the Static Subscriber Group Access Profile on page 380](#)

- profile

Specifying the Static Subscriber Global Dynamic Profile

You specify a previously created dynamic profile that is instantiated when a static subscriber logs in. This profile is used for all static subscribers. This value can be overridden for a group of static subscribers when a different profile is configured for that group.

To specify the dynamic profile used for all static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers]
user@host# set dynamic-profile dyn-profile-1
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Specifying the Static Subscriber Group Dynamic Profile on page 380
 - dynamic-profiles

Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers

For a given interface, only a single static subscriber (or group) is logged in. Although we do not recommend this practice, you might have other kinds of subscribers configured on the same interface, such as a DHCP subscriber managed by the DHCP application. You can use the `aggregate-clients` statement to extend the dynamic profile for all static subscribers to enable multiple subscribers to share the same VLAN logical interface.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. That is, the profiles for multiple subscribers of different types are instantiated on the interface, but the profile attributes of each are merged together. Alternatively, you can specify that the instantiated profile for the current subscriber is replaced by the profile of a new subscriber that logs in using the same logical interface. This configuration can be overridden for a group of static subscribers when a different configuration is applied for that group.

To enable multiple subscribers to share the same VLAN logical interface for all static subscribers, do one of the following:

- Specify that the multiple subscriber attributes are merged for the logical interface.

```
[edit system services static-subscribers dynamic-profile dyn-profile-1]
user@host# set aggregate-clients merge
```

- Specify that the entire logical interface is replaced when a new subscriber logs into the network using the same VLAN logical interface.

```
[edit system services static-subscribers dynamic-profile dyn-profile-3]
user@host# set aggregate-clients replace
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Specifying the Static Subscriber Group Dynamic Profile on page 380
 - dynamic-profile

Configuring the Static Subscriber Global Authentication Password

You configure a password that is included in the Access-Request message sent to AAA to authenticate all static subscribers. This value can be overridden for a group of static subscribers when a different password is configured for that group.

To specify the authentication password used for all static subscribers:

- Specify the password.

```
[edit system services static-subscribers authentication]
user@host# set password Gj85*3mS
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Configuring the Static Subscriber Group Authentication Password on page 382
 - authentication

Configuring the Static Subscriber Global Username

You configure how the username is formed. The username serves as the username for all static subscribers that are created and is included in the Access-Request message sent to AAA to authenticate all static subscribers. This value can be overridden for a group of static subscribers when a different username is configured for that group.

The username must include at least one of the five possible elements. The value of each element is concatenated in a specific order; the resulting string is the username. If you specify their inclusion, the interface name, logical system name, and routing instance name are derived from the configuration context. The elements are ordered as follows:

user-prefix.interface.logical-system-name.routing-instance-name@domain-name

To configure the username for all static subscribers:

1. (Optional) Specify a prefix for the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set user-prefix Building5
```

2. (Optional) Specify that the interface name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set interface
```


3. (Optional) Specify that the logical system name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set logical-system-name
```

4. Specify that the routing instance name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set routing-instance-name
```

5. Specify the domain name included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set domain-name campus.example.com
```

Configured in the default logical system and master routing instance for interface ge-0/1/1.100, this sample configuration generates the following username:

```
Building5.ge-0-1-1-100.default.master.campus.example.com
```

Related Topics

- Configuring Subscribers over Static Interfaces on page 371
- Configuring the Static Subscriber Group Username on page 382
- username-include

Creating a Static Subscriber Group

You can override the configuration that is applied globally to static subscribers by creating a static subscriber group that consists of a set of statically configured interfaces. You can then apply a common configuration for the group with values different than the global values for access and dynamic profiles, password, and username.

To configure an interface group for static subscribers:

1. Access the [edit system services static-subscribers] hierarchy level.
2. Create the group and assign the name.

```
[edit system services static-subscribers]
user@host# edit group boston
```

3. Specify the names of one or more interfaces on which static subscribers can be created. 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 static-subscribers group boston]
user@host# set interface ge-1/0/1.1
user@host# set interface ge-1/0/1.2
```

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

```
[edit system services static-subscribers group boston]
user@host# set interface ge-1/0/1.3 upto ge-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 static-subscribers group boston]
user@host# interface ge-1/0/1.1 upto ge-1/0/1.102
user@host# interface ge-1/0/1.6 exclude
user@host# interface ge-1/0/1.70 upto ge-1/0/1.80 exclude
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Specifying the Static Subscriber Group Access Profile on page 380
 - Specifying the Static Subscriber Group Dynamic Profile on page 380
 - Configuring the Static Subscriber Group Authentication Password on page 382
 - Configuring the Static Subscriber Group Username on page 382

Specifying the Static Subscriber Group Access Profile

You can override the configured global access profile by specifying a different profile for a group of static subscribers. The access profile triggers AAA services for that group of static subscribers.

To specify the access profile used for a group of static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers group boston]
user@host# set access-profile boston-acs
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Specifying the Static Subscriber Global Access Profile on page 376
 - profile

Specifying the Static Subscriber Group Dynamic Profile

You can override the configured global dynamic profile by specifying a different profile for a group of static subscribers. The dynamic profile is instantiated when any static subscriber in the group logs in.

To specify the dynamic profile used for a group of static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers group boston]
user@host# set dynamic-profile dyn-profile-2
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371

- Specifying the Static Subscriber Global Dynamic Profile on page 377
- dynamic-profiles

Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group

For a given interface, only a single static subscriber group (or static subscriber) is logged in. Although we do not recommend this practice, you might have other kinds of subscribers configured on the same interface, such as a DHCP subscriber managed by the DHCP application. You can use the **aggregate-clients** statement to extend the dynamic profile for a static subscriber group to enable multiple subscribers to share the same VLAN logical interface.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. That is, the profiles for multiple subscribers of different types are instantiated on the interface, but the profile attributes of each are merged together. Alternatively, you can specify that the instantiated profile for the current subscriber group is replaced by the profile of a new subscriber that logs in using the same logical interface. This configuration overrides the configuration applied to all static subscribers that are not members of the group.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. Alternatively, you can specify that the logical interface is replaced when a new subscriber logs in using the same logical interface. This configuration overrides the configuration applied to all static subscribers that are not members of the group.

To enable multiple subscribers to share the same VLAN logical interface for a static subscriber group, do one of the following:

- Specify that the multiple subscriber attributes are merged for the logical interface.

```
[edit system services static-subscribers group boston dynamic-profile dyn-profile-2]
user@host# set aggregate-clients merge
```

- Specify that the entire logical interface is replaced when a new subscriber logs into the network using the same VLAN logical interface.

```
[edit system services static-subscribers group boston dynamic-profile dyn-profile-4]
user@host# set aggregate-clients replace
```

Related Topics

- Configuring Subscribers over Static Interfaces on page 371
- Specifying the Static Subscriber Group Dynamic Profile on page 380
- dynamic-profile

Configuring the Static Subscriber Group Authentication Password

You can override the configured global authentication password by specifying a different password for a group of static subscribers. This password is included in the Access-Request message sent to AAA to authenticate all static subscribers in the group.

To specify the authentication password used for a group of static subscribers:

- Specify the password.

```
[edit system services static-subscribers group boston authentication]
user@host# set password knTS$Sk2
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Configuring the Static Subscriber Global Authentication Password on page 378
 - authentication

Configuring the Static Subscriber Group Username

You can override the configured global username by specifying a different username for a group of static subscribers. The username serves as the username for a group of static subscribers that is created and is included in the Access-Request message sent to AAA to authenticate that group.

The username must include at least one of the five possible elements. The value of each element is concatenated in a specific order; the resulting string is the username. If you specify their inclusion, the interface name, logical system name, and routing instance name are derived from the configuration context. The elements are ordered as follows:

user-prefix.interface.logical-system-name.routing-instance-name@domain-name

To configure the username for a group of static subscribers:

1. (Optional) Specify a prefix for the username.

```
[edit system services static-subscribers group boston authentication
username-include]
user@host# set user-prefix 2ndFloor
```

2. (Optional) Specify that the interface name is included in the username.

```
[edit system services static-subscribers group boston authentication
username-include]
user@host# set interface
```

3. (Optional) Specify that the logical system name is included in the username.

```
[edit system services static-subscribers group boston authentication
username-include]
```

```
user@host# set logical-system-name
```

4. Specify that the routing instance name is included in the username.

```
[edit system services static-subscribers group boston authentication
username-include]
user@host# set routing-instance-name
```

5. Specify the domain name included in the username.

```
[edit system services static-subscribers group boston authentication
username-include]
user@host# set domain-name building5.example.com
```

Configured in the default logical system and master routing instance for interface ge-0/1/2.50, this sample configuration generates the following username:

```
2ndfloor.ge-0-1-2-50.default.master.building5.example.com
```

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Configuring the Static Subscriber Global Username on page 378
 - username-include

Forcing a Static Subscriber to Be Logged Out

You can force a static subscriber to be logged out on an interface. After you do so, no subscriber can subsequently log in on that interface until the interface state is reset either by a router reset or by entering the `request services static-subscribers login interface` command.

- To forcibly log out a static subscriber on a static interface:

```
user@host> request services static-subscribers logout interface ge-2/0/1.5
```

- Related Topics**
- Resetting the State of an Interface for Static Subscriber Login on page 383

Resetting the State of an Interface for Static Subscriber Login

When a static subscriber has been forcibly logged out on an interface with the `request services static-subscribers logout interface` command, you can reset the state of the interface. This action enables a static subscriber to log in on the interface. If you do not reset the state manually, then no static subscribers can log in on the interface until the state is reset by a router reset.

- To reset the state of a static interface:

```
user@host> request services static-subscribers login interface ge-2/0/1.5
```

Related Topics ■ Forcing a Static Subscriber to Be Logged Out on page 383

Forcing a Group of Static Subscribers to Be Logged Out

You can force the static subscribers on all interfaces in a group to be logged out. After you do so, no subscriber can subsequently log in on an interface in that group until the interface state is reset either by a router reset or by entering the `request services static-subscribers login group` command.

- To forcibly log out all static subscribers on a static interface group:

```
user@host> request services static-subscribers logout group boston
```

Related Topics ■ Resetting the State of an Interface Group for Static Subscriber Login on page 384

Resetting the State of an Interface Group for Static Subscriber Login

When static subscribers have been forcibly logged out on an interface group with the `request services static-subscribers logout group` command, you can reset the state of the group. This action enables static subscribers to log in on the interfaces in the group. If you do not reset the state manually, then no static subscribers can log in on any interface in the group until the state is reset by a router reset.

- To reset the state of a static interface group:

```
user@host> request services static-subscribers login group boston
```

Related Topics ■ Forcing a Group of Static Subscribers to Be Logged Out on page 384

Chapter 19

Static Subscribers for Subscriber Access Examples

- Example: Configuring Static Subscribers for Subscriber Access on page 385

Example: Configuring Static Subscribers for Subscriber Access

This example shows a static subscriber configuration.

1. Configure the access profile to be used for static subscribers.

```
access {
  profile access5 {
    provisioning-order jsr;
    accounting {
      order radius;
    }
    authentication {
      order radius;
    }
  }
}
```

2. Configure the dynamic profile to be used for static subscribers.

If you do not configure this profile, the default profile, junos-default-profile, is used

3. Configure the static interfaces on which to layer the static subscribers.
4. Configure the parameters that apply globally to all static subscribers in the configuration context.

```
static-subscribers {
  access-profile access5;
  dynamic-profile dyn-profile-1;
  authentication {
    password Gj85*3mS;
    username-include {
      user-prefix Building5;
      interface;
      logical-system-name;
      routing-instance-name;
      domain-name example.com;
    }
  }
}
```

```
    }
  }
}
```

5. If you want to override the global parameters for certain static subscribers, create a group of static interfaces for those subscribers and configure parameters to apply to that group. Repeat this step for as many groups as you need.

```
static-subscribers {
  group boston {
    interface ge-1/0/1.1 upto ge-1/0/1.102
    interface ge-1/0/1.6 exclude
    interface ge-1/0/1.70 upto ge-1/0/1.80 exclude
    access-profile boston-ac;
    dynamic-profile dyn-profile-2;
    authentication {
      password knTS$$k2;
      username-include {
        user-prefix 2ndFloor;
        interface;
        logical-system-name;
        routing-instance-name;
        domain-name example.net;
      }
    }
  }
}
```

6. Configure tracing options for static subscriber events.

```
static-subscribers {
  traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}
```


Chapter 20

Summary of Static Subscriber Statements

access-profile

Syntax	access-profile <i>profile-name</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers], [edit system services static-subscribers]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the access profile that triggers AAA services for all static subscribers on interfaces configured at the [edit system services static-subscribers interface] hierarchy level.
Options	<i>profile-name</i> —Name of the static subscriber access profile.
Required Privilege Level	access—To view this statement in the configuration. access-control—To add this statement to the configuration.
Related Topics	■ Configuring Subscribers over Static Interfaces on page 371 ■ Specifying the Static Subscriber Global Access Profile on page 376

access-profile

Syntax	<code>access-profile <i>profile-name</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i>],</p> <p>[edit system services static-subscribers group <i>group-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the access profile that triggers AAA services for static subscribers in the group. This statement overrides the access profile configured at the [edit system services static-subscribers interface] hierarchy level.
Options	<i>profile-name</i> —Name of the static subscriber access profile.
Required Privilege Level	<p>access—To view this statement in the configuration.</p> <p>access-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Specifying the Static Subscriber Group Access Profile on page 380

aggregate-clients

Syntax	aggregate-clients (merge replace);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> system services static-subscribers dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> system services static-subscribers dynamic-profile <i>profile-name</i>],</p> <p>[edit system services static-subscribers dynamic-profile <i>profile-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Specify for all static subscribers except those overridden by a group configuration that the router merge (chain) subscriber (client) attributes such as firewall filters and CoS attributes or replace them when multiple subscriber sessions exist on the same underlying VLAN.</p> <p>Not supported for IP demux subscriber interfaces.</p>
Default	By default, multiple subscribers cannot be on the same logical interface.
Options	<p>merge—Aggregate the attributes of multiple subscribers for the logical interface.</p> <p>replace—Replace the entire logical interface whenever a new client logs in to the network using the same VLAN logical interface.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers on page 377

aggregate-clients

Syntax	aggregate-clients (merge replace);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> dynamic-profile <i>profile-name</i>],</p> <p>[edit system services static-subscribers group <i>group-name</i> dynamic-profile <i>profile-name</i>]</p>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Specify for static subscribers in the group that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple subscriber sessions exist on the same underlying VLAN. This statement overrides the parameters configured at the [edit system services static-subscribers dynamic-profile] hierarchy level.</p> <p>Not supported for IP demux subscriber interfaces.</p>
Default	By default, multiple subscribers cannot be on the same logical interface.
Options	<p>merge—Aggregate the attributes of multiple subscribers for the logical interface.</p> <p>replace—Replace the entire logical interface whenever a new client logs in to the network using the same VLAN logical interface.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group on page 381

authentication

Syntax	<pre> authentication { password <i>password-string</i>; username-include { domain-name <i>domain-name</i>; interface; logical-system-name; routing-instance-name; user-prefix <i>user-prefix-string</i>; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> system services static-subscribers], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers], [edit system services static-subscribers]</p>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the authentication parameters that trigger the Access-Request message to AAA for all static subscribers on interfaces configured at the [edit system services static-subscribers interface] hierarchy level, except those overridden by a group configuration.
Options	<p><i>profile-name</i>—Name of the static subscriber access profile.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Authentication Password on page 378

authentication

Syntax

```
authentication {
  password password-string;
  username-include {
    domain-name domain-name;
    interface;
    logical-system-name;
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
```

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers group *group-name*],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name*],
 [edit routing-instances *routing-instances-name* system services static-subscribers group *group-name*],
 [edit system services static-subscribers group *group-name*]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the authentication parameters that trigger the Access-Request message to AAA for static subscribers in the group. This statement overrides the authentication parameters configured at the [edit system services static-subscribers interface] hierarchy level.

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 Subscribers over Static Interfaces on page 371
- Configuring the Static Subscriber Group Authentication Password on page 382

domain-name

Syntax	domain-name <i>domain-name</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit system services static-subscribers authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the domain name that is included at the end of the username created for static subscribers in the group.
Options	<i>domain-name</i> —Domain name that ends the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message. The string can include the following characters: a through z, A through Z, 0 through 9, “-”, or “.”.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Username on page 378

domain-name

Syntax	domain-name <i>domain-name</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit system services static-subscribers group <i>group-name</i> authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the domain name that is included at the end of the username created for static subscribers in the group.
Options	<i>domain-name</i> —Domain name that ends the username created for static subscribers in the group. The username is also sent to RADIUS in the Access-Request message. The string can include the following characters: a through z, A through Z, 0 through 9, “-”, or “.”.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Group Username on page 382

dynamic-profile

Syntax `dynamic-profile profile-name {
 aggregate-clients (merge | replace);
 }`

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system
 services static-subscribers],
[edit routing-instances *routing-instances-name* system services static-subscribers],
[edit system services static-subscribers]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the dynamic client profile that is instantiated at login and de-instantiated at
logout for all static subscribers on interfaces configured at the [edit system services
static-subscribers interface] hierarchy level.



NOTE: Do not specify a dynamic profile that creates a dynamic interface.

Default By default, the *junos-default-profile* is used when you do not specify a global dynamic
profile with this statement.

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

The remaining statement is explained separately.

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

Related Topics ■ Configuring Subscribers over Static Interfaces on page 371
■ Specifying the Static Subscriber Global Dynamic Profile on page 377

dynamic-profile

Syntax `dynamic-profile profile-name {
 aggregate-clients (merge | replace);
 }`

Hierarchy Level `[edit logical-systems logical-system-name system services static-subscribers group group-name],
[edit logical-systems logical-system-name routing-instances routing-instances-name system services static-subscribers group group-name],
[edit routing-instances routing-instances-name system services static-subscribers group group-name],
[edit system services static-subscribers group group-name]`

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the dynamic client profile that is instantiated at login and de-instantiated at logout for static subscribers in the group. This statement overrides the dynamic profile configured at the `[edit system services static-subscribers interface]` hierarchy level.



NOTE: Do not specify a dynamic profile that creates a dynamic interface.

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

The remaining statement is explained separately.

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

- Related Topics**
- Configuring Subscribers over Static Interfaces on page 371
 - Specifying the Static Subscriber Group Dynamic Profile on page 380

group

Syntax `group group-name {
 access-profile profile-name;
 dynamic-profile profile-name {
 aggregate-clients (merge | replace);
 }
 authentication {
 password password-string;
 username-include {
 domain-name domain-name;
 interface;
 logical-system-name;
 routing-instance-name;
 user-prefix user-prefix-string;
 }
 }
 interface interface-name <exclude> <upto upto-interface-name>;
}`

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers],
 [edit routing-instances *routing-instances-name* system services static-subscribers],
 [edit system services static-subscribers]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure a static subscriber group with values that override the values configured at the [edit system services static-subscribers] hierarchy level for subscribers outside the group. Includes the subscriber access and dynamic profiles, the authentication parameters that trigger the Access-Request message to AAA for static subscribers in the group, and the statically configured interfaces that form the group.



NOTE: The logical system and routing instance in which the group is configured must match the logical system and routing instance where the static interfaces are configured.

Options *group-name*—Name of a group that defines authentication parameters for static subscribers to override the global authentication 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 Subscribers over Static Interfaces on page 371
 ■ Creating a Static Subscriber Group on page 379

interface

Syntax `interface interface-name <exclude> <upto upto-interface-name>;`

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers group *group-name*],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name*],
 [edit routing-instances *routing-instances-name* system services static-subscribers group *group-name*],
 [edit system services static-subscribers group *group-name*]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify one or more interfaces, or a range of interfaces, that are within a specified group on which static subscribers are created. You can repeat the **interface** *interface-name* statement to specify multiple interfaces within a group. You must configure each interface in only one group.



NOTE: The logical system and routing instance in which the static interfaces are configured must match the logical system and routing instance where the group is configured.

Options `exclude`—(Optional) Exclude an interface or a range of interfaces from the group.

interface-name—Name of the interface on which static subscribers are created. If you do not specify a unit number for the interface, then .0 is assumed. For example, `ge-0/1/0` is interpreted as `ge-0/1/0.0`.

upto-interface-name—(Optional) The upper end of the range of interfaces; the lower end of the range is the *interface-name* entry. The interface device name of *upto-interface-name* must be the same as the device name of *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 Subscribers over Static Interfaces on page 371
- Creating a Static Subscriber Group on page 379

interface

Syntax interface;

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication username-include],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication username-include],
 [edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication username-include],
 [edit system services static-subscribers group *group-name* authentication username-include]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify that a modified version of the interface name is included as part of the username created for static subscribers in the group. The username is also sent to RADIUS in the Access-Request message. The interface name is modified by replacing the “/” character with the “-” character. For example, ge-0/1/2.50 is converted to ge-0-1-2.50.

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

Related Topics ■ Configuring Subscribers over Static Interfaces on page 371
 ■ Configuring the Static Subscriber Group Username on page 382

interface

Syntax	interface;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit system services static-subscribers authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that a modified version of the interface name is included as part of the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message. The interface name is modified by replacing the “/” character with the “-” character. For example, ge-0/1/2.50 is converted to ge-0-1-2.50.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Username on page 378

logical-system-name

Syntax	logical-system-name;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit system services static-subscribers authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that the name of the logical system is included as part of the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Username on page 378

logical-system-name

Syntax	logical-system-name;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit system services static-subscribers group <i>group-name</i> authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that the name of the logical system is included as part of the username created for static subscribers in the group. The username is also sent to RADIUS in the Access-Request message.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Group Username on page 382

password

Syntax password *password-string*;
 username-include {
 domain-name *domain-name*;
 username-include;
 logical-system-name;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication],
 [edit routing-instances *routing-instances-name* system services static-subscribers authentication],
 [edit system services static-subscribers authentication]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the password that is sent to AAA for user login for all static subscribers on interfaces configured at the [edit system services static-subscribers interface] hierarchy level, except those overridden by a group configuration.

The remaining statements are explained separately.

Options *password-string*—String that defines the password.

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

Related Topics ■ Configuring Subscribers over Static Interfaces on page 371
 ■ Configuring the Static Subscriber Global Authentication Password on page 378

password

Syntax password *password-string*;
 username-include {
 domain-name *domain-name*;
 interface;
 logical-system-name;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication],
 [edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication username-include], authentication],
 [edit system services static-subscribers group *group-name* authentication]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the password that is sent to AAA for user login for static subscribers in the group. This statement overrides the password and authentication parameters configured at the [edit system services static-subscribers authentication] hierarchy level.

The remaining statements are explained separately.

Options *password-string*—String that defines the password.

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

Related Topics ■ Configuring Subscribers over Static Interfaces on page 371
 ■ Configuring the Static Subscriber Group Authentication Password on page 382

routing-instance-name

Syntax	routing-instance-name;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include], [edit system services static-subscribers authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that the name of the routing instance is included as part of the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Username on page 378

routing-instance-name

Syntax	routing-instance-name;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit system services static-subscribers group <i>group-name</i> authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that the name of the routing instance is included as part of the username created for static subscribers in the group. The username is also sent to RADIUS in the Access-Request message.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Group Username on page 382

static-subscribers

Syntax

```
static-subscribers {
  access-profile profile-name;
  authentication {
    password password-string;
    username-include {
      domain-name domain-name;
      interface;
      logical-system-name;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name {
    aggregate-clients (merge | replace);
  }
  group group-name {
    access-profile profile-name;
    authentication {
      password password-string;
      username-include {
        domain-name domain-name;
        interface;
        logical-system-name;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
    dynamic-profile profile-name {
      aggregate-clients (merge | replace);
    }
    interface interface-name <exclude> <upto upto-interface-name>;
  }
}
```

Hierarchy Level [edit logical-systems *logical-system-name* system services],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services],
 [edit routing-instances *routing-instances-name* system services],
 [edit system services]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure and associate subscribers with statically configured interfaces for dynamic service provisioning.

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

Related Topics ■ Configuring Subscribers over Static Interfaces on page 371

traceoptions

Syntax traceoptions {
 file <filename> <files number> <match regular-expression > <size maximum-file-size>
 <world-readable | no-world-readable>;
 flag flag <disable>;
 level (all | error | info | notice | verbose | warning);
 no-remote-trace;
 }

Hierarchy Level [edit logical-systems *logical-system-name* system processes static-subscribers],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system
 processes static-subscribers],
 [edit routing-instances *routing-instances-name* system processes static-subscribers],
 [edit system processes static-subscribers]

Release Information Statement introduced in JUNOS Release 9.6.

Description Define tracing operations for static subscriber 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.

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.
- authentication—Trace authentication events.
- configuration—Trace configuration events.
- database—Trace database events.
- general—Trace general flow.
- gres—Trace GRES events.
- profile—Trace dynamic profile events.
- rtsock—Trace routing socket events.
- statistics—Trace statistics events.
- subscriber—Trace subscriber events.

level—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

size *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.

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

trace—To view this statement in the configuration.

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

Related Topics

- Configuring Subscribers over Static Interfaces on page 371
- Tracing Static Subscriber Operations on page 373

username-include

Syntax username-include {
 domain-name *domain-name*;
 interface;
 logical-system-name;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication],
 [edit routing-instances *routing-instances-name* system services static-subscribers authentication],
 [edit system services static-subscribers authentication]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the information included in the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message.

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 ■ Configuring Subscribers over Static Interfaces on page 371
 ■ Configuring the Static Subscriber Global Username on page 378

username-include

Syntax username-include {
 domain-name *domain-name*;
 interface;
 logical-system-name;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication],
 [edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication],
 [edit system services static-subscribers group *group-name* authentication]

Release Information Statement introduced in JUNOS Release 9.6.

Description Specify the information included in the username created for static subscribers in the group. This statement overrides the username parameters configured at the [edit system services static-subscribers authentication] hierarchy level. The username is also sent to RADIUS in the Access-Request message.

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 ■ Configuring Subscribers over Static Interfaces on page 371
 ■ Configuring the Static Subscriber Group Username on page 382

user-prefix

Syntax	<code>user-prefix <i>user-prefix-string</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> system services static-subscribers authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include],</p> <p>[edit routing-instances <i>routing-instances-name</i> system services static-subscribers authentication username-include],</p> <p>[edit system services static-subscribers authentication username-include]</p>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that a string is included as the beginning of the username created for all static subscribers except those overridden by a group configuration. The username is also sent to RADIUS in the Access-Request message.
Options	<i>user-prefix-string</i> —String that begins the username. The string can include the following characters: a through z, A through Z, 0 through 9, “-“, or “.”.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Global Username on page 378

user-prefix

Syntax	<code>user-prefix <i>user-prefix-string</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit routing-instances <i>routing-instances-name</i> system services static-subscribers group <i>group-name</i> authentication username-include], [edit system services static-subscribers group <i>group-name</i> authentication username-include]
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify that a string is included as the beginning of the username created for static subscribers in the group.
Options	<i>user-prefix-string</i> —String that begins the username. The string can include the following characters: a through z, A through Z, 0 through 9, “-“, or “.”.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Subscribers over Static Interfaces on page 371 ■ Configuring the Static Subscriber Group Username on page 382

Part 4

Mobile IP Access

- Mobile IP Overview on page 415
- Configuring Mobile IP on page 427
- Summary of Mobile IP Statements on page 437

Chapter 21

Mobile IP Overview

- Mobile IP Home Agent Elements and Behavior on page 415
- Mobile IP Registration on page 418
- Mobile IP Routing and Forwarding on page 422
- Mobile IP in the WiMAX Environment on page 423

Mobile IP Home Agent Elements and Behavior

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.

You configure Mobile IP home agent parameters in the `[edit services mobile-ip]` hierarchy level, the `[edit logical-systems logical-system-name]` hierarchy level and the `[edit routing-instances routing-instances-name]` hierarchy level.



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.

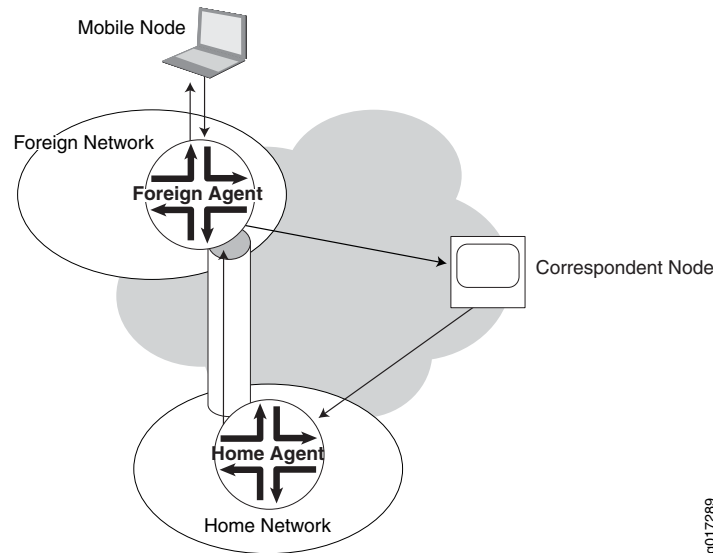
When a mobile node roams into a new, foreign network, it negotiates with the foreign agent to get a secondary IP address, which is referred to as the care-of address. The mobile node registers this care-of address with the home agent. The home agent then establishes a tunnel to the care-of address if the tunnel is not established earlier.



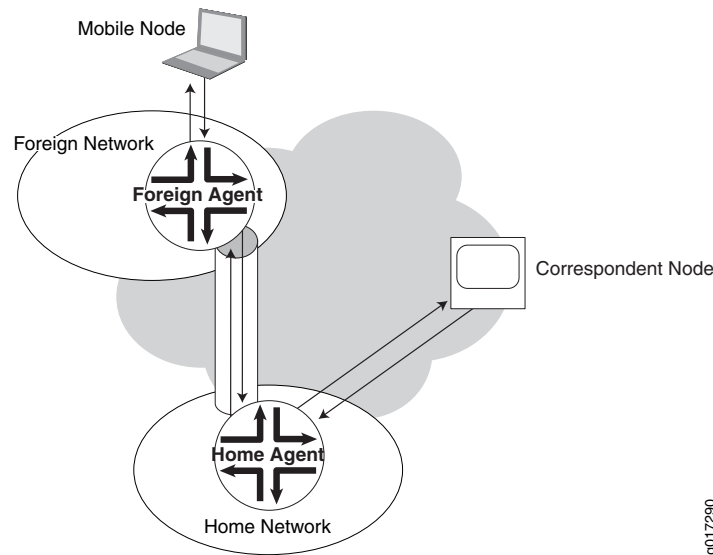
NOTE: You need to establish only one tunnel between the home agent and the care-of address. Demultiplexing of the traffic is done through IP address inspection.

Packets sent to the home address of the mobile node are redirected by the home agent through the tunnel to the care-of address at the foreign agent. The foreign agent routes the packets to the mobile node's home address. Figure 5 on page 416 illustrates this forwarding and routing process behavior. Although the traffic to the correspondent node comes from the foreign agent, to the correspondent node the traffic appears to come from the mobile node's home network.

Figure 5: Mobile IP Network Without Reverse Tunneling



If the mobile node's home address is a private address or if the foreign agent implements ingress filtering, a reverse tunnel from the care-of address to the home agent is required. This reverse tunnel capability is negotiated between the foreign agent and the home agent when the mobile node requests registration. Traffic from a correspondent node to the mobile node is forwarded by the home agent through the foreign agent as in the other scenario. Figure 6 on page 417 shows how traffic from the mobile node to a correspondent node is tunneled from the foreign agent to the home agent and then routed to the correspondent node by the home agent.

Figure 6: Mobile IP Network with Reverse Tunneling

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 forwarded over any interface.

You can use the Mobile IP home agent feature to configure the home agent within the default router context with either local or AAA authentication. When you configure local authentication, you can also configure Mobile IP independently in any named routing instance in any configured logical router. When you configure AAA as the authentication method, you can configure Mobile IP only in the default router context.

The Mobile IP home agent can also receive, process, and send Worldwide Interoperability for Microwave Access (WiMAX) vendor-specific RADIUS attributes (VSAs). This feature enables Mobile IP home agent to work in a WiMAX home connectivity services network (H-CSN), to provide for mobility management at the IP layer.

The home agent handles the following tasks:

- Registration of mobile nodes
- Routing and forwarding of mobile node traffic

Related Topics

- Mobile IP Registration on page 418
- Mobile IP Routing and Forwarding on page 422
- Mobile IP in the WiMAX Environment on page 423
- Configuring Mobile IP on page 427

Mobile IP Registration

The home agent receives the registration requests (RRQs) on UDP port 434. The registration request contains the home agent IP address. The home agent can support static home address allocation and dynamic home address allocation. The home agent can revoke a mobile node's registration. When this happens, the mobility binding is removed and the foreign agent is informed of the revocation so it can free up its resources. The foreign agent can send a registration revocation request to the home agent when the mobile node roams to another area. The revocation request can include a revocation support extension to indicate that it supports the revocation mechanism.

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.

Reauthentication

Reauthentication 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 29 on page 419. 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 29: 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

Table 29: Juniper VSAs Used by Mobile IP (continued)

Attribute Number	Attribute Name	Description	Value
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. Include 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.

When local authentication is configured, you can configure Mobile IP independently in any named routing instance in any configured logical router. All Mobile IP statements are available in those contexts, except for the **order aaa** statement at the **[edit services mobile-ip authenticate]** hierarchy level.

Accounting

The JUNOS Mobile IP home agent application supports time-based accounting for Mobile IP subscribers. Include the **statistics time** statement in the subscriber access profile at the **[edit access profile profile-name accounting]** hierarchy level. Time-based accounting for Mobile IP subscribers also requires that you include the **authenticate order aaa** statement at the **[edit services mobile-ip]** hierarchy level. Accounting begins when the Mobile IP home agent registers the mobile node and creates a binding with the mobile node.

Accounting stops when the binding is deleted. Any of the following actions can cause the binding to be deleted:

- The mobile user logs off.
- The binding lifetime expires.
- The mobile node is deregistered for any reason.
- The foreign agent sends a revocation message.

The Acct-Start message the home agent sends to the AAA server includes the network address identifier (NAI) in the User-Name attribute and the home address of the mobile IP node in the Framed-IP-Address attribute. The Acct-Stop message additionally includes the Acct-Session-Id and Acct-Session-Time attributes.

You cannot currently configure time-based accounting for only the Mobile IP service in a given logical router or routing instance. Enabling time-based accounting for Mobile IP also enables time-based accounting for all other services that are configured in that logical router or routing instance. If you do not want time-based accounting to apply to other services, then you must configure those services in a different logical router or routing instance.

- 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 38
 - Mobile IP Home Agent Elements and Behavior on page 415
 - Mobile IP Routing and Forwarding on page 422
 - Mobile IP in the WiMAX Environment on page 423
 - Configuring Mobile IP on page 427

Mobile IP Routing and Forwarding

Mobile IP employs a care-of address to process traffic for the mobile node.

The mobile node acquires the a care-of address from the foreign agent. The care-of address is reachable from the mobile node, and routable from the home agent. The mobile node includes the care-of address 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 foreign agent 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 care-of address. 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.

Mobile IP does not support Graceful Routing Engine Switchover (GRES). It handles the rebooting of processes in the following ways:

- Mobile IP process—After Mobile IP completes a restart, it removes the Mobile IP subscriber entries from AAA and the session database. When that is complete, Mobile IP can process new mobile node registration requests.
- AAA process—After AAA completes a restart, Mobile IP removes all subscriber data held internally by AAA and all corresponding session database entries.
- Routing protocol process—When the connection between the routing protocol process and Mobile IP is lost, Mobile IP responds by clearing the mobile node bindings that are associated with the logical system in which the routing protocol process restarted. The routing protocol process maintains routes to mobile nodes during the restart. The routing protocol process flushes these routes if they are not reinstalled after the restart completes and before the stale route timer expires.

- Related Topics**
- Mobile IP Home Agent Elements and Behavior on page 415
 - Mobile IP Registration on page 418
 - Mobile IP in the WiMAX Environment on page 423
 - Configuring Mobile IP on page 427

Mobile IP in the WiMAX Environment

Worldwide Interoperability for Microwave Access (WiMAX) is the international standard for wide area radio access networks. It provides a framework for networks that are implemented in different ways to successfully interoperate with mobile subscribers that roam among the networks. This interoperability enables the subscribers to be authenticated by their home network wherever they roam, and to receive the services for which they are authorized.

The Mobile IP home agent can operate in either of two access modes, generic and WiMAX. The generic access type is appropriate when the home agent is deployed in a generic Mobile IP home network. When deployed as a home agent in a WiMAX home connectivity services network (H-CSN), you must configure the WiMAX access type. The WiMAX access type enables the Mobile IP home agent to receive, process, and send WiMAX vendor-specific attributes (VSAs) that are used by AAA and the RADIUS server to authenticate the mobile subscriber. When the access type is generic, the Mobile IP home agent cannot handle these VSAs.



NOTE: The Mobile IP configuration for WiMAX requires that AAA be used for the authentication method. For that reason, WiMAX is available only in the default router context.

A WiMAX H-CSN is analogous to the Mobile IP home network for non-WiMAX implementations. When WiMAX is enabled for the Mobile IP home agent in an H-CSN, the Mobile IP home agent triggers subscriber authentication when the agent receives the registration request. The home agent stores WiMAX Forum (vendor ID 24757) vendor-specific attributes (VSAs) listed in Table 30 on page 424 in the session database based on the registration request.

Table 30: WiMAX Forum VSAs used by Mobile IP

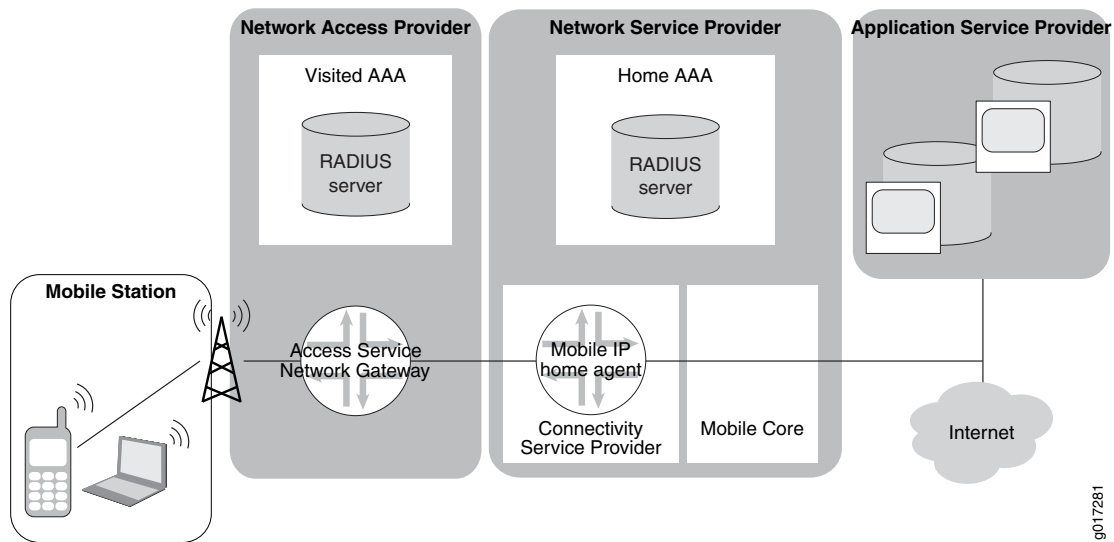
Attribute Number	Attribute Name	Description	Value
26-1	WiMAX-Capability	Identifies the WiMAX capabilities supported by the home agent (sent in the Access-Request message). In an Access-Accept message, Identifies the capabilities selected by the RADIUS server (returned in the Access-Accept message).	string or integer
26-6	hHA-IP-MIP4	IP address of the home agent (hHA) making the request	octet string: IP address
26-10	MN-hHA-MIP4-KEY	MN-hHA key sent by the RADIUS server for validation by the home agent	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key
26-11	MN-hHA-MIP4-SPI	Security parameter index (SPI) associated with the MN-hHA-MIP4 key	integer: 4-octet
26-15	hHA-RK-KEY	Key used by the NAS to generate FA-HA keys	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key
26-16	hHA-RK-SPI	SPI associated with the hHA-RK key	integer: 4-octet
26-17	HA-RK-Lifetime	Lifetime of the hHA-RK key and derived keys	integer: 4-octet
26-18	RRQ-HA-IP	IP address of the home agent contained in the Mobile IP registration request or the binding update	octet string: IP address

Table 30: WiMAX Forum VSAs used by Mobile IP (continued)

Attribute Number	Attribute Name	Description	Value
26-19	RRQ-MN-HA-KEY	The MN-HA key bound to the home agent IP address as reported by the RRQ-HA-IP attribute. Used to validate the MN-HA-AE of the Mobile IP registration request.	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key

The home agent requests AAA to fetch the corresponding WiMAX-related information from the RADIUS server. The AAA client sends an Access-Request message to the server. The RADIUS server responds with the necessary WiMAX information, such as the MN-HA key and the HA-RK key, and then the AAA client passes the response to the home agent. The Mobile IP home agent verifies the response received from AAA, processes the registration request, and then grants, extends, or denies subscriber registration.

Figure 7 on page 425 shows the elements of a sample WiMAX topology.

Figure 7: Sample Mobile IP WiMAX Topology

The Mobile IP subscriber registration flow is a four-step process.

1. The access service network gateway (ASN-GW) sends the subscriber registration request from the mobile node to the Mobile IP home agent. The registration request is protected by the MN-HA authentication extension and the FA-HA authentication extension.
2. The home agent requests that the RADIUS server send the cryptographic keys for the Mobile IP session identified by user@realm. The home agent announces

to the RADIUS server that it would like to source IP session-based accounting messages.

3. The RADIUS server agrees to use IP session-based accounting, provides the requested cryptographic keys, and sends the AAA-Session-ID for this session.
4. The home agent replies to the Mobile IP registration request.

Reauthentication of WiMAX subscribers is not currently supported.

You can configure the Mobile IP home agent for WiMAX access by including the **wimax** statement at the **[edit services mobile-ip access-type]** hierarchy level. You can prevent the Mobile IP home agent from being able to process WiMAX VSAs by either removing the **wimax** statement at the **[edit services mobile-ip access-type]** hierarchy level or by including the **generic** statement at the **[edit services mobile-ip access-type]** hierarchy level. The default access type for Mobile IP home agent is generic.

- 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 38
 - Mobile IP Home Agent Elements and Behavior on page 415
 - Mobile IP Registration on page 418
 - Mobile IP Routing and Forwarding on page 422
 - Configuring Mobile IP on page 427

Chapter 22

Configuring Mobile IP

- Configuring Mobile IP on page 427
- Tracing Mobile IP Operations on page 428
- Configuring the Mobile IP Authentication Method on page 432
- Configuring the Mobile IP Home Agent on page 432
- Configuring the Local Authentication Attributes for the Mobile Node on page 433
- Configuring Accounting for Mobile IP Subscribers on page 433
- Configuring Dynamic Home Assignment for the Mobile Node on page 434
- Configuring the Access Type for Mobile IP on page 435

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 the authentication method for registration requests, local or AAA.

See “Configuring the Mobile IP Authentication Method” on page 432.
2. Configure the Mobile IP home agent.

See “Configuring the Mobile IP Home Agent” on page 432.
3. Configure the authentication attributes for the mobile node.

See “Configuring the Local Authentication Attributes for the Mobile Node” on page 433.
4. Configure accounting for Mobile IP subscribers.

See “Configuring Accounting for Mobile IP Subscribers” on page 433
5. Configure the dynamic reassignment of the mobile node to another home agent.

See “Configuring Dynamic Home Assignment for the Mobile Node” on page 434.
6. Configure the access type for Mobile IP.

See “Configuring the Access Type for Mobile IP” on page 435.

7. Configure trace options for troubleshooting the configuration.

See “Tracing Mobile IP Operations” on page 428.

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.

Trace-related configurations are independent for each logical system and routing instance in which Mobile IP is configured. Mobile IP can generate two types of log messages:

- Trace messages common to all logical systems and routing instances in which Mobile IP is configured. Examples of this global message type are the messages generated by Mobile IP during initialization after it starts up. These trace messages are stored in the default trace file, `/var/log/mipd`. You cannot configure Mobile IP to save global messages in a different file. Mobile IP traces global messages by default.
- Trace messages specific to a logical system or routing instance in which Mobile IP is configured. An example of this message type is the message generated by Mobile IP when it receives a registration request. These trace messages are stored in the trace file configured for that logical system or routing instance. These messages cannot be saved in `/var/log/mipd`.

Tracing operations take place as follows:

1. Global messages are logged in the `/var/log/mipd` file. Logical system or routing instance messages are logged in a file that you must configure, also located in the `/var/log` directory. You cannot change the directory (`/var/log`) in which trace files are located.
2. When the file reaches 128 kilobytes (KB), it is renamed until there are three trace files. For example, `mipd` becomes `mipd.0`, then `mipd.1`, and then `mipd.2`. Then the oldest trace file (`mipd.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*.)

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

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 429.

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

See “Configuring the Number and Size of Mobile IP Log Files” on page 430.

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

See “Configuring Access to the Mobile IP Log File” on page 430.

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

See “Configuring a Regular Expression for Mobile IP Lines to Be Logged” on page 430.

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

See “Configuring the Mobile IP Tracing Flags” on page 431.

The Mobile IP traceoptions operations are described in the following sections:

- Configuring the Mobile IP Trace Log Filename on page 429
- Configuring the Number and Size of Mobile IP Log Files on page 430
- Configuring Access to the Mobile IP Log File on page 430
- Configuring a Regular Expression for Mobile IP Lines to Be Logged on page 430
- Configuring the Mobile IP Tracing Flags on page 431

Configuring the Mobile IP Trace Log Filename

Global messages common to all Mobile IP logical systems and routing instances are recorded only in `/var/log/mipd`. Mobile IP automatically creates this file if it is not present when Mobile IP starts. You cannot configure global messages to be recorded in any other file.

You must specify a different name with the `file` option for messages that are specific to a logical system or routing instance in which Mobile IP is configured. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

To configure the filename for Mobile IP tracing operations for a logical system or routing instance:

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

```
[edit logical-systems lr1 services mobile-ip traceoptions]
user@host# set file mip-lr1_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. (Mobile IP supports the *files* and *size* options for the *traceoptions* statement.)

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

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit services mobile-ip traceoptions]
user@host# set file mip_1_logfile_1 world-readable
```

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

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

```
[edit 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 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
session-db	Trace session database events
signal	Trace signal operations
subscriber	Trace subscriber events
trace	Trace changes in tracing
tunnel	Trace tunneling operations
user-interface	Trace user interface operations

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit services mobile-ip traceoptions]
user@host# set flag home-agent
```

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. AAA server authentication is the default method.



NOTE: AAA server authentication is available only in the default router context. Local authentication is available in both default and nondefault router contexts.

To configure the Mobile IP authentication method:

- Specify either local or AAA authentication.

```
[edit services mobile-ip]
user@host# set authenticate order local
```

Related Topics ■ Configuring Mobile IP on page 427

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. (Optional) 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. (Optional) 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 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
```

Related Topics ■ Configuring Mobile IP on page 427

Configuring the Local Authentication Attributes for the Mobile Node

You specify for each mobile node several attributes 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
```

Related Topics ■ Configuring Mobile IP on page 427

Configuring Accounting for Mobile IP Subscribers

You can configure time-based accounting to track the subscriber sessions of Mobile IP subscribers.

To configure Mobile IP accounting:

1. Configure the IP address for the RADIUS accounting server.

```
[edit access profile mip-win4]
user@host# set radius accounting-server 192.168.20.5
```

2. Specify RADIUS as the accounting method for Mobile IP subscribers.

```
[edit access profile mip-win4 accounting]
user@host# set order radius
```

3. Specify time-based accounting for the access profile used for the subscriber.

```
[edit access profile mip-win4 accounting]
user@host# set statistics time
```

- Related Topics**
- Configuring Mobile IP on page 427
 - Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
 - Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21
 - Configuring RADIUS Server Parameters for Subscriber Access on page 22

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
```


Related Topics ■ Configuring Mobile IP on page 427

Configuring the Access Type for Mobile IP

You can configure the Mobile IP home agent to operate in a Worldwide Interoperability for Microwave Access (WiMAX) home connectivity services network (H-CSN). This configuration enables the home agent to receive, process, and send WiMAX VSAs for subscriber authentication and registration. By default, Mobile IP cannot process the WiMAX VSAs. For operation in non-WiMAX environments, you can return it to this mode by configuring the **generic** access type.



NOTE: The Mobile IP configuration for WiMAX requires that AAA be used for the authentication method. For that reason, WiMAX is available only in the default router context.

To configure the access type, do one of the following:

- Configure generic operation.

```
[edit services mobile-ip]  
user@host# set access-type generic
```

- Configure WiMAX operation.

```
[edit services mobile-ip]  
user@host# set access-type wimax
```

Related Topics ■ Configuring Mobile IP on page 427

Chapter 23

Summary of Mobile IP Statements

access-type

Syntax	access-type { (generic wimax); }
Hierarchy Level	[edit services mobile-ip], [edit logical-systems <i>logical-system-name</i> services mobile-ip], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> services mobile-ip], [edit routing-instances <i>routing-instance-name</i> services mobile-ip]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Configure the access type for Mobile IP
Default	The generic access type is used by default.
Options	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	■ Configuring Mobile IP on page 427 ■ Configuring the Access Type for Mobile IP on page 435

algorithm

Syntax	algorithm (hmac-md5 md5);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i> spi <i>hexadecimal-value</i>] hierarchy levels added in JUNOS Release 9.5.</p>
Description	Configure the algorithm used for authenticating Mobile IP messages.
Default	HMAC-MD5 is used by default.
Options	<p>hmac-md5—Specifies algorithm hmac-md5</p> <p>md5—Specifies algorithm md5</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

authenticate

Syntax	authenticate { order (aaa local); }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip], [edit routing-instances <i>routing-instances-name</i> services mobile-ip], [edit services mobile-ip]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip] hierarchy levels added in JUNOS Release 9.5.
Description	Define the authentication method performed for Mobile IP.
Options	The remaining statement is explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Access Type for Mobile IP on page 435

dynamic-home-assignment

Syntax	<pre>dynamic-home-assignment { home-agent { nai (name@domain.com @domain.com) { home-agent ip-address; } } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip], [edit routing-instances <i>routing-instances-name</i> services mobile-ip], [edit services mobile-ip]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip] hierarchy levels added in JUNOS Release 9.5.</p>
Description	Define the dynamic assignment rule for the home agent.
Options	The remaining statements are explained separately.
Required Privilege Level	<p>system—To view this statement in the configuration. system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring Dynamic Home Assignment for the Mobile Node on page 434

enable-service

Syntax	<code>enable-service <i>interface-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], [edit services mobile-ip home-agent]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent] hierarchy levels added in JUNOS Release 9.5.
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. Include the statement once for each interface to be enabled.
Options	<i>interface-name</i> —Interface on which the home agent can be enabled.
Required Privilege Level	view—To view this statement in the configuration. view-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

entity-type

Syntax	entity-type (host mobility-agent);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>], [edit services mobile-ip peer spi <i>hexadecimal-value</i>]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer spi <i>hexadecimal-value</i>] hierarchy levels added in JUNOS Release 9.5.
Description	Configure the security parameter for the peer entity, either a mobile node, home agent, or foreign agent.
Options	host—Mobile node in home agent mobility-agent—Home agent or foreign agent
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

generic

Syntax	generic;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip access-type], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> services mobile-ip access-type], [edit routing-instances <i>routing-instance-name</i> services mobile-ip access-type], [edit services mobile-ip access-type]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Disable WiMAX features for Mobile IP home agent, preventing interoperoperation in a WiMAX environment.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	■ Configuring Mobile IP on page 427 ■ Configuring the Access Type for Mobile IP on page 435

home-agent

Syntax

```
home-agent {
  enable-service interface-name;
  virtual-network {
    home-agent-address ip-address {
      registration-lifetime seconds;
      revocation-required;
      timestamp-tolerance seconds;
    }
  }
}
```

Hierarchy Level [edit logical-systems *logical-system-name* services mobile-ip],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services
 mobile-ip],
 [edit routing-instances *routing-instances-name* services mobile-ip],
 [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.
 Support at the [edit logical-systems *logical-system-name* services mobile-ip], [edit
 logical-systems *logical-system-name* routing-instances *routing-instances-name* services
 mobile-ip], and [edit routing-instances *routing-instances-name* services mobile-ip] hierarchy
 levels added in JUNOS Release 9.5.

Description Define the virtual networks and non-virtual networks for the Mobile IP home agent.

Options 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 ■ Configuring Mobile IP on page 427

home-agent

Syntax	<pre>home-agent { nai (name@domain @domain) { home-agent ip-address; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip dynamic-home-assignment], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip dynamic-home-assignment], [edit routing-instances <i>routing-instances-name</i> services mobile-ip dynamic-home-assignment], [edit services mobile-ip dynamic-home-assignment]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip dynamic-home-assignment], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip dynamic-home-assignment], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip dynamic-home-assignment] hierarchy levels added in JUNOS Release 9.5.</p>
Description	Configure the IP address to which registration requests are sent as part of the home agent's dynamic assignment rule.
Options	The remaining statements are explained separately.
Required Privilege Level	<p>system—To view this statement in the configuration. system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring Dynamic Home Assignment for the Mobile Node on page 434

home-agent

Syntax	home-agent <i>ip-address</i> ; }
Hierarchy Level	[edit services mobile-ip dynamic-home-assignment home-agent nai <i>name@domain</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>name@domain</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>name@domain</i>], [edit routing-instances <i>routing-instance-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>name@domain</i>], [edit services mobile-ip dynamic-home-assignment home-agent nai <i>@domain</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>@domain</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>@domain</i>], [edit routing-instances <i>routing-instance-name</i> services mobile-ip dynamic-home-assignment home-agent nai <i>@domain</i>]
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	<i>ip-address</i> —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	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring Dynamic Home Assignment for the Mobile Node on page 434

home-agent-address

Syntax	home-agent-address <i>ip-address</i> { registration-lifetime <i>seconds</i> ; revocation-required; timestamp-tolerance <i>seconds</i> ; }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network], [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network], [edit services mobile-ip home-agent virtual-network]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network] hierarchy levels added in JUNOS Release 9.5.
Description	Defines addressing for the virtual network of the Mobile IP home agent.
Options	<i>ip-address</i> —For virtual networks, the loopback IP address for the virtual network. For non-virtual networks, a public address. 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	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

key

Syntax	key (hex ascii) <i>string</i> ;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>name@domain</i> spi <i>hexadecimal-value</i>] hierarchy levels added in JUNOS Release 9.5.</p>
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	<p>hex <i>string</i>—Key specified in HEX format</p> <p>ascii <i>string</i>—Key specified in ASCII format</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

mobile-ip

```

Syntax  mobile-ip {
            access-type {
                (generic | wimax);
            }
            authenticate {
                order (aaa | local);
            }
            dynamic-home-assignment {
                home-agent {
                    nai (name@domain | @domain) {
                        home-agent ip-address;
                    }
                }
            }
            home-agent {
                enable-service interface-name;
                virtual-network {
                    home-agent-address ip-address {
                        registration-lifetime seconds;
                        revocation-required;
                        timestamp-tolerance seconds;
                    }
                }
            }
            peer {
                (ip-address address | nai name@domain) {
                    spi hexadecimal-value {
                        algorithm (hmac-md5 | md5);
                        entity-type (host | mobility-agent);
                        key (hex | ascii) string;
                        replay-method (none | timestamp seconds);
                    }
                }
            }
            traceoptions {
                file <filename> <files number> <match regular-expression > <size maximum-file-size>
                <world-readable | no-world-readable>;
                flag flag;
                level (all | error | info | notice | verbose | warning);
                no-remote-trace;
            }
        }

```

Hierarchy Level [edit services],
 [edit logical-systems *logical-system-name* services],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services],
 [edit routing-instances *routing-instances-name* services]

Release Information Statement introduced in JUNOS Release 9.3.

`access-type` statement added in JUNOS Release 9.5. Support at the [edit logical-systems *logical-system-name* services], [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services], and [edit routing-instances *routing-instances-name* services], hierarchy levels added in JUNOS Release 9.5.

Description Configure JUNOS Mobile IP features.

Options 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 ■ Configuring the Mobile IP Home Agent on page 432

nai

Syntax `nai (name@domain | @domain) {
 home-agent ip-address;
 }`

Hierarchy Level [edit logical-systems *logical-system-name* services mobile-ip dynamic-home-assignment home-agent],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent],
[edit routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent],
[edit services mobile-ip dynamic-home-assignment home-agent]

Release Information Statement introduced in JUNOS Release 9.3.
Support at the [edit logical-systems *logical-system-name* services mobile-ip dynamic-home-assignment home-agent], [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent], and [edit routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent] hierarchy levels added in JUNOS Release 9.5.

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

Related Topics ■ Configuring Mobile IP on page 427
■ Configuring Dynamic Home Assignment for the Mobile Node on page 434

order

Syntax	order (aaa local);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip authenticate], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip authenticate], [edit routing-instances <i>routing-instances-name</i> services mobile-ip authenticate], [edit services mobile-ip authenticate],
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip authenticate], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip authenticate], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip authenticate] hierarchy levels added in JUNOS Release 9.5.
Description	Define the authentication method performed for Mobile IP.
Default	AAA is the default authentication method.
Options	<p>aaa—Authentication is performed by AAA. This option is available only in the default router and default routing instance, and therefore only in the [edit services mobile-ip] hierarchy level.</p> <p>local—Authentication is performed using parameters defined in the local database.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Access Type for Mobile IP on page 435

peer

```

Syntax  peer {
            (ip-address address | nai name@domain) {
                spi hexadecimal-value {
                    algorithm (hmac-md5 | md5);
                    entity-type (host | mobility-agent);
                    key (hex | ascii) string;
                    replay-method (timestamp seconds | none);
                }
            }
        }

```

Hierarchy Level [edit logical-systems *logical-system-name* services mobile-ip],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services
 mobile-ip],
 [edit routing-instances *routing-instances-name* services mobile-ip],
 [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.
 Support at the [edit logical-systems *logical-system-name* services mobile-ip], [edit
 logical-systems *logical-system-name* routing-instances *routing-instances-name* services
 mobile-ip], and [edit routing-instances *routing-instances-name* services mobile-ip] hierarchy
 levels added in JUNOS Release 9.5.

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

Related Topics ■ Configuring Mobile IP on page 427
 ■ Configuring the Mobile IP Home Agent on page 432

registration-lifetime

Syntax	registration-lifetime <i>seconds</i> ;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>],</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>],</p> <p>[edit services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>] hierarchy levels added in JUNOS Release 9.5.</p>
Description	Configure maximum period for registration lifetime that is accepted by the Mobile IP home agent.
Options	<p>registration-lifetime <i>seconds</i>—Maximum lifetime that the home agent accepts in any registration request. The registration lifetime is not affected if you change the system clock.</p> <p>Range: 7 through 65535 seconds</p> <p>Default: 3600 seconds</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

replay-method

Syntax	replay-method (none timestamp seconds);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>].</p> <p>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>].</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>].</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>].</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>].</p> <p>[edit routing-instances <i>routing-instances-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>],</p> <p>[edit services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i> spi <i>hexadecimal-value</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer <i>nai@domain</i> spi <i>hexadecimal-value</i>] hierarchy levels added in JUNOS Release 9.5.</p>
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.
Default	If you do not configure the replay protection method, then the timestamp tolerance is taken from the home agent by default.
Options	<p>none—Timestamp tolerance is obtained from the setting configured for the home agent</p> <p>timestamp <i>seconds</i>—Tolerance time in which a registration request timestamp and the local time of the home agent can differ. Range: 1 through 255 seconds</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	■ Configuring Mobile IP on page 427

- Configuring the Mobile IP Home Agent on page 432

revocation-required

Syntax	revocation-required;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>], [edit routing-instances <i>routing-instances-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>], [edit services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>], and [edit routing-instances <i>routing-instances-name</i> services home-agent virtual-network home-agent-address <i>ip-address</i>] hierarchy levels added in JUNOS Release 9.5.
Description	Configure the Mobile IP home agent to accept registration revocation requests only when the request includes the revocation extension.
Default	The Mobile IP home agent supports registration revocation requests that include the revocation extension, but it does not require the extension.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

spi

Syntax	<pre>spi <i>hexadecimal-value</i> { algorithm (hmac-md5 md5); entity-type (host mobility-agent); key (hex ascii) <i>string</i>; replay-method (none timestamp <i>seconds</i>); }</pre>
Hierarchy Level	<pre>[edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>user@domain</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i>], [edit services mobile-ip peer ip-address <i>address</i>], [edit services mobile-ip peer nai <i>user@domain</i>]</pre>
Release Information	<p>Statement introduced in JUNOS Release 9.3.</p> <p>Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip peer ip-address <i>address</i>], [edit logical-systems <i>logical-system-name</i> services mobile-ip peer nai <i>user@domain</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer ip-address <i>address</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip peer nai <i>user@domain</i>] hierarchy levels added in JUNOS Release 9.5.</p>
Description	<p>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.</p>
Options	<p><i>hexadecimal-value</i>—Security parameter index identifier.</p> <p>Range: 100 to FFFFFFFF</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

statistics

Syntax	statistics (time volume-time);
Hierarchy Level	[edit access profile <i>profile-name</i> accounting]
Release Information	Statement introduced in JUNOS Release 9.1. Statement introduced in JUNOS Release 9.1 for EX Series switches. volume-time option introduced in JUNOS Release 9.4.
Description	Configure the router or switch to collect time statistics, or both volume and time statistics, for the sessions being managed by AAA.
Options	time—Collect uptime statistics only. volume-time—Collect both volume and uptime statistics. This option is not available for Mobile IP.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Mobile IP Home Agent Elements and Behavior on page 415■ Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

timestamp-tolerance

Syntax	timestamp-tolerance <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], [edit services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>]
Release Information	Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent virtual-network home-agent-address <i>ip-address</i>] hierarchy levels added in JUNOS Release 9.5.
Description	Configure the acceptable difference between a registration request timestamp and the local time of the home agent.
Options	timestamp-tolerance <i>seconds</i> —Acceptable difference in time between a registration request timestamp and the local time of the home agent. Range: 1 through 255 seconds Default: 7 seconds
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

traceoptions

Syntax traceoptions {
 file <filename> <files number> <match regular-expression > <size maximum-file-size>
 <world-readable | no-world-readable>;
 flag flag;
 level (all | error | info | notice | verbose | warning);
 no-remote-trace;
 }

Hierarchy Level [edit logical-systems *logical-system-name* services mobile-ip],
 [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip],
 [edit routing-instances *routing-instances-name* services mobile-ip],
 [edit services mobile-ip]

Release Information Statement introduced in JUNOS Release 9.3.
 Support at the [edit logical-systems *logical-system-name* services mobile-ip], [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip], and [edit routing-instances *routing-instances-name* services mobile-ip] hierarchy levels added in JUNOS Release 9.5.

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*. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured.



NOTE: Global messages (common to all logical systems and routing instances) are always saved in */var/log/mipd*. Messages that are specific to a logical system or routing instance are never saved in */var/log/mipd*. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

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.

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.
- authentication—Trace authentication operations.

- **binding**—Trace bindings.
- **event**—Trace events.
- **ha-fsm**—Trace home agent state machine operations.
- **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.
- **session-db**—Trace session database events.
- **signal**—Trace signal operations.
- **subscriber**—Trace subscriber events.
- **timer**—Trace timer events.
- **trace**—Trace changes in tracing.
- **tunnel**—Trace tunneling operations.
- **user-interface**—Trace user interface events.

level—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

no-remote-trace—Disable remote tracing.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-world-readable—(Optional) Disable unrestricted file access.

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.

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 trace—To view this statement in the configuration.
 trace-control—To add this statement to the configuration.

- Related Topics**
- Configuring Mobile IP on page 427
 - Tracing Mobile IP Operations on page 428

wimax

Syntax wimax;

Hierarchy Level [edit services mobile-ip access-type],
 [edit logical-systems *logical-system-name* services mobile-ip access-type],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services
 mobile-ip access-type],
 [edit routing-instances *routing-instance-name* services mobile-ip access-type]



NOTE: Although this statement is available in the CLI for both default and nondefault router contexts, the commit operation is disallowed when you configure the statement in a nondefault router context.

Release Information Statement introduced in JUNOS Release 9.5.

Description Enable WiMAX features for Mobile IP home agent, including the ability to process, send, and receive WiMAX Vendor Specific Attributes (VSAs).

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

- Related Topics**
- Configuring Mobile IP on page 427
 - Configuring the Access Type for Mobile IP on page 435

virtual-network

Syntax	<pre>virtual-network { home-agent-address <i>ip-address</i> { registration-lifetime <i>seconds</i>; revocation-required; timestamp-tolerance <i>seconds</i>; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], [edit services mobile-ip home-agent]</p>
Release Information	<p>Statement introduced in JUNOS Release 9.3. Support at the [edit logical-systems <i>logical-system-name</i> services mobile-ip home-agent], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instances-name</i> services mobile-ip home-agent], and [edit routing-instances <i>routing-instances-name</i> services mobile-ip home-agent] hierarchy levels added in JUNOS Release 9.5.</p>
Description	<p>Define the virtual network for the Mobile IP home agent. Only one virtual network is supported.</p>
Options	<p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration. system-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Mobile IP on page 427 ■ Configuring the Mobile IP Home Agent on page 432

Part 5

Dynamic Profiles for Access and Services

- Dynamic Profiles Overview on page 467
- Configuring Dynamic Profiles on page 481
- Dynamic Profile Examples on page 491
- Summary of Dynamic Profile Statements on page 495

Chapter 24

Dynamic Profiles Overview

- Dynamic Profiles Overview on page 467
- Dynamic Variables Overview on page 468
- JUNOS Predefined Variables on page 469
- User-Defined Variables on page 478

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:

- class of service
- firewall
- interfaces
- protocols
- routing-instances
- routing-options
- variables

This topic covers:

- Dynamic Profile Interface Support on page 467
- What Dynamic Profiles Do on page 468
- How Dynamic Profiles Work on page 468

Dynamic Profile Interface Support

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 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 481
 - Configuring a Dynamic Profile for Client Access on page 485
 - Configuring a Dynamic Profile for Various Levels of Services on page 487
 - Dynamic Variables Overview on page 468
 - Subscriber Interface Overview on page 533

Dynamic Variables Overview

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

- How Dynamic Variables Work on page 468

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 Software 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 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 the 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 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.

-
- Related Topics**
- Configuring a Basic Dynamic Profile on page 481
 - Configuring a Dynamic Profile for Client Access on page 485
 - Configuring a Dynamic Profile for Various Levels of Services on page 487
 - JUNOS Predefined Variables on page 469
 - User-Defined Variables on page 478
 - Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 482
 - Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 483
 - Dynamic Profiles Overview on page 467
 - Subscriber Interface Overview on page 533
 - Example: Firewall Dynamic Profile on page 492
 - Example: IGMP Dynamic Profile on page 491
 - RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
-

JUNOS Predefined 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 31 on page 470 provides a list of predefined variables, their descriptions, and where in the JUNOS hierarchy you can configure them.

Table 31: JUNOS Predefined Variables and Definitions

Variable	Definition
Access and Access-Internal Routes	
\$junos-framed-route-ip-address-prefix	Route prefix of an access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access] hierarchy level for the route statement.
\$junos-framed-route-next-hop	Next-hop address of an access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route address] hierarchy level for the next-hop statement.
\$junos-framed-route-cost	Cost metric of an access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route address] hierarchy level for the metric statement.
\$junos-framed-route-distance	Distance of an access route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access route address] hierarchy level for the preference statement.
\$junos-subscriber-ip-address	<p>IP address of a subscriber identified in an access-internal route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal] hierarchy level for the route statement.</p> <p>This variable is also used for creating dynamic IP demux interfaces.</p>
\$junos-interface-name	<p>Logical underlying interface of an access-internal route. DHCP or PPP supplies this information when the subscriber logs in. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal route address] hierarchy level for the qualified-next-hop statement.</p> <p>This variable is also used for creating dynamic IP demux interfaces.</p>
\$junos-subscriber-mac-address	MAC address for a subscriber identified in an access-internal route. You specify this variable at the [edit dynamic-profiles <i>profile-name</i> routing-options access-internal route address qualified-next hop <i>underlying-interface</i>] hierarchy level for the mac-address statement.
Dynamic Protocols	

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

Variable	Definition
\$junos-interface-name	<p>Name of the dynamic interface to which the subscriber access client connects. Its use is in dynamically enabling IGMP on the subscriber interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.</p> <p>The interface name is derived from concatenating the \$junos-interface-ifd-name and the \$junos-underlying-interface-unit variables obtained when a subscriber is created dynamically at the [dynamic-profiles <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-igmp-version	<p>IGMP version configured in a client access profile. The JUNOS Software obtains this information from the RADIUS server when a subscriber accesses the router. The version is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the [dynamic-profiles <i>profile-name</i> protocols igmp] hierarchy level for the interface statement.</p>
Dynamic CoS — RADIUS-obtained Scheduler-Map Name and Traffic-Shaping Parameters	
\$junos-cos-scheduler-map	<p>Scheduler-map name configured in a traffic-control profile in a dynamic profile for used for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the scheduler-map statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy level.</p> <p>NOTE: The scheduler map can be defined dynamically (at the [edit dynamic-profiles <i>profile-name</i> class-of-service scheduler-maps] hierarchy level) or statically (at the [edit class-of-service scheduler-maps] hierarchy level).</p>

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

Variable	Definition
\$junos-cos-shaping-rate	<p>Shaping rate configured in a traffic-control profile in a dynamic profile for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>shaping-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p>
\$junos-cos-guaranteed-rate	<p>Guaranteed rate configured in a traffic-control profile in a dynamic profile for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>guaranteed-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p>
\$junos-cos-delay-buffer-rate	<p>Delay-buffer rate configured in a traffic-control profile in a dynamic profile for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the <code>delay-buffer-rate</code> statement at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code> hierarchy level.</p>
Dynamic CoS — RADIUS-obtained Scheduler Name and Parameters	
\$junos-cos-scheduler	<p>Name of a scheduler configured in a dynamic profile for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable at the <code>[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers]</code> hierarchy level.</p>

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

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

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

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

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

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

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

Variable	Definition
\$junos-cos-scheduler-dropfile-any	<p>Name of the drop profile for random early detection (RED) for loss-priority level any specified for a scheduler configured in a dynamic profile for subscriber access. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached.</p> <p>You reference this variable in the drop-profile statement at the [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map loss-priority any protocol any] hierarchy level.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>
Filters — RADIUS-obtained Policies	
\$junos-input-filter	Attaches a filter based on RADIUS VSA 26-10 (Ingress-Policy-Name) to the interface.
\$junos-output-filter	Attaches a filter based on RADIUS VSA 26-11 (Egress-Policy-Name) to the interface.
Subscriber Interfaces — Dynamic IP Demux Interfaces	
\$junos-interface-unit	Creates a unit number for a dynamic demux interface or VLAN interface. The router supplies this information when the subscriber accesses the network. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i>] hierarchy level for the unit statement.
\$junos-loopback-interface	Selects the loopback interface the subscriber uses. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" family inet] hierarchy level for the unnumbered-address statement.
\$junos-preferred-source-address	Selects the preferred source address associated with the loopback address used for the subscriber. You specify this variable at the [dynamic profiles <i>profile-name</i> interfaces demux0 unit "\$junos-interface-unit" family inet unnumbered-address "\$junos-loopback-interface"] hierarchy level for the preferred-source-address statement.

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

Variable	Definition
\$junos-subscriber-ip-address	<p>IP address of the subscriber. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>demux0</i> unit family <i>inet</i> demux-source] hierarchy level.</p> <p>This variable is also used for creating access-internal routes.</p>
\$junos-underlying-interface	<p>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 <i>profile-name</i> interfaces demux0 unit "<i>\$junos-interface-unit</i>" demux-options] hierarchy level for the <i>underlying-interface</i> statement.</p> <p>When configured, the underlying interface is used to determine the <i>\$junos-underlying-interface</i>, <i>\$junos-underlying-interface-unit</i>, and <i>\$junos-ifd-name</i> variables. For example, if the receiving logical interface is ge-0/0/0.1, the <i>\$junos-underlying-interface</i> variable is set to ge-0/0/0 and the <i>\$junos-underlying-interface-unit</i> variable is set to 1.</p> <p>This variable is also used for creating access-internal routes.</p>
Subscriber Interfaces — Static VLAN Interfaces	
\$junos-interface-ifd-name	<p>Name of the 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 <i>profile-name</i> interfaces] hierarchy level.</p>
\$junos-underlying-interface-unit	<p>Obtains the unit number for the underlying interface. It specifies the use of the underlying interface for the subscriber. You specify this variable at the [dynamic-profiles <i>profile-name</i> interfaces <i>\$junos-interface-ifd-name</i>] hierarchy for the unit statement.</p>
Wholesale Networking	

Table 31: JUNOS Predefined Variables and Definitions (*continued*)

Variable	Definition
\$junos-interface-name	<p>Name of the dynamic interface to which the subscriber access client connects. Its use is in identifying the subscriber interface. You specify this variable at the [dynamic-profiles <i>profile-name</i> routing-instance <i>\$junos-routing-instance</i>] hierarchy level for the interface statement.</p> <p>The interface name is derived from concatenating the <i>\$junos-interface-ifd-name</i> and the <i>\$junos-underlying-interface-unit</i> variables obtained when a subscriber is created dynamically at the [dynamic-profiles <i>profile-name</i> routing-instance <i>\$junos-routing-instance</i> interface] hierarchy level.</p>
\$junos-routing-instance	<p>Name of the routing instance to which the subscriber is assigned. This variable triggers one of two return values from the RADIUS server—<i>LSRI-Name</i> or <i>Redirect-LSRI-Name</i>.</p> <p>You reference this variable in the statement at the [dynamic-profiles <i>profile-name</i>] hierarchy level for the routing-instance statement.</p>

- Related Topics**
- Dynamic Variables Overview on page 468
 - Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 482
 - User-Defined Variables on page 478

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 35.

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**
- Dynamic Profiles Overview on page 467
 - Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 483
 - RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
 - JUNOS Predefined Variables on page 469

Chapter 25

Configuring Dynamic Profiles

- Configuring a Basic Dynamic Profile on page 481
- Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 482
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 483
- Configuring a Dynamic Profile for Client Access on page 485
- Configuring a Dynamic Profile for Various Levels of Services on page 487
- Modifying Dynamic Profiles on page 488

Configuring a Basic Dynamic Profile

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

Before you configure dynamic profiles for initial client access:

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

See “Subscriber Interface Overview” on page 533 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 22

To configure a basic dynamic profile:

1. Name the profile.

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

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

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

3. Define the unit statement with the internal variable:
 - When referencing an existing interface, specify the `$junos-underlying-interface-unit` variable used by the router to match the unit value of the receiving interface.
 - When creating dynamic interfaces, specify the `$junos-interface-unit` variable used by the router to generate a unit value for the interface.

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

or

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

- Related Topics**
- Configuring a Dynamic Profile for Client Access on page 485
 - Configuring a Dynamic Profile for Various Levels of Services on page 487
 - Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 482
 - Configuring Static Subscriber Interfaces in Dynamic Profiles on page 539
 - Configuring VLAN Dynamic Profiles on page 509
 - Dynamic Profiles Overview on page 467
 - Dynamic Variables Overview on page 468
 - JUNOS Predefined Variables on page 469
 - Example: Firewall Dynamic Profile on page 492
 - Example: IGMP Dynamic Profile on page 491

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 `[edit dynamic-profiles profile-name variables]` hierarchy level.

Before you configure dynamic variables:

1. Create a basic dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.
2. Ensure that the router hardware is configured in the network to accept subscriber access.

To configure predefined variables in a dynamic profile:

1. Access the desired dynamic profile.

```
[edit]
user@host# edit dynamic-profiles igmpProfile1
[edit dynamic-profiles igmpProfile1]
```

2. Configure the necessary variables.

```
[edit dynamic-profiles igmpProfile1]
user@host# set protocols igmp interface $junos-interface-name
```

For a complete list of supported predefined variables, see “JUNOS Predefined Variables” on page 469.

- Related Topics**
- Configuring a Basic Dynamic Profile on page 481
 - Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 483
 - Dynamic Profiles Overview on page 467
 - Dynamic Variables Overview on page 468
 - JUNOS Predefined Variables on page 469
 - Example: Firewall Dynamic Profile on page 492
 - Example: IGMP Dynamic Profile on page 491

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 `[edit 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 481.

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 20.

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 22

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 igmpProfile1 variables]
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 igmpProfile1 variables]
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

- Dynamic Profiles Overview on page 467
- Dynamic Variables Overview on page 468
- Configuring a Basic Dynamic Profile on page 481
- User-Defined Variables on page 478

- Configuring Predefined Internal Dynamic Variables in Dynamic Profiles on page 482
- Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access on page 663
- Example: Firewall Dynamic Profile on page 492
- Example: IGMP Dynamic Profile on page 491

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 481.

2. Configure the necessary router interfaces that you want accessing DHCP clients to use.

See “Subscriber Interface Overview” on page 533 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 20.

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 22

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-interface-name
```

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 481
 - Dynamic Profiles Overview on page 467

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 481.

2. Configure a dynamic profile that enables DHCP clients access to the network.

See “Configuring a Dynamic Profile for Client Access” on page 485



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 20.

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 22

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 485.

3. (Optional) Specify any filters for the interface.

See “Dynamically Attaching Statically Created Filters” on page 599 or “Dynamically Attaching Filters Using RADIUS Variables” on page 600.

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 481
 - Dynamic Profiles Overview on page 467

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 481
 - Dynamic Profiles Overview on page 467

Chapter 26

Dynamic Profile Examples

- Example: IGMP Dynamic Profile on page 491
- Example: Firewall Dynamic Profile on page 492
- Example: Minimum PPPoE Dynamic Profile on page 492
- Example: Subscriber Secure Policy Dynamic Profile on page 493

Example: IGMP Dynamic Profile

In this example, IGMP is configured for subscriber access using JUNOS predefined variables.

The predefined variables equate to RADIUS settings as follows:

JUNOS Predefined Variable	RADIUS VSA Name	RADIUS Attribute Number
\$var-igmp-version	IGMP-Version	26-78
\$var-igmp-access-grp	IGMP-Access-Group-Name	26-71
\$var-igmp-access-src-grp	IGMP-Access-Source- Group-Name	26-72

```
[edit dynamic-profiles profile-name]  
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 JUNOS predefined variables.

The predefined variables equate to RADIUS settings as follows:

JUNOS Predefined Variable	RADIUS VSA Name	RADIUS Attribute Number
\$junos-input-filter	Ingress-Policy-Name	26-10
\$junos-output-filter	Egress-Policy-Name	26-11

```
dynamic-profiles {
    DynamicFilterProfile {
        interfaces {
            "$junos-interface-ifd-name" {
                unit "$junos-underlying-interface-unit" {
                    family inet {
                        filter {
                            input "$junos-input-filter";
                            output "$junos-output-filter";
                        }
                    }
                }
            }
        }
    }
}
```



NOTE: You must also configure any global firewall parameters.

Example: Minimum PPPoE Dynamic Profile

This example shows the minimum configuration for a dynamic profile that is used for static PPPoE interfaces. The configuration must include the `interface pp0` stanza.

```
dynamic-profiles {
```

```
ppp-profile-1 {
  interfaces {
    pp0 {
      unit "$junos-interface-unit";
    }
  }
}
```

- Related Topics**
- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 129
 - Creating Dynamic Profiles for PPP Subscriber Interfaces on page 130
 - Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 132

Example: Subscriber Secure Policy Dynamic Profile

In this example, subscriber secure policy mirroring is configured for subscriber access using user-defined variables and JUNOS predefined variables. This example is for the flow-tap service configured on a router without a Tunnel Services PIC.

The user-defined variables equate to RADIUS settings as follows:

User-Defined Variable Name	JUNOS Variable	RADIUS VSA Name	RADIUS Attribute Number	Example RADIUS Setting
ssp-intercept-id	\$ssp-intercept-id	Interception Identifier	26-59	subscriber-bg-2350
ssp-destination-addr	\$ssp-destination-addr	MD-IP-Address	26-60	192.163.100.22
ssp-destination-port	\$ssp-destination-port	MD-Port-Number	26-61	2222

```
variables {
  var ssp-intercept-id;
  var ssp-destination-addr;
  var ssp-destination-port;
}
interfaces {
  <*> {
    unit <*> {
      family inet {
        filter {
          input ssp;
          output ssp;
        }
      }
    }
  }
}
firewall {
  family inet {
    filter ssp {
      term $ssp-id {
        from {
```

```
        # optional classifiers.
    }
    then {
        flowtap-destination-address $ssp-destination-addr;
        flowtap-destination-port $ssp-destination-port;
        flowtap;
    }
}
}
```

Chapter 27

Summary of Dynamic Profile Statements

attribute

Syntax	attribute <i>attribute-number</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> 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	<i>attribute-number</i> —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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

default-value

Syntax	default-value <i>default-value</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> variables <i>variable-name</i>]
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	<i>default-value</i> —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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

dynamic-profiles

```

Syntax  dynamic-profiles {
            profile-name {
                class-of-service {
                    interfaces {
                        interface-name {
                        }
                        unit logical-unit-number {
                            output-traffic-control-profile profile-name;
                        }
                    }
                }
                scheduler-maps {
                    map-name {
                        forwarding-class class-name scheduler scheduler-name;
                    }
                }
                schedulers {
                    (scheduler-name) {
                        buffer-size (seconds | percent percentage | remainder | temporal
                                    microseconds);
                        drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
                        protocol (any | non-tcp | tcp) drop-profile profile-name;
                        priority priority-level;
                        transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
                    }
                }
                traffic-control-profiles profile-name {
                    delay-buffer-rate (percent percentage | rate | $junos-cos-delay-buffer-rate);
                    guaranteed-rate (percent percentage | rate | $junos-cos-guaranteed-rate);
                    scheduler-map map-name;
                    shaping-rate (percent percentage | rate | $junos-cos-shaping-rate);
                }
            }
            firewall {
                family family {
                    fast-update-filter filter-name {
                        interface-specific;
                        match-order [match-order];
                        term term-name {
                            from {
                                match-conditions;
                            }
                            then {
                                action;
                                action-modifiers;
                            }
                        }
                        only-at-create;
                    }
                }
            }
        }
        interfaces interface-name {

```

```

unit logical-unit-number {
    family family {
        address address;
        filter {
            input filter-name (
                precedence precedence;
            )
            output filter-name {
                precedence precedence;
            }
        }
        unnumbered-address interface-name preferred-source-address address;
    }
    ppp-options {
        chap;
        pap;
    }
    vlan-id number;
    vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}

protocols {
    igmp {
        interface interface-name {
            accounting;
            disable;
            group-policy policy-name;
            immediate-leave;
            no-accounting;
            oif-map;
            passive;
            promiscuous-mode;
            ssm-map ssm-map-name;
            static {
                group group {
                    source source;
                }
            }
            version version;
        }
    }
}

routing-instances {
    interface interface-name;
}

routing-options {
    multicast {
        interface interface-name {
            no-qos-adjust;
        }
    }
}

variables {
    variable-name {
        mandatory;
        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 467](#)
- [Configuring a Basic Dynamic Profile on page 481](#)

interface

Syntax	<code>interface interface-name;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> routing-instances <i>routing-instance-name</i>] [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>], [edit routing-instances <i>routing-instance-name</i>]
Release Information	Statement introduced prior to JUNOS Release 7.4. [edit dynamic-profiles <i>profile-name</i> routing-instances <i>routing-instance-name</i>] support added in JUNOS Release 9.6.
Description	Assign the specified interface to the current routing instance. When used in the [edit dynamic-profiles <i>profile-name</i> routing-instances <i>routing-instance-name</i>] hierarchy, specify the <i>\$junos-routing-instance</i> predefined variable.
Options	<i>interface-name</i> —Name of the interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring Routing Instances

mandatory

Syntax	<code>mandatory;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> variables <i>variable-name</i>]
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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

routing-instances

Syntax `routing-instances routing-instance-name {
 interface interface-name;
 }`

Hierarchy Level [edit dynamic-profiles],

Release Information Statement introduced in JUNOS Release 9.6.

Description Dynamically configure an additional routing entity for a router.

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

The remaining statement is explained separately.



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

The `interface` statement is described 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 Retail Dynamic Profile

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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

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 User-Defined CoS Variables in a Dynamic Service Profile on page 653

vendor-id

Syntax	vendor-id <i>id</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> variables radius]
Release Information	Statement introduced in JUNOS Release 9.3.
Description	Configure the vendor ID as a variable in a dynamic profile.
Options	<i>id</i> —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	<ul style="list-style-type: none"> ■ Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 653

vlan-id

Syntax	vlan-id <i>number</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	For Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.
Options	<i>number</i> —A valid VLAN identifier. When used in the dynamic-profiles hierarchy, specify the <code>\$junos-vlan-id</code> predefined variable to dynamically obtain the 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-tags

Syntax `vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];`

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

Release Information Statement introduced in JUNOS Release 9.5.

Description For Gigabit Ethernet IQ and IQE interfaces only, binds TPIDs and 802.1Q VLAN tag IDs to a logical interface. You must include the **stacked-vlan-tagging** statement at the `[edit interfaces interface-name]` hierarchy level.



NOTE: The inner-range *vid1-vid2* option is supported on MX Series routers with IQE PICs only.

Options `inner [tpid].vlan-id`—A TPID (optional) and a valid VLAN identifier in the format *tpid.vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the `$junos-vlan-id` predefined variable to dynamically obtain the VLAN ID.

Range: For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.

`outer [tpid].vlan-id`—A TPID (optional) and a valid VLAN identifier in the format *tpid.vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the `$junos-stacked-vlan-id` predefined variable.

Range: For VLAN ID, 1 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces. VLAN ID 0 is reserved for tagging the priority of frames.

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

Related Topics

- Configuring Dual VLAN Tags
- stacked-vlan-tagging

Part 6

Dynamic VLANs

- Dynamic VLAN Overview on page 507
- Configuring Dynamic VLANs on page 509
- Dynamic VLAN Examples on page 527

Chapter 28

Dynamic VLAN Overview

- Dynamic 802.1Q VLAN Overview on page 507

Dynamic 802.1Q VLAN Overview

You can identify VLANs statically or dynamically.

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. Many hosts can be connected to the same Gigabit Ethernet switch, but they cannot be in the same routing or bridging domain.

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

Static VLAN Configuration

Static VLAN configuration is not described in this guide. For information about how to statically configure VLANs and stacked VLANs, see the *JUNOS Network Interfaces Configuration Guide*. For an example of how to configure static VLANs in a subscriber access network, see the *JUNOS Broadband Subscriber Management Solutions Guide*.

Dynamic VLAN Configuration

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

Dynamically configuring VLANs or stacked VLANs requires the following general steps:

1. Configure a dynamic profile for dynamic VLAN or dynamic stacked VLAN creation.

See “Configuring VLAN Dynamic Profiles” on page 509.

2. Associate the VLAN or stacked VLAN dynamic profile with the interface.

See “Configuring VLAN Interfaces to Use Dynamic Profiles” on page 516.

3. Specify the Ethernet packet type that the VLAN dynamic profile accepts.

See “Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept” on page 517.

4. Define VLAN ranges for use by the dynamic profile when creating VLAN IDs.

See “Configuring VLAN Ranges for Use with Dynamic Profiles” on page 519.

Chapter 29

Configuring Dynamic VLANs

- Configuring VLAN Dynamic Profiles on page 509
- Configuring VLAN Interfaces to Use Dynamic Profiles on page 516
- Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept on page 517
- Configuring an Authentication Password for VLAN or Stacked VLAN Ranges on page 518
- Configuring VLAN Ranges for Use with Dynamic Profiles on page 519
- Configuring Dynamic Authentication for VLAN Interfaces on page 522
- Configuring VLAN Interface Username Information for AAA Authentication on page 524
- Verifying and Managing Dynamic VLAN Configuration on page 525

Configuring VLAN Dynamic Profiles

Creating dynamic single-tag VLANs or stacked (dual-tag) VLANs requires the use of dynamic profiles. The dynamic profile automatically references the VLAN interface and creates the interface unit and the necessary VLAN IDs for each new single-tag VLAN or stacked VLAN.



NOTE: VLAN dynamic profiles do not support user-defined variables. Use only JUNOS VLAN predefined variables when configuring VLAN dynamic profiles. See “Dynamic Variables Overview” on page 468 for information about dynamic variables.

-
- Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values on page 510
 - Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values on page 511
 - Configuring a Stacked VLAN Dynamic Profile on page 513
 - Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces to Separate Routing Instances on page 514

Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values

You can configure a VLAN dynamic profile to create single-tag VLANs that accept only standard TPID values (a TPID value of 0x8100) by using the `vlan-id` statement and the `$junos-vlan-id` variable.



NOTE: This procedure configures a dynamic profile that accepts only TPID values of 0x8100. To configure a VLAN dynamic profile for creating VLANs using any TPID values, see “Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values” on page 511.

Before you begin:

- Configure the dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the `$junos-interface-ifd-name` variable for the dynamic interface and the `$junos-interface-unit` variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the `demux-source` statement.

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

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

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit"]
user@host# set proxy-arp
```

4. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

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

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

5. Define the unit family.
 - a. Specify the family type.

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

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

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

- c. Specify the unnumbered address.

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

- d. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values

You can configure a VLAN dynamic profile to create single-tag VLANs that accept any TPID values by configuring the `vlan-tags` statement and the `$junos-vlan-id` variable.



NOTE: For procedures to configure a VLAN dynamic profile for creating single-tag VLANs that use only standard TPID values (a TPID value of 0x8100), see “Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values” on page 510.

Before you begin:

- Configure the dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the `$junos-interface-ifd-name` variable for the dynamic interface and the `$junos-interface-unit` variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the `demux-source` statement.

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

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

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit"]
user@host# set proxy-arp
```

4. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

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

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

5. Define the unit family.

- a. Specify the family type.

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

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

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

- c. Specify the unnumbered address.

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

- d. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a Stacked VLAN Dynamic Profile

You can configure a dynamic profile for creating stacked 802.1Q VLANs.

Before you begin:

- Configure the dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

To configure a stacked VLAN dynamic profile:

1. Ensure that the VLAN dynamic profile uses the `$junos-interface-ifd-name` variable for the dynamic interface and the `$junos-interface-unit` variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the `demux-source` statement.

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

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

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
 "$junos-interface-unit"]
user@host# set proxy-arp
```

4. Specify the outer VLAN ID variable.

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

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

5. Specify the inner VLAN ID variable.

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

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

6. Define the unit family.

- a. Specify the family type.

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

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

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

- c. Specify the unnumbered address.

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

- d. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
"$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces to Separate Routing Instances

You can configure a VLAN dynamic profile that dynamically-creates, underlying VLAN interfaces and associates these interfaces to dynamically-created routing instances. The VLAN interface is created in the default logical system (LS) for a specific routing instance as defined by VSA 26–1 (LSRI-Name) on the AAA server (for example, RADIUS server).

To configure a dynamic VLAN profile using routing instances:

1. Name the profile.

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

2. Specify that you want to dynamically create routing instances on the default logical system.

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

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

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

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

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


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

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

6. Enable dynamic demux interface creation.

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

7. (Optional) To configure the router to respond to any ARP request, specify the `proxy-arp` statement.

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

8. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

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

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

9. Define the unit family.

- a. Specify the family type.

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

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

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name"
 unit "$junos-interface-unit" family inet]
user@host# set mac-validate strict
```

- c. Specify the unnumbered address to dynamically create loopback interfaces.

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

- d. (Optional) Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
 "$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring VLAN Interfaces to Use Dynamic Profiles

You can configure an interface to use a single-tag VLAN or stacked (dual-tag) VLAN dynamic profile when creating dynamic VLANs. The dynamic profile assigns a VLAN ID to each VLAN dynamically created over the interface by using the single-tag VLAN and stacked VLAN ranges configured for the VLAN interface. You can configure VLAN interfaces to use dynamic profiles in the following ways:

- Associating a Single-Tag VLAN Dynamic Profile to an Interface on page 516
- Associating a Stacked VLAN Dynamic Profile to an Interface on page 516

Associating a Single-Tag VLAN Dynamic Profile to an Interface

Before you begin:

- Configure the VLAN dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

To associate a single-tag VLAN dynamic profile to an interface:

1. Access the interface that you want to use for creating VLANs.

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

2. Edit the `auto-configure` to automatically configure VLANs.

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

3. Edit the `vlan-ranges` stanza.

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

4. Specify the dynamic VLAN profile that you want the interface to use.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges]
user@host# set dynamic-profile VLAN-PROF1
```

Associating a Stacked VLAN Dynamic Profile to an Interface

To associate a stacked (dual-tag) VLAN dynamic profile to an interface:

1. Access the interface that you want to use for creating VLANs.

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

2. Edit the `auto-configure` stanza to automatically configure the stacked VLANs.

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

3. Edit the stacked-vlan-ranges stanza.

```
[edit interfaces ge-1/0/0 auto-configure]
user@host# edit stacked-vlan-ranges
```

4. Specify the dynamic VLAN profile that you want the interface to use.

```
[edit interfaces ge-1/0/0 auto-configure stacked-vlan-ranges]
user@host# set dynamic-profile STACKED-VLAN-PROF1
```

Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept

To create dynamic single-tag VLANs and dynamic stacked (dual-tag) VLANs, you must specify what Ethernet packet type you want the single-tag VLAN or stacked VLAN dynamic profile to accept. You can configure which VLAN Ethernet packet types a dynamic profile accepts in the following ways:

- Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles on page 517
- Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles on page 518

Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles

To configure the VLAN Ethernet packet type the VLAN dynamic profile can accept:

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

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

2. Edit the VLAN auto-configure stanza.

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

3. Edit the vlan-ranges stanza.

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

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

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

5. Specify what VLAN Ethernet packet type the VLAN or stacked VLAN dynamic profile accepts.



NOTE: This release supports inet (IPv4) and dhcp-v4 Ethernet packet types.

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

Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles

To configure the VLAN Ethernet packet type the stacked VLAN dynamic profile can accept:

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

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

2. Edit the VLAN auto-configure stanza.

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

3. Edit the stacked-vlan-ranges stanza.

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

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

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

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



NOTE: This release supports inet (IPv4) and dhcp-v4 Ethernet packet types.

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

Configuring an Authentication Password for VLAN or Stacked VLAN Ranges

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



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

To configure an authentication password:

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

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

2. Edit the VLAN auto-configure stanza.

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

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

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

or

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

4. Edit the VLAN authentication stanza.

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

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

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set password PSSWD1
```

Related Topics ■ [Configuring Dynamic Authentication for VLAN Interfaces on page 522](#)

Configuring VLAN Ranges for Use with Dynamic Profiles

You define dynamic VLAN ranges under the `[edit interfaces]` hierarchy. You can configure VLAN ranges in the following ways for use with dynamic profiles:

- [Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles on page 520](#)
- [Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles on page 520](#)
- [Configuring Dynamic Mixed VLAN Ranges on page 521](#)

Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles

You configure VLAN ranges at the [edit interfaces] hierarchy level by specifying the `vlan-tagging` statement for the interface and defining VLAN ranges for use with a VLAN dynamic profile.

To configure a VLAN range:

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

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

2. Specify the `vlan-tagging` statement to indicate that this interface is for use with stacked VLAN ranges.

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

3. Access the VLAN [auto-configure] hierarchy level.

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

4. Access the [vlan-ranges] hierarchy level.

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

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

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

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

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

Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles

You configure stacked VLAN ranges at the [edit interfaces] hierarchy level by specifying the `stacked-vlan-tagging` statement for the interface and defining stacked VLAN ranges for use with a stacked VLAN dynamic profile.

To configure a VLAN range:

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

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

2. Specify the `stacked-vlan-tagging` statement to indicate that this interface is for use with stacked VLAN ranges.

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

3. Access the VLAN [auto-configure] hierarchy level.

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

4. Access the [stacked-vlan-ranges] hierarchy level.

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

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

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

6. Specify the outer and inner stacked VLAN ranges that you want the dynamic profile to use. The following example specifies an outer stacked VLAN ID range from 2000 through 4000 and an inner stacked VLAN ID range of **any** (enabling a range from 1 through 4094 for the inner stacked VLAN ID).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set ranges 2000-4000,any
```

Configuring Dynamic Mixed VLAN Ranges

Dynamic VLAN and dynamic stacked VLAN configuration supports mixed (or flexible) VLAN ranges. You configure mixed VLAN ranges at the [edit interfaces] hierarchy level by specifying the **flexible-vlan-tagging** statement for the interface and defining both VLAN and stacked VLAN ranges for use with different VLAN or stacked VLAN dynamic profiles.



NOTE: JUNOS VLAN IDs for single-tag VLANs are equivalent to the outer tags used for stacked (dual-tag) VLANs. When configuring mixed (flexible) VLANs, ensure that single-tag VLAN IDs and stacked VLAN outer tag values do not overlap.

To configure both VLAN and stacked VLAN ranges:

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

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

2. Specify the **flexible-vlan-tagging** statement to indicate that this interface is for use with both VLAN and stacked VLAN ranges.

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

3. Access the VLAN [auto-configure] hierarchy level.

```
[edit interfaces ge-0/0/0]
```

```
user@host# edit auto-configure
```

4. Access the [vlan-ranges] hierarchy level.

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

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

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

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

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

7. Access the [stacked-vlan-ranges] hierarchy level.

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

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

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

9. Specify the outer and inner stacked VLAN ranges that you want the dynamic profile to use. The following example specifies an outer stacked VLAN ID range from 3001 through 4000 (to avoid overlapping VLAN IDs with single-tag VLANs) and an inner stacked VLAN ID range of any (enabling a range from 1 through 4094 for the inner stacked VLAN ID).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set ranges 3001-4000,any
```

Configuring Dynamic Authentication for VLAN Interfaces

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

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

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

- Extended DHCP Local Server Overview on page 58

- Extended DHCP Relay Agent Overview on page 94



NOTE: You can also configure dynamically created VLAN interfaces over PPP or PPPoE interfaces. For information about how to configure PPP or PPPoE, see the *JUNOS Network Interfaces Configuration Guide*.

To configure dynamic authentication for dynamically created VLAN interfaces:

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

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

- Configuring an Access Profile for Subscriber Management on page 44
- Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
- Configuring How Accounting Statistics Are Collected for Subscriber Access on page 21
- Configuring Router or Switch Interaction with RADIUS Servers on page 19

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

See “Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces to Separate Routing Instances” on page 514.

3. Define the VLAN physical interface for automatic configuration.

See the following topics:

- Enabling VLAN Tagging
- Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept on page 517
- Configuring VLAN Ranges for Use with Dynamic Profiles on page 519
- Configuring an Authentication Password for VLAN or Stacked VLAN Ranges on page 518
- Configuring VLAN Interface Username Information for AAA Authentication on page 524

4. Associate an access profile to the VLAN interface.

See “Attaching Access Profiles” on page 45.

5. Associate a dynamic profile to the VLAN interface.

See “Configuring VLAN Interfaces to Use Dynamic Profiles” on page 516.

Related Topics ■ Dynamic 802.1Q VLAN Overview on page 507

Configuring VLAN Interface Username Information for AAA Authentication

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

The `username-include` statement supports the following statement options:

- `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 a string. The router adds the `@` delimiter to the username.
- `interface-name`—The interface name as a string. The router appends the interface name and VLAN ID or stacked VLAN ID to the username string used for authentication. The appended information takes the following format:
 - For single VLAN—`<interface-name>:<4-digit-vlan-id>`
 - For stack VLANs—`<interface-name>:<4-digit-svlan-id>-<4-digit-vlan-id>`
- `mac-address`—The client hardware address (chaddr), obtained from the DHCP discover packet, in a string of the format `xxxx.xxxx.xxxx`.
- `option-82`—The raw payload of the option 82 from the PDU is concatenated to the username.
- `radius-realm`—A string indicating the RADIUS realm.
- `user-prefix`—A string indicating the user prefix.

The username takes the format

`<user-prefix><mac-address><circuit-type><option-82><interface-name><domain-name><radius-realm>`
with each component separated by whatever delimiter you choose.



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

To configure VLAN interface username information:

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

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

2. Edit the auto-configure stanza.

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

3. Edit the vlan-ranges stanza.

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

4. Edit the authentication stanza.

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

5. Edit the username-include stanza.

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

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

Related Topics ■ Configuring Dynamic Authentication for VLAN Interfaces on page 522

Verifying and Managing Dynamic VLAN Configuration

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

Action ■ To display subscriber dynamic VLAN information:

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

■ To display interface-specific output for dynamic VLANs:

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

■ To clear the binding state of dynamic VLAN interfaces:

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

Related Topics ■ For more information, see the *JUNOS System Basics and Services Command Reference* and the *JUNOS Interfaces Command Reference*.

Chapter 30

Dynamic VLAN Examples

- Example: Configuring a VLAN Dynamic Profile for VLANs with a TPID of 0x8100 on page 527
- Example: Configuring a VLAN Dynamic Profile for VLANs with Any TPID Value and Enabling Demux Interfaces over the VLAN Interface on page 527
- Example: Configuring a Stacked VLAN Dynamic Profile on page 528
- Example: Dynamic VLAN Interface Configuration on page 528
- Example: Dynamic Stacked VLAN Interface Configuration on page 528
- Example: Dynamic Flexible VLAN Interface Configuration on page 529
- Example: Configuring a Flexible VLAN Interface for Use with a Nonstandard Ethertype on page 529

Example: Configuring a VLAN Dynamic Profile for VLANs with a TPID of 0x8100

```
vlan-prof1 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-interface-unit" {
        vlan-id "$junos-vlan-id"; #Note the statement and variable use.
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
}
```

Example: Configuring a VLAN Dynamic Profile for VLANs with Any TPID Value and Enabling Demux Interfaces over the VLAN Interface

```
vlan-prof-any-tpid {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-interface-unit {
        demux-source inet; #Enables demux interface use over the VLAN interface.
        vlan-tags outer $junos-vlan-id; #Statement/variable combination enables the
          recognition of any VLAN interface TPID value.
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
}
```

```

    }
  }
}

```

Example: Configuring a Stacked VLAN Dynamic Profile

```

svlan-prof1 {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-interface-unit {
        vlan-tags outer $junos-stacked-vlan-id inner $junos-vlan-id;
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
}

```

Example: Dynamic VLAN Interface Configuration

```

interfaces {
  ge-0/0/0 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile vlan-prof1 {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
  }
}

```

Example: Dynamic Stacked VLAN Interface Configuration

```

interfaces {
  ge-0/0/0 {
    stacked-vlan-tagging;
    auto-configure {
      stacked-vlan-ranges {
        dynamic-profile svlan-prof {
          accept inet;
          ranges {
            1-1, any;
          }
        }
      }
    }
  }
}

```

```

    }
  }
}

```

Example: Dynamic Flexible VLAN Interface Configuration

```

interfaces {
  ge-0/0/0 {
    flexible-vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile vlan-prof1 {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    stacked-vlan-ranges {
      dynamic-profile svlan-prof1 {
        accept inet;
        ranges {
          1-1, any;
        }
      }
    }
  }
}

```

Example: Configuring a Flexible VLAN Interface for Use with a Nonstandard Ethertype

This example specifies an ethertype of 0x9100 instead of the standard 0x8100.

```

interfaces {
  ge-0/0/0 {
    flexible-vlan-tagging;
    gigether-options {
      ethernet-switch-profile {
        tag-protocol-id 0x9100;
      }
    }
    auto-configure {
      vlan-ranges {
        dynamic-profile vlan-prof {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    stacked-vlan-ranges {
      dynamic-profile svlan-prof {

```

```
accept inet;  
ranges {  
    1-1,any;  
}  
}  
}  
}  
}
```


Part 7

Subscriber Interfaces

- Subscriber Interface Overview on page 533
- Configuring Subscriber Interfaces for Dynamic Profiles on page 539
- Subscriber Interface Examples on page 547
- Subscriber Interfaces over Aggregated Ethernet Overview on page 551
- Configuring Subscriber Interfaces over Aggregated Ethernet on page 555
- Subscriber Interfaces over Aggregated Ethernet Examples on page 559
- Summary of Subscriber Interface Configuration Statements on page 565

Chapter 31

Subscriber Interface Overview

- Subscriber Interface Overview on page 533
- Static Subscriber Interfaces and VLAN Overview on page 534
- Subscriber Interfaces and IP Demux Overview on page 535
- MAC Address Validation for Subscriber Interfaces Overview on page 536

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]
interfaces interface-name {
  unit logical-unit-number {
    family family {
      address address;
      filter {
        input filter-name;
      }
    }
  }
}
```

```

        output filter-name;
    }
    unnumbered-address interface-name preferred-source-address address;
    vlan-id;
}
vlan-tagging;
}

```

Dynamically Identifying Subscribers

You can configure 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 534
 - Subscriber Interfaces and IP Demux Overview on page 535

Static Subscriber Interfaces and VLAN Overview

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

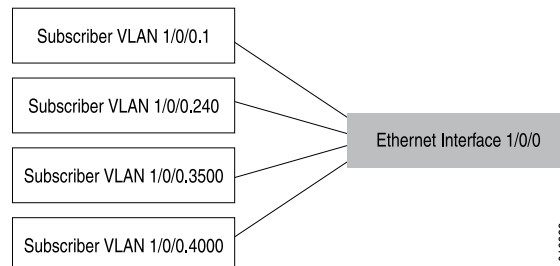
In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

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

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

Figure 8 on page 534 shows an example of subscriber interfaces on an individual VLAN.

Figure 8: 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 540
 - For more information about IP demux interfaces, see Subscriber Interfaces and IP Demux Overview on page 535

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.

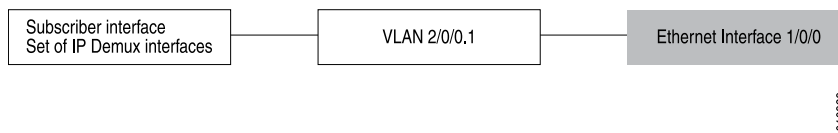
The subscriber interfaces can provide different levels of services for individual subscribers in an access network. For example, you can apply CoS parameters for each subscriber.

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 9 on page 535 shows a subscriber interface configured using a set of IP demux interfaces with an underlying VLAN interface.

Figure 9: 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 Ethernet Services 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 Static Subscriber Interfaces Using IP Demux Interfaces on page 540
- Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 542
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 543
- CoS and Static IP Demux Interface Set Overview on page 636
- 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 Ethernet Services 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 544

Chapter 32

Configuring Subscriber Interfaces for Dynamic Profiles

- [Configuring Static Subscriber Interfaces in Dynamic Profiles on page 539](#)
- [Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 542](#)
- [Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 543](#)
- [Configuring MAC Address Validation for Subscriber Interfaces on page 544](#)

Configuring Static Subscriber Interfaces in Dynamic Profiles

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

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

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

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

This topic contains the following sections:

- [Configuring a Subscriber Interface with a Static VLAN Interface on page 540](#)
- [Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 540](#)
- [Associating Dynamic Profiles with Statically Created Interfaces on page 541](#)

Configuring a Subscriber Interface with a Static VLAN Interface

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

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

To configure a subscriber interface over a VLAN:

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

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

2. Configure the units and assign the VLAN IDs.

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

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

See “Associating Dynamic Profiles with Statically Created Interfaces” on page 541.

Configuring Static Subscriber Interfaces Using IP Demux Interfaces

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

To configure a static IP demux subscriber interface:

1. Configure the IP demux interface on a physical device (of the underlying logical interface) represented by a logical unit number.

See Configuring an IP Demultiplexing Interface.

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

See Configuring an IP Demux Underlying Interface

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

See Specifying the Demux Underlying Interface.

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

See Configuring IP Demux Prefixes.

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

See “Associating Dynamic Profiles with Statically Created Interfaces” on page 541.



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

Associating Dynamic Profiles with Statically Created Interfaces

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



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

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

1. Access the profile.

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

2. Specify the interface name variable.

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

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

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

Related Topics

- Static Subscriber Interfaces and VLAN Overview on page 534
- 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 656
 - Subscriber Interfaces and IP Demux Overview on page 535

- 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 481.

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# set unnumbered-address lo0.0
```

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

The variable is dynamically replaced with the IP address that DHCP supplies when the subscriber logs in.

```
[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 535
 - Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 545
 - Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75
 - Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 548

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 on page 544
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 545

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 481.

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 541.

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 481.

- Configure the dynamic demux interface.

See “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 543.

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 536](#)
 - [Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 548](#)

Chapter 33

Subscriber Interface Examples

- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units) on page 547
- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface on page 547
- Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation) on page 548
- Example: Configuring a Static Subscriber Interface with a Loopback on page 548
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 548

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 539

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 539](#)

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 539](#)

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 539](#)

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;
      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 543
 - Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 75

Chapter 34

Subscriber Interfaces over Aggregated Ethernet Overview

- Static VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 551
- Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 553

Static VLAN Subscriber Interfaces over Aggregated Ethernet Overview

You can configure static or dynamic hierarchical class of service (CoS) on a subscriber interface represented by a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. You must configure the aggregated Ethernet logical interface on Enhanced Queuing Dense Port Concentrators (EQ DPCs) in MX Series Ethernet Services Routers.

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

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

- Guidelines for Configuring a Static VLAN Subscriber Interface over Aggregated Ethernet for Static or Dynamic CoS Support on page 551
- Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static VLAN Subscriber Interface on page 552

Guidelines for Configuring a Static VLAN Subscriber Interface over Aggregated Ethernet for Static or Dynamic CoS Support

Keep the following guidelines in mind when configuring static or dynamic CoS for a subscriber interface on a static VLAN stacked on a two-link aggregated Ethernet logical interface:

- Configure the aggregated Ethernet logical interface over two physical interfaces capable of performing hierarchical scheduling, which is only supported for ports on EQ DPCs in MX Series Ethernet Services Routers.
- Configure the aggregated Ethernet logical interface to operate in hierarchical scheduler mode instead of in the default per-unit scheduler mode.

- Configure the aggregated Ethernet logical interface with both underlying links operating in link-protect mode.
- You can apply static or dynamic CoS characteristics to a scheduler node at the aggregated Ethernet logical interface or its underlying physical interface, but not at an interface set.



NOTE: In the current release, hierarchical CoS is not supported for dynamic VLAN interfaces over aggregated Ethernet links.

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

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

- If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode, which requires that the two underlying physical interfaces be designated as primary and backup links.
- In addition, if you need to support one-to-one active/backup link redundancy at the DPC level, configure the aggregated Ethernet interface on physical interfaces that reside on different EQ DPCs.



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

Related Topics

- Static Subscriber Interfaces and VLAN Overview on page 534
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 555
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 559
- Guidelines for Configuring CoS for Subscriber Access on page 636
- CoS for Subscriber Access Overview on page 629

Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet Overview

You can configure a subscriber interface using a static or dynamic IP demultiplexing (demux) logical interface stacked on an aggregated Ethernet logical interface. You must configure the aggregated Ethernet logical interface on Enhanced Queuing Dense Port Concentrators (EQ DPCs) in MX Series Ethernet Services Routers.

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

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

- Options for Aggregated Ethernet Logical Interfaces That Support IP Demux Subscriber Interfaces on page 553
- Features Supported with Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet on page 554

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

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

1:1 Active/Backup Link Redundancy

If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode, which requires that two underlying physical interfaces be designated as primary and backup links. In addition, if you need to support one-to-one active/backup link redundancy at the DPC level, configure the aggregated Ethernet interface on physical interfaces that reside on different EQ DPCs.

Link protection is required when configuring hierarchical CoS on the subscriber interface.

Load Balancing

If you need to support traffic load balancing instead of redundancy, configure the aggregated Ethernet interface to operate in Link Aggregation Control Protocol (LACP) active mode. When using LACP link protection, you can configure only two member links to an aggregated Ethernet interface: one active and one standby. The JUNOS implementation of the IEEE 802.3ad standard balances traffic across the member links within an aggregated Ethernet bundle based on the Layer 3 information carried in the packet.

For more information about aggregated Ethernet interfaces, see the *JUNOS Network Interfaces Configuration Guide*.

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

Table 32 on page 554 lists key subscriber access features supported with static or dynamic IP demux subscriber interfaces, organized by type of underlying logical interface:

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

In this release of JUNOS Software, no feature limitations are specific to IP demultiplexing. Instead, IP demux interfaces over aggregated Ethernet are subject to the same scaling and configuration limitations inherent to aggregated Ethernet logical interfaces.

Table 32: Features Supported with Static or Dynamic IP Demux Subscriber Interfaces

Feature	Static or Dynamic IP Demux Subscriber Interface	
	Aggregated Ethernet Underlying Interface	Non-aggregated Underlying Logical Interface
Protocol family support	IPv4 only	IPv4 only
Per-subscriber firewall filtering and statistics	Supported	Supported
Hierarchical CoS	Supported	Supported
Per-subscriber CoS parameters within the [edit dynamic-profiles <i>profile-name</i> class-of-service] hierarchy	Supported	Supported
Per-subscriber IGMP configuration within the [edit dynamic-profiles <i>profile-name</i> protocols] hierarchy	No	No

- Related Topics**
- Subscriber Interfaces and IP Demux Overview on page 535
 - Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 556
 - Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 562

Chapter 35

Configuring Subscriber Interfaces over Aggregated Ethernet

- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 555
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 556

Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet

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

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

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

1. Configure the aggregated Ethernet interface.
 - a. Configure the number of aggregated Ethernet interfaces on the router.
See [Configuring the Number of Aggregated Ethernet Interfaces on the Device](#).
 - b. Configure the aggregated Ethernet interface.
See [Configuring an Aggregated Ethernet Interface](#).
 - c. (Optional) Configure LACP.
See [Configuring Aggregated Ethernet LACP](#).
 - d. (Optional) Configure the minimum number of links.
See [Configuring Aggregated Ethernet Minimum Links](#).
 - e. (Optional) Configure the link speed.

See Configuring Aggregated Ethernet Link Speed.

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

See Configuring Aggregated Ethernet Link Protection.



NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 658.

2. Configure the static or dynamic VLAN interface.
 - For static VLAN interfaces, see “Configuring a Subscriber Interface with a Static VLAN Interface” on page 540.
 - For dynamic VLAN interfaces, see “Configuring VLAN Dynamic Profiles” on page 509 and “Configuring VLAN Interfaces to Use Dynamic Profiles” on page 516.
3. Configure subscriber management services on the subscriber interface.
 - For firewall filters, see “Dynamically Attaching Statically Created Filters” on page 599.
 - For hierarchical CoS, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 658.

- Related Topics**
- Static VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 551
 - Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 559
 - Guidelines for Configuring CoS for Subscriber Access on page 636
 - CoS for Subscriber Access Overview on page 629

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

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

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

See Configuring the Number of Aggregated Ethernet Interfaces on the Device.
 - b. Configure the aggregated Ethernet interface.

See Configuring an Aggregated Ethernet Interface.

- c. (Optional) Configure LACP.

See Configuring Aggregated Ethernet LACP.

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

See Configuring Aggregated Ethernet Minimum Links.

- e. (Optional) Configure the link speed.

See Configuring Aggregated Ethernet Link Speed.

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

For general instructions, see Configuring Aggregated Ethernet Link Protection.



NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 658.

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

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

See Configuring an IP Demux Underlying Interface.

- 3. Configure the static or dynamic IP demux interface.
 - For static subscriber interfaces, see “Configuring Static Subscriber Interfaces Using IP Demux Interfaces” on page 540.
 - For dynamic subscriber interfaces, see “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 543.



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

- 4. (Optional) Configure subscriber management services on the subscriber interface..
 - For firewall filters, see “Dynamically Attaching Statically Created Filters” on page 599.
 - For hierarchical CoS, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 658.

Related Topics ■ Subscriber Interfaces and IP Demux Overview on page 535

- Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 553
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 562

Chapter 36

Subscriber Interfaces over Aggregated Ethernet Examples

- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 559
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 562

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

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

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

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

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

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

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

```
[edit]
interfaces {
  ge-5/0/3 {
```

```

    gigaether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
    ge-5/1/2 {
      gigaether-options {
        802.3ad {
          ae0;
          backup;
        }
      }
    }
  }
}

```

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

```

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

```

4. Configure static traffic-shaping and scheduling parameters.

```

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

```

```

    }
    scheduler_nc {
        transmit-rate percent 5;
        buffer-size percent 5;
    }
}
scheduler-maps { # Associate queues with schedulers
    smap_2 {
        forwarding-class be scheduler_be;
        forwarding-class ef scheduler_ef;
        forwarding-class af scheduler_af;
        forwarding-class nc scheduler_nc;
    }
}
}

```

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

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

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

[edit]

```

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

```

- Related Topics**
- Static VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 551
 - Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 555
 - Guidelines for Configuring CoS for Subscriber Access on page 636
 - CoS for Subscriber Access Overview on page 629

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

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

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

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

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

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

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

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



```
    }
}
```

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

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

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

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

- Related Topics**
- Subscriber Interfaces and IP Demux Overview on page 535
 - Static or Dynamic IP Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 553
 - Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 556

Chapter 37

Summary of Subscriber Interface Configuration 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 543
- For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

demux-options

Syntax	demux-options { underlying-interface <i>interface-name</i> }
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces demux0 <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in JUNOS Release 9.0. The [edit dynamic-profiles <i>profile-name</i>] 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	<ul style="list-style-type: none"> ■ Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 543 ■ For information about static IP demux interfaces, see the <i>JUNOS Network Interfaces Configuration Guide</i>

demux-source

Syntax	demux-source { source-address; }
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced in JUNOS Release 9.0. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.3.
Description	Configure a logical demultiplexing (demux) source address for a subscriber in a dynamic profile.
Options	<p>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.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 543 ■ For information about static IP demux interfaces, see the <i>JUNOS Network Interfaces Configuration Guide</i>

family

Syntax family *family* {
 address *address*;
 filter {
 input *filter-name* (
 precedence *precedence*;
 }
 output *filter-name* {
 precedence *precedence*;
 }
 }
 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
- inet6—Internet Protocol version 6 suite

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

- 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 543
 - For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*

filter

Syntax	<pre> filter { input <i>filter-name</i> (precedence <i>precedence</i>; } output <i>filter-name</i> { precedence <i>precedence</i>; } } </pre>
Hierarchy Level	<p>[edit dynamic-profiles family <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]</p>
Release Information	<p>Statement introduced before JUNOS Release 7.4.</p> <p>The [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>] hierarchy added in JUNOS Release 9.2.</p>
Description	Apply a dynamic filter to an interface. When you configure filters, you can configure only the family <i>inet</i> .
Options	<p>input <i>filter-name</i>—Name of one filter to evaluate when packets are received on the interface.</p> <p>output <i>filter-name</i>—Name of one filter to evaluate when packets are transmitted on the interface.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ For general information about configuring firewall filters, see the <i>JUNOS Policy Framework Configuration Guide</i> ■ Dynamic Firewall Filters Overview on page 589 ■ Classic Filters Overview on page 590 ■ Basic Filter Syntax on page 592

interfaces

Syntax

```

interfaces {
  interface-name {
    unit logical-unit-number {
      family family {
        address address;
        filter {
          input filter-name (
            precedence precedence;
          }
          output filter-name {
            precedence precedence;
          }
        }
        mac-validate (loose | strict);
        rpf-check {
          mode loose;
        }
        unnumbered-address interface-name preferred-source-address address;
      }
    }
    ppp-options {
      chap;
      pap;
    }
    proxy-arp;
    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 533
 - Configuring Static Subscriber Interfaces in Dynamic Profiles on page 539
 - For general information about configuring static interfaces, see the *JUNOS Network Interfaces 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);
        rpf-check {
          mode loose;
        }
        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 543
- 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 <i>profile-name</i> demux0 unit <i>logical-unit-number</i> family <i>family</i>]
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	<p>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.</p> <p>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.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	■ Configuring MAC Address Validation for Subscriber Interfaces on page 544

mode

Syntax	mode loose;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family (inet) rpf-check],
Release Information	Statement introduced before JUNOS Release 9.6.
Description	Check whether the packet has a source address with a corresponding prefix in the routing table. If a corresponding prefix is not found, unicast reverse path forwarding (RPF) loose mode does not accept the packet. Unlike strict mode, loose mode does not check whether the interface expects to receive a packet with a specific source address prefix.
Default	If you do not include this statement, unicast RPF is in strict mode.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	■ Configuring Unicast RPF

precedence

Syntax	<code>precedence <i>precedence</i>;</code>
Hierarchy Level	[edit dynamic-profiles family <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> inet filter], [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i> inet filter]
Release Information	Statement introduced in JUNOS Release 9.3.
Description	Apply a precedence to a dynamic filter.
Options	<i>precedence</i> —Precedence value for the filter. The lower the precedence value, the higher the precedence. Range: 0 through 250 Default: 0
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ For general information about configuring firewall filters, see the <i>JUNOS Policy Framework Configuration Guide</i> ■ Dynamic Firewall Filters Overview on page 589 ■ Classic Filters Overview on page 590 ■ Fast Update Filters Overview on page 593 ■ Basic Filter Syntax on page 592 ■ Basic Fast Update Filter Syntax on page 596

preferred-source-address

Syntax	<code>preferred-source-address address;</code>
Hierarchy Level	[edit dynamic-profiles interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> unnumbered-address <i>interface-name</i>], [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i>],
Release Information	Statement introduced in JUNOS Release 9.0. The [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> unnumbered-address <i>interface-name</i>] hierarchy added in JUNOS Release 9.2. Support for the <code>\$junos-preferred-source-address</code> predefined variable added in JUNOS Release 9.6.
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. To configure the preferred source address dynamically, include the <code>\$junos-preferred-source-address</code> predefined variable. Configuration of a preferred source address for unnumbered Ethernet interfaces is supported for IPv4 and IPv6 address families.
Options	<i>address</i> —Secondary IP address of the donor loopback interface. Use the <code>\$junos-preferred-source-address</code> dynamic variable to dynamically apply a preferred source address to the unnumbered Ethernet interface.
Required Privilege Level	<i>interface</i> —To view this statement in the configuration. <i>interface-control</i> —To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring an Unnumbered Interface ■ <i>JUNOS Network Interfaces Configuration Guide</i> ■ <i>JUNOS System Basics Configuration Guide</i>

proxy-arp

Syntax	proxy-arp;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Release 9.5.
Description	For Ethernet interfaces only, configure the router to respond to any ARP request, as long as the router has an active route to the target address of the ARP request.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

rpf-check

Syntax	<pre>rpf-check { mode loose; }</pre>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],
Release Information	Statement introduced in JUNOS Release 9.6.
Description	<p>Check whether traffic is arriving on an expected path. You can include this statement with the <code>inet</code> protocol family only.</p> <p>The <code>mode</code> statement is explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	■ Configuring Unicast RPF

underlying-interface

Syntax	<code>underlying-interface <i>underlying-interface-name</i>;</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> interfaces demux0 <i>interface-name</i> unit unit <i>logical-unit-number</i> demux-options]</code>
Release Information	Statement introduced before JUNOS Release 7.4. The <code>[edit dynamic-profiles <i>profile-name</i> interfaces demux0]</code> hierarchy added in JUNOS Release 9.3. Support for aggregated Ethernet added in JUNOS Release 9.4.
Description	Configure the underlying interface on which the demultiplexing (demux) interface is running.
Options	<i>underlying-interface-name</i> —Either the specific name of the interface on which the DHCP discover packet arrives or the interface variable (<code>\$junos-underlying-interface</code>). 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, 10-Gigabit Ethernet, or aggregated Ethernet interfaces.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 543 ■ For information about static underlying interfaces, see the <i>JUNOS Network Interfaces Configuration Guide</i>

unit

Syntax unit *logical-unit-number* {
 demux-source (inet);
 family *family* {
 address *address*;
 filter {
 input *filter-name* (
 precedence *precedence*;
 }
 output *filter-name* {
 precedence *precedence*;
 }
 }
 }
 unnumbered-address *interface-name* preferred-source-address *address*;
 }
 keepalives {
 interval *seconds*;
 }
 ppp-options {
 chap;
 pap;
 }
 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 543
 ■ For information about static IP demux interfaces, see the *JUNOS Network Interfaces Configuration Guide*


unnumbered-address

Syntax	<code>unnumbered-address interface-name preferred-source-address address;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced in JUNOS Release 8.2. <code>preferred-source-address</code> option introduced in JUNOS Release 9.0. The [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>] hierarchy added in JUNOS Release 9.2. Support for the <code>\$junos-loopback-interface</code> predefined variable added in JUNOS Release 9.6.
Description	<p>For Ethernet interfaces, enable the local address to be derived from the specified interface. Configuring unnumbered Ethernet interfaces enables IP processing on the interface without assigning an explicit IP address to the interface. To configure unnumbered address dynamically, include the <code>\$junos-loopback-interface-address</code> predefined variable.</p> <p>You can configure unnumbered address support on Ethernet interfaces for IPv4 and IPv6 address families.</p>
Options	<p><i>interface-name</i>—Name of the interface from which the local address is derived. Use the <code>\$junos-loopback-interface</code> dynamic variable to dynamically apply a loopback interface. The loopback interface used is based on the routing instance of the subscriber. The specified interface must have a logical unit number and a configured IP address, and must not be an unnumbered interface.</p> <p>The <code>preferred-source-address</code> statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring an Unnumbered Interface ■ <i>JUNOS System Basics Configuration Guide</i>

vlan-id

Syntax	<code>vlan-id number;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	For Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.
Options	<p><i>number</i>—A valid VLAN identifier. When used in the dynamic-profiles hierarchy, specify the <code>\$junos-vlan-id</code> predefined variable to dynamically obtain the VLAN identifier.</p> <p>Range:</p> <p>For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023.</p> <p>For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094.</p> <p>VLAN ID 0 is reserved for tagging the priority of frames.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

vlan-tagging

Syntax	vlan-tagging;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i>] 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 8

Dynamic Firewall Services for Subscriber Access

- Dynamic Firewall Services Overview on page 589
- Configuring Filters for Dynamic Profiles on page 599
- Configuring Fast Update Filters on page 603
- Firewall Filter Examples on page 617
- Summary of Dynamic Firewall For Subscriber Access Statements on page 621

Chapter 38

Dynamic Firewall Services Overview

- Dynamic Firewall Filters Overview on page 589
- Classic Filters Overview on page 590
- Basic Classic Filter Syntax on page 592
- Fast Update Filters Overview on page 593
- Basic Fast Update Filter Syntax on page 596
- Match Conditions and Actions in Fast Update Filters on page 597

Dynamic Firewall Filters Overview

Firewall filters provide rules that define whether to permit or deny packets that are transiting an interface on a router. The subscriber management feature supports two categories of firewall filters—classic filters and fast update filters. Classic filters are compiled at commit time and then, when a service is activated, an interface-specific clone of the filter is created and attached to a logical interface. Classic filters are static filters, and therefore cannot contain subscriber-specific terms (also called rules). Fast update filters are similar to classic filters in many ways. However, fast update filters support subscriber-specific, rather than interface-specific, filter values. Fast update filters also allow individual filter terms to be incrementally added or removed from filters without requiring that the entire filter be recompiled for each modification. Fast update filters are essential for networking environments in which multiple subscribers might share the same logical interface.

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.

Related Topics

- Classic Filters Overview on page 590
- Fast Update Filters Overview on page 593

- Dynamically Attaching Statically Created Filters on page 599
- Dynamically Attaching Filters Using RADIUS Variables on page 600

Classic Filters Overview

The dynamic firewall feature supports classic filters and fast update filters. Classic filters are compiled at commit time. When a service activation takes place, the router creates an interface-specific clone of the filter and attaches the clone to the specified logical interface. Classic filters are static filters, and therefore cannot contain subscriber-specific terms, as opposed to fast update filters, which are subscriber-specific.

This overview covers:

- Classic Filter Types on page 590
- Classic Filter Components on page 590
- Classic Filter Processing on page 591
- Guidelines for Creating and Applying Classic Filters for Subscriber Interfaces on page 591

Classic Filter Types

The following classic 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.

Classic Filter Components

When creating a classic 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, or rule, 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.

Classic Filter Processing

The order of the terms within a classic 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.

In addition to the top-down term processing within filters, you can specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. In other words, filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Guidelines for Creating and Applying Classic 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 then 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 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 589
 - Fast Update Filters Overview on page 593
 - Dynamically Attaching Statically Created Filters on page 599
 - Dynamically Attaching Filters Using RADIUS Variables on page 600
 - Verifying and Managing Firewall Filter Configuration on page 615

Basic Classic Filter Syntax

This section provides the basic classic 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;
                precedence precedence;
              }
              output filter-name;
                filter-name;
                precedence precedence;
            }
          }
        }
      }
    }
  }
}
[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 599
 - Dynamic Firewall Filters Overview on page 589

Fast Update Filters Overview

The dynamic firewall feature supports classic filters and fast update filters. Fast update filters support subscriber-specific filter values, as opposed to classic filters, which are interface-specific. Fast update filters allow individual filter terms, or rules, to be added or removed from filters without requiring that you recompile the filter after each modification—terms are added and removed when subscriber services are added and removed.

Using the fast update filters feature involves three distinct operations:

1. Creating the filter—You define fast update filters under the `[edit dynamic-profiles profile-name firewall family family]` hierarchy. The `dynamic-profiles` stanza enables you to use dynamic variables to create subscriber-specific configurations for the filter's match terms. See “Configuring Fast Update Filters” on page 603.
2. Associating the filter to a dynamic profile—You use the `[edit dynamic-profiles profile-name interface interface-name unit unit-number family family]` hierarchy to associate the filter to a dynamic profile. This is the same procedure used for classic filters. See “Associating Fast Update Filters to Interfaces in a Dynamic Profile” on page 614.
3. Attaching the filter to an interface—When a subscriber logs in, the dynamic profile instantiates the subscriber session and applies the properties of the profile, including the fast update filter, to the session interface. This is the same procedure used for classic filters. Also, similar to classic filters, the name of fast update filters can be provided in a user's RADIUS file.

When a dynamic profile instantiates a subscriber session and applies a fast update filter, the router verifies that the filter is not already present on the session interface. If the filter is not present, the router adds the filter. If the filter is already present on the interface, the router simply adds any new terms that are not in the existing filter. This procedure is reversed when subscriber sessions are deleted. Any terms that were added by a session are then removed when the session is deleted. The filter is deleted when the last subscriber session is deleted.



NOTE: You can optionally specify that a term can be added only once and cannot be modified. See “Match Conditions and Actions in Fast Update Filters” on page 597.

This overview covers:

- Fast Update Filter Components on page 594
- Fast Update Filter Processing on page 594
- Fast Update Filter Names on page 595
- Guidelines for Creating and Applying Fast Update Filters on page 595

Fast Update Filter Components

When creating a fast update filter, you define one or more terms that specify the filtering criteria and the action to take when a match occurs.

Each term consists of the following components:

- Match condition—Specifies values or fields that the packet must contain. You can match a maximum of five fields in a fast update filter. A match condition can contain a single value or range. This differs from classic filters, in which terms can have multiple values. However, you can use additional terms to specify multiple ranges. “Fast Update Filter Match Conditions” on page 607 lists the supported match conditions for fast update filters. The order in which the terms appear in a fast update filter is not important, because the router examines the most specific term first. (Classic filters examine the terms in the order in which the terms are listed.)
- Action—Specifies what to do when a packet matches the match condition. If no action is specified for a term, the default action is to accept the packet. “Fast Update Filter Actions and Action Modifiers” on page 607 lists the supported actions for fast update filters.

Terms that are added to the filter during session instantiation must have a unique set of match conditions. Two terms overlap, or conflict, if a packet can match both sets of conditions—as a result, there are two different actions for the packet. You can ensure that terms are unique by using the `$junos-subscriber-ip-address` variable as the `source-address` (for an input filter) or `destination-address` (for an output filter) in the `from` statement. You must then supply the `source-address` or `destination-address` condition, as appropriate, as the first condition in the `match-order` statement.

- Related Topics**
- Fast Update Filter Actions and Action Modifiers on page 607
 - Fast Update Filter Match Conditions on page 607
 - Avoiding Conflicts When Terms Are Matched on page 609

Fast Update Filter Processing

You must use the `match-order` statement to explicitly specify the order in which the router examines filter match conditions. Also, the router examines only those conditions that you include in the `match-order` statement. When a fast update filter contains multiple terms, the router compares a packet against the terms starting with the most specific condition first. When the packet first matches a condition, the router performs the action defined in the term to either permit or deny the packet, and then 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 filter. The router continues to compare the packet to the next specified term until a match is found. If there is no match after all terms have been examined, the router silently drops the packet.

You can specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower

precedence value for a filter gives it a higher precedence within the dynamic profile. In other words, filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Fast Update Filter Names

When a filter is attached to an interface, the router first searches for a classic filter with the specified name, and then uses the classic filter. If no classic filter exists with that name, the router then searches in the dynamic-profile for a fast update filter with the specified name, and uses that filter.

If two different dynamic-profiles include a fast update filter with the same name, the **match-order** specification of the two filters must be identical. If the two filters are activated on the same interface, the terms are added together.

The router includes the filter name in **show firewall** command results. The router also creates unique names for filter terms and counters for **show firewall** command.

When a fast update filter is created by the activation of a dynamic profile, the router creates an interface-specific name for the filter. The name uses the following format, which is also used for classic filters:

`<filter-name>-<interface-name>.<subunit>-<direction>`

For example, an input filter named **httpFilter** on interface **ge-1/0/0.5** is named as follows (in indicates an input filter and out indicates an output filter):

`http-filter-ge-1/0/0.5-in`

The router creates unique names for the filter terms and counters by appending the session ID to all term and counter names. Terms that use the **only-at-create** statement have a session-id of 0. Terms and counters use the following format:

`<term-name>-<session-id>`

`<counter-name>-<session-id>`

Guidelines for Creating and Applying Fast Update Filters

Fast update filters enable you to create subscriber-specific firewall filters and dynamically apply these filters to statically created interfaces using dynamic profiles. Individual terms can be added to, or removed from, a filter without requiring that the entire filter be recompiled.

When creating and applying fast update filters, keep the following in mind:

- This release supports dynamic application of input and output filters.
- Fast update filters must always include terms that permit DHCP traffic to pass. See “Configuring Filters to Permit Expected Traffic” on page 608.

- The **interface-specific** statement is required for all fast update filters.
- The **match-order** statement is required—you must explicitly state the order of the match fields in a fast update filter. See “Configuring the Match Order for Fast Update Filters” on page 605
- The **match-order** statement uses an implied wildcard for conditions that you specify in the statement. If you specify a condition that is not also configured in the **from** specification of a filter term, the router considers that a wildcard for that condition.
- A filter term can have only a single value or range; however, you can configure multiple terms to specify multiple ranges.
- You can match a maximum of five match conditions in a filter.

Related Topics

- Dynamic Firewall Filters Overview on page 589
- Classic Filters Overview on page 590
- Dynamically Attaching Statically Created Filters on page 599
- Verifying and Managing Firewall Filter Configuration on page 615

Basic Fast Update Filter Syntax

This section shows the basic fast update filter 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 family {
        filter {
          input filter-name;
          precedence precedence;
          output filter-name;
          precedence precedence;
        }
      }
    }
  }
}
[edit dynamic-profiles profile-name]
firewall {
  family family {
    fast-update-filter filter-name {
      [desired filter configuration]
    }
    fast-update-filter filter-name {
      [desired filter configuration]
    }
  }
}
```

}

Related Topics ■ Configuring Fast Update Filters on page 603

Match Conditions and Actions in Fast Update Filters

To create a fast update filter, you use the **term** statement to specify conditions that a packet must have, and to specify the action the router performs when those conditions exist in the packet.

This section covers:

- Match Conditions on page 597
- Actions on page 597
- Adding Terms Only Once on page 598

Match Conditions

Match conditions specify characteristics that a packet must have—if the conditions exist in the packet, the router then performs the specified action. You use the **from** keyword in the **term** statement to specify match conditions for the filter. The packet must match all conditions in the **from** specification for the action to be performed, which also means that their order in the **from** specification is not important.

An individual condition in a **from** specification can contain a single value or range. You can match a maximum of five match conditions in a filter.

“Fast Update Filter Match Conditions” on page 607 lists the match conditions you can use in fast update filters.



NOTE: The router uses an implied wildcard for conditions that you include in the **match-order** statement. If you include a condition that is *not* configured in the **from** specification of a filter term, the router considers that a wildcard for the condition.

For example, if you include the **dscp** condition in the **match-order** statement, but do not configure a **dscp** value in the **from** specification of the filter term, the router performs the action configured in the **then** specification of the filter on all DSCP values.

Actions

Actions and action modifiers specify the operation the router performs when a particular match condition exists in a packet. You use the **then** keyword in the **term** statement to specify the actions to perform on packets whose characteristics match the conditions specified in the preceding **from** specification.

Action modifiers are actions taken in addition to the specified action. You can configure any combination of action modifiers. For the action or action modifier to

take effect, all conditions in the **from** specification must match. If you specify **log** as one of the actions in a term, this constitutes a termination action; whether any additional terms in the filter are processed depends on the traffic through the filter. The action modifier operations carry a default **accept** action. For example, if you specify an action modifier and do not specify an action, the specified action modifier is implemented and the packet is accepted.

“Fast Update Filter Actions and Action Modifiers” on page 607 lists the actions and action modifiers you can use in fast update filters.

Adding Terms Only Once

You can optionally specify that a term can be added only when the fast update filter is first created, and cannot be later changed by adding or removing conditions. We recommend that you only use the **only-at-create** option for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (counting the default drop packet, for instance).

- Related Topics**
- Configuring Terms for Fast Update Filters on page 606
 - Fast Update Filter Match Conditions on page 607
 - Fast Update Filter Actions and Action Modifiers on page 607

Chapter 39

Configuring Filters for Dynamic Profiles

- Dynamically Attaching Statically Created Filters on page 599
- Dynamically Attaching Filters Using RADIUS Variables on page 600
- Defining Dynamic Filter Processing Order on page 601

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 classic firewall filters and how to create them. See “Configuring Fast Update Filters” on page 603 for information about creating fast update filters.

2. Create a basic dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

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.



NOTE: The following example specifies an optional precedence value for the output filter.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
user@host# set filter output static-output-filter precedence 50
```

Related Topics

- Classic Filters Overview on page 590
- Fast Update Filters Overview on page 593
- Dynamically Attaching Filters Using RADIUS Variables on page 600

- 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-filter
26-11	Egress-Policy-Name	\$junos-output-filter

Before you can attach a filter using RADIUS.

1. Create a basic dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

2. Ensure that RADIUS ingress and egress policies are configured appropriately.

See “Configuring RADIUS Server Parameters for Subscriber Access” on page 22

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

- Classic Filters Overview on page 590
- Dynamically Attaching Statically Created Filters on page 599
- For more information about JUNOS default groups, see the *JUNOS CLI User Guide*
- For more information about firewall filters, see the *JUNOS Policy Framework Configuration Guide*

Defining Dynamic Filter Processing Order

You can force filter processing to occur in a particular order by using the **precedence** statement. You specify a precedence for input and output filters within a dynamic profile at the [edit dynamic-profiles family *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*] and [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*] hierarchy level.

The precedence range is from 0 to 250. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Before you define a precedence for a filter in a dynamic profile.

1. Create the filters you want to attach to the dynamic profile.

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 481.

3. Attach the filters to the dynamic profile.

See “Dynamically Attaching Statically Created Filters” on page 599 or “Dynamically Attaching Filters Using RADIUS Variables” on page 600.

To define a precedence for an input and output filter:

1. Specify the input filter precedence in the dynamic profile.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet filter]
user@host# set filter input precedence 50
```

2. Specify the output filter precedence in the dynamic profile.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet filter]
user@host# set filter output precedence 5
```

- Related Topics**
- Classic Filters Overview on page 590
 - For information about firewall filters, see the *JUNOS Policy Framework Configuration Guide*

Chapter 40

Configuring Fast Update Filters

- Configuring Fast Update Filters on page 603
- Configuring the Match Order for Fast Update Filters on page 605
- Configuring Terms for Fast Update Filters on page 606
- Fast Update Filter Match Conditions on page 607
- Fast Update Filter Actions and Action Modifiers on page 607
- Configuring Filters to Permit Expected Traffic on page 608
- Avoiding Conflicts When Terms Are Matched on page 609
- Associating Fast Update Filters to Interfaces in a Dynamic Profile on page 614
- Verifying and Managing Firewall Filter Configuration on page 615

Configuring Fast Update Filters

You configure a fast update filter in a dynamic profile—this enables you to use dynamic variables in the filter configuration. After you configure fast update filters, you then use the `dynamic-profiles` syntax to associate the filter to the subscriber interface.

To configure a fast update filter for subscriber access:

1. Access the dynamic profile you want to use.

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

2. Specify that you want to configure a firewall, and specify the family.

```
[edit dynamic-profiles myProfile]
user@host# edit firewall family inet
```

3. Specify that you want to configure a fast update filter and assign a name to the filter.

```
[edit dynamic-profiles myProfile firewall family inet]
user@host# edit fast-update-filter httpFilter
```

4. Specify the interface-specific statement. This statement is mandatory.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
```

```
user@host# set interface-specific
```

5. Configure the match order to use for the filter terms.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set match-order [source-address protocol destination-port]
```

See “Configuring the Match Order for Fast Update Filters” on page 605.

6. Specify that you want to configure a term for the filter and assign the name to the term. Configure the match conditions and actions for the term.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# edit term term1
```

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter term
term1]
user@host# set from protocol tcp
user@host# set from source-address $junos-subscriber-ip-address
user@host# set from destination-port http
user@host# set then count http-cnt
```

See “Configuring Terms for Fast Update Filters” on page 606.

- Related Topics**
- Configuring the Match Order for Fast Update Filters on page 605
 - Configuring Terms for Fast Update Filters on page 606
 - Associating Fast Update Filters to Interfaces in a Dynamic Profile on page 614
 - Fast Update Filters Overview on page 593
 - Dynamic Profiles Overview on page 467
 - For information about firewall filters, see Configuring Standard Firewall Filters the *JUNOS Policy Framework Configuration Guide*

Configuring the Match Order for Fast Update Filters

You must include the `match-order` statement to explicitly specify the order in which router examines the match conditions. The router examines only those match conditions that you include in the statement. You can match a maximum of five conditions.



NOTE: If the `match-order` statement contains a condition that is not specified in the `from` statement of a term, the router considers that a wildcard for that condition.

If you use the same fast update filter in multiple dynamic profiles, you must configure the same match order for all profiles.

To configure the order in which the router examines the match conditions of a fast update filter:

1. Access the fast update filter:

```
[edit dynamic-profiles myProfile]
user@host# edit firewall family inet fast-update-filter httpFilter
```

2. Specify the mandatory interface-specific statement.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set interface-specific
```

3. Configure the match order for the match conditions in the filter. Use brackets to enclose multiple match conditions.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set match-order [source-address protocol destination-port]
```

- Related Topics**
- Configuring Fast Update Filters on page 603
 - Configuring Terms for Fast Update Filters on page 606
 - Fast Update Filters Overview on page 593
 - Dynamic Profiles Overview on page 467
 - Fast Update Filter Match Conditions on page 607
 - For information about firewall filters, see the *JUNOS Policy Framework Configuration Guide*

Configuring Terms for Fast Update Filters

A fast update filter consists of one or more terms. A term is made up of one or more match conditions and the action to take when a packet matches the specified conditions.

To configure a term for a fast update filter:

1. Access the fast update filter.

```
[edit dynamic-profiles myProfile]
user@host# edit firewall family inet fast-update-filter httpFilter
```

2. Create the new term and assign a name to the term.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set term term1
```

3. Configure the match condition for the term. See “Fast Update Filter Match Conditions” on page 607 for the supported match conditions for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set from protocol tcp
user@host# set from source-address $junos-subscriber-ip-address
user@host# set from destination-port http
```

4. Configure the action that the router takes when the match conditions are met. See “Fast Update Filter Actions and Action Modifiers” on page 607 for the supported actions for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set then accept
```

5. (Optional) Configure the action-modifiers that you want the router to take when the match conditions are met. See “Fast Update Filter Actions and Action Modifiers” on page 607 for the supported action-modifiers for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set then count http-cnt
```

6. (Optional) Configure the term to be added only once, when the fast update filter is first created.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set only-at-create
```

- Related Topics**
- Configuring Fast Update Filters on page 603
 - Configuring the Match Order for Fast Update Filters on page 605
 - Fast Update Filters Overview on page 593
 - Fast Update Filter Match Conditions on page 607

- Fast Update Filter Actions and Action Modifiers on page 607
- For additional information about firewall filter terms, see the following topics in the *JUNOS Policy Framework Configuration Guide*
 - Overview of Match Conditions in Firewall Filter Terms
 - Configuring Actions in Firewall Filter Terms

Fast Update Filter Match Conditions

Table 33: Fast Update Filter Match Conditions

Match Condition	Description
destination-address <i>prefix</i>	IP destination address field.
destination-port <i>number</i>	TCP or UDP destination port field. Can be a single number, a single range, or one of the standard port synonyms.
dscp <i>number</i>	The differentiated services code point. Can be a single number, a single range, or the standard synonyms. IPv4 only.
match-terms <i>string-of-conditions</i>	A series of match conditions. Enclose the string within a set of quotation marks and use semicolons to separate entries. For example, match-terms “protocol tcp; destination-port http”;. Dynamic profile variables are not allowed in the string.
protocol <i>number</i>	IP protocol field. Can be a single number, as single range, or one of the standard protocol synonyms. IPv4 only.
source-address <i>prefix</i>	IP source address field.
source-port <i>number</i>	TCP or UDP source port field. Can be a single number, as single range, or one of the standard protocol synonyms.

Fast Update Filter Actions and Action Modifiers

Table 34: Fast Update Filter Actions and Action Modifiers

Action or Action Modifier	Description
Actions	
accept	Accept the packet.
action-terms <i>string-of-actions</i>	A series of multiple actions or action modifiers. Enclose the string within a set of quotation marks and use semicolons to separate entries. For example, action-terms “log; count http-cnt”;. Dynamic profile variables are not allowed in the string.
discard	Drop the packet silently, without sending an Internet Control Message Protocol (ICMP) message.

Table 34: Fast Update Filter Actions and Action Modifiers (*continued*)

Action or Action Modifier	Description
ignore-term	Do not add this term to the filter. All match conditions and actions are ignored.
port-mirror	Port mirror packets.
routing-instance <i>routing-instance</i>	Forward packets to specified routing instance.
Action-Modifiers	
count <i>counter-name</i>	Increment the specified counter.
forwarding-class <i>class</i>	Classify the packet into one of the following forwarding classes: as , assured-forwarding , best-effort , expedited-forwarding , or network-control .
log	Log the packet header information.
loss-priority (high medium-high medium-low low)	Set the loss priority level for packets.
policer <i>policer-name</i>	Rate-limit packets based on the specified policer.

Configuring Filters to Permit Expected Traffic

You must explicitly configure your firewall filter to permit expected traffic, such as DHCP traffic, to pass. Otherwise, the expected traffic is denied when the filter is applied to the interface. This requirement applies to both classic and fast update filters.

The following example shows a fast update filter that might be used to permit DHCP traffic. The actual filter you use depends on the expected traffic in your network.

In the example, the term **allow-dhcp** permits all DHCP traffic from all source addresses. The term also includes the **only-at-create** option to specify that the term is applied only when the filter is first applied. The term **sub-allow-dhcp** includes the JUNOS predefined variable **\$junos-subscriber-ip-address**, which permits all subscriber-specific DHCP traffic.

The **match-order** statement configuration lists the conditions from most-specific to least-specific, as recommended in “Configuring the Match Order for Fast Update Filters” on page 605. Because this filter is designed to permit ingress DHCP traffic, the **source-address** condition is listed first.

```

firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address protocol destination-port ];
      term allow-dhcp {
        only-at-create;
      }
    }
  }
}
```

```

        from {
            source-address 0.0.0.0/32;
            destination-address 255.255.255.255/32;
            destination-port 67;
            protocol udp;
        }
        then accept;
    }
    term sub-allow-dhcp {
        from {
            source-address $junos-subscriber-ip-address;
            destination-address 192.168.1.2/32;
            destination-port 67;
            protocol udp;
        }
        then accept;
    }
}
}
}

```

- Related Topics**
- Configuring the Match Order for Fast Update Filters on page 605
 - Configuring Terms for Fast Update Filters on page 606

Avoiding Conflicts When Terms Are Matched

A fast update filter can contain multiple terms, each with a variety of match conditions. However, when you configure multiple terms in a filter, you must ensure that the terms do not overlap, or conflict with each other. Two terms are considered to overlap when it is possible for a packet to match all conditions of both terms. Because each term specifies a different action for matches, the router cannot determine which action to take. When terms overlap, a conflict error occurs and the session fails when the dynamic profile attempts to apply the filter. The error log indicates the overlapping terms.

How the Router Evaluates Terms in a Filter

The router creates a table of match conditions when examining terms. The table, which is similar to a routing table, is based on the conditions included in the **match-order** statement. When the router receives a packet, the router examines the packet's contents in the sequence specified in the **match-order** statement.

For example, using the sample configuration in the following Match-Order Example, the router first examines the packet's **source-address**, then the **destination-address**, and finally the **destination-port**. As shown in the following table, the two terms in the filter do not overlap because each term has a different **destination-port** specification.

The router then takes the appropriate filter action for the term that matches the destination-port value of the packet.

Term	source-address	destination-address	destination-port	Action
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

Match-Order Example

```

firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address destination-port ];
      term t55 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port http;
        }
        then {
          count t55_cntr;
          accept;
        }
      }
      term t999 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port https;
        }
        then {
          count t999_cntr;
          accept;
        }
      }
    }
  }
}

```

Using Implied Wildcards

This section shows an example of how you might use an implied wildcard specification in the match configuration. A condition in the **match-order** statement is an implied wildcard when that condition is not configured in the **from** specification of a term in the filter.



NOTE: When you use ranges (for example, a range of values or a wildcard) in terms, the ranges must not overlap—overlapping ranges create a conflict error. However, you can configure a range in one term and an exact match in another term. For example, in the following filter table, the wildcard destination port value in term **t3** does not overlap the destination port specifications in terms **t55** and **t999** because the **http** and **https** values are exact matches.

In the Implied Wildcard Example configuration, the router views the **destination-port** condition in the **match-order** statement as an implied wildcard for term **t3**, because there is no **destination-port** value configured in that term. As a result, the wildcard specifies that for term **t3** any **destination-port** value is accepted. The filter table appears as follows:

Term	source-address	destination-address	destination-port	Action
t3	subscriber's address	3.1.1.2/32	any (wildcard)	count t3_cntr accept
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

In the following filter configuration, traffic with a destination port of **http** matches term **t55** and traffic with a destination port of **https** matches term **t999**. Traffic with a destination port other than **http** or **https** matches term **t3**, which is the implied wildcard.

Implied Wildcard Example

```
firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address dscp protocol destination-port ];
      term t3 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
        }
        then {
          count t3_cntr;
          accept;
        }
      }
      term t55 {
        from {
          source-address $junos-subscriber-ip-address;
```

```

        destination-address 3.1.1.2/32;
        destination-port http;
    }
    then {
        count t55_cntr;
        accept;
    }
}
term t999 {
    from {
        source-address $junos-subscriber-ip-address;
        destination-address 3.1.1.2/32;
        destination-port https;
    }
    then {
        count t999_cntr;
        accept;
    }
}
}
}
}
}

```

Conflict Caused by Overlapping Ranges

This section shows two examples of overlapping ranges in terms. When you use ranges (such as a wildcard or a range of values) in terms, the ranges must not overlap—overlapping ranges create a conflict error and the session fails.

In the following filter configuration, the **destination-port** ranges in the two terms overlap. Ports in the range from 50 through 80 match both term **src0** and term **src1**, which each specify different actions to take.



NOTE: You can configure a range in one term and an exact match in another term. See the section, *Using Implied Wildcards*, for an example that uses a wildcard for a match condition in one term and an exact match for the condition in a second term.

Term	source-address	destination-address	destination-port	Action
src0	subscriber's address	10.1.1.2/32	0–80	count c1_cntr accept
src1	subscriber's address	10.1.1.2/32	50–100	count c2_cntr accept

Overlapping Ranges Example 1

```

firewall {
    family inet {
        fast-update-filter fuf-src {
            interface-specific;

```

```
match-order [ source-address destination-address destination-port ];
term src0 {
  from {
    source-address $junos-subscriber-ip-address;
    destination-address 10.1.1.2/32;
    destination-port 0–80;
  }
  then {
    count c1_cntr;
    accept;
  }
}
term src1 {
  from {
    source-address $junos-subscriber-ip-address;
    destination-address 10.1.1.2/32;
    destination-port 50–100;
  }
  then {
    count c2_cntr;
    accept;
  }
}
```

In this filter configuration, the **protocol** specification in terms **src21** and **src22** use the implied wildcard, which configures a range for each term. Because overlapping ranges are not allowed, a conflict error results.

Term	source-address	destination-address	protocol	destination-port	Action
src20	subscriber's address	10.1.1.2/32	udp	any (wildcard)	count c20_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	http	count c21_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	https	count c22_cntr accept

**Overlapping Ranges
Example 2**

```
firewall {
  family inet {
    fast-update-filter fuf-src2 {
      interface-specific;
      match-order [ source-address destination-address protocol destination-port ];
      term src20 {
        from {
          source-address $junos-subscriber-ip-address;
```

```

        destination-address 10.1.1.2/32;
        protocol udp;
    }
    then {
        count c20_cntr;
        accept;
    }
}
term src21 {
    from {
        source-address $junos-subscriber-ip-address;
        destination-address 10.1.1.2/32;
        destination-port http;
    }
    then {
        count c21_cntr;
        accept;
    }
}
term src22 {
    from {
        source-address $junos-subscriber-ip-address;
        destination-address 10.1.1.2/32;
        destination-port https;
    }
    then {
        count c22_cntr;
        accept;
    }
}
}

```

- Related Topics**
- Configuring Fast Update Filters on page 603
 - Configuring Terms for Fast Update Filters on page 606
 - Configuring the Match Order for Fast Update Filters on page 605

Associating Fast Update Filters to Interfaces in a Dynamic Profile

After you configure the fast update filter, you reference the filter in the **interfaces** stanza of a dynamic profile. When the dynamic profile instantiates a subscriber session, the router applies the terms of the filter to the interface.

To apply a fast update filter to an interface in a dynamic profile:

1. Access the dynamic profile you want to use.

```

[edit]
user@host# edit dynamic-profile myProfile

```

2. Specify the interface for the dynamic profile—use the dynamic interface variable.

```

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

```

- 3. Specify the underlying interface—use the unit number variable.

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

- 4. Specify the family.

```
[edit dynamic-profile myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host# edit family inet
```

- 5. Specify the filters that you want to apply to the interface.

```
[edit dynamic-profile myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter input httpFilter
user@host# set filter output myOutFilter
```

- Related Topics**
- Dynamic Profiles Overview on page 467
 - Configuring Static Subscriber Interfaces in Dynamic Profiles on page 539
 - Associating Dynamic Profiles with Statically Created Interfaces on page 541
 - Fast Update Filters Overview on page 593
 - For information about firewall filters, see Configuring Standard Firewall Filters the *JUNOS Policy Framework Configuration Guide*

Verifying and Managing Firewall Filter Configuration

Purpose View or manage information for firewall filters:



NOTE: The router creates unique names for fast update filters and for filter terms and counters. See *Naming Fast Update Filters* in “Fast Update Filters Overview” on page 593 for information.

- Action**
- To display statistics for firewall filters:

```
user@host> show firewall
```

- To display firewall log information:

```
user@host> show firewall log
```

- To clear filter counters:

```
user@host> clear firewall all
```

- Related Topics**
- Classic Filters Overview on page 590
 - Fast Update Filters Overview on page 593

- For more information, see the *JUNOS Routing Protocols and Policies Command Reference*

Chapter 41

Firewall Filter Examples

- Examples: Configuring Static Filters on page 617
- Example: Configuring Fast Update Filters for Subscriber Access on page 619

Examples: Configuring Static Filters

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 599

Example: Configuring Fast Update Filters for Subscriber Access

This example shows you how to configure a fast update filter that is an input filter that counts the HTTP and non-HTTP packets from a subscriber. In the example, you use the firewall stanza to create the filter and the interfaces stanza to attach the filter.

```

[edit dynamic-profiles myProfile]
firewall {
  family inet {
    fast-update-filter httpFilter {
      interface-specific;
      match-order [source-address protocol destination-port];
      term term1 {
        from {
          protocol tcp;
          source-address $junos-subscriber-ip-address;
          destination-port http;
        }
        then {
          count http-cnt;
        }
      }
      term term2 {
        from {
          protocol tcp;
          source-address $junos-subscriber-ip-address;
        }
        then {
          count non-http-cnt;
        }
      }
    }
  }
}
interfaces {
  "$junos-interface-ifd-name" {
    unit "$junos-underlying-interface-unit" {
      family inet {
        filter {
          input httpFilter;
        }
      }
    }
  }
}

```

Related Topics ■ [Configuring Fast Update Filters on page 603](#)

Chapter 42

Summary of Dynamic Firewall For Subscriber Access Statements

family

Syntax family *family* {
 fast-update-filter *filter-name* {
 interface-specific;
 match-order [*match-order*];
 term *term-name* {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }
 }
 }

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

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure protocol family information for firewall filters in a dynamic profile.

Options *family*—Protocol family:

- inet—Internet Protocol version 4 suite

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 Fast Update Filters on page 603

fast-update-filter

Syntax fast-update-filter *filter-name* {
 interface-specific;
 match-order [*match-order*];
 term *term-name* {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }
 }

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

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure fast update firewall filters in a dynamic profile.

Options *filter-name*—Name that identifies the filter. The name can contain letters, numbers, and hyphens (-) and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (" ").

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 Fast Update Filters on page 603

firewall

Syntax

```

firewall {
  family family {
    fast-update-filter filter-name {
      interface-specific;
      match-order [match-order];
      term term-name {
        from {
          match-conditions;
        }
        then {
          action;
          action-modifiers;
        }
        only-at-create;
      }
    }
  }
}

```

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

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure firewall filters 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 Fast Update Filters on page 603

interface-specific

Syntax interface-specific;

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family* fast-update-filter *filter-name*]

Release Information Statement introduced in JUNOS Release 9.6.

Description Configure interface-specific names for firewall counters that are based on fast update filters.

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

Related Topics ■ Configuring Fast Update Filters on page 603

match-order

Syntax	<code>match-order [<i>match-order</i>];</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> firewall family <i>family</i> fast-update-filter <i>filter-name</i>]</code>
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Specify the match conditions and the order in which the conditions are examined. Enclose a string of multiple conditions in brackets. The router examines only the conditions you specify, and examines them in the specified order.
Options	<p><i>match-order</i>—One or more of the following conditions. “Fast Update Filter Match Conditions” on page 607 describes the match conditions.</p> <ul style="list-style-type: none"> ■ destination-address ■ destination-port ■ dscp (IPv4 only) ■ protocol (IPv4 only) ■ source-address ■ source-port
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Fast Update Filters on page 603 ■ Configuring the Match Order for Fast Update Filters on page 605 ■ Fast Update Filter Match Conditions on page 607

precedence

Syntax	<code>precedence <i>precedence</i>;</code>
Hierarchy Level	[edit dynamic-profiles family <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> inet filter], [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i> inet filter]
Release Information	Statement introduced in JUNOS Release 9.3.
Description	Apply a precedence to a dynamic filter.
Options	<i>precedence</i> —Precedence value for the filter. The lower the precedence value, the higher the precedence. Range: 0 through 250 Default: 0
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ For general information about configuring firewall filters, see the <i>JUNOS Policy Framework Configuration Guide</i> ■ Dynamic Firewall Filters Overview on page 589 ■ Classic Filters Overview on page 590 ■ Fast Update Filters Overview on page 593 ■ Basic Filter Syntax on page 592 ■ Basic Fast Update Filter Syntax on page 596

term

Syntax `term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }`

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family* fast-update-filter *filter-name*]

Release Information Statement introduced in JUNOS Release 9.6.

Description Define terms for fast update filters.

Options *action*—(Optional) An action to take if conditions match. If you do not specify an action, the packets that match the conditions in the **from** statement are accepted.

action-modifiers—(Optional) One or more actions to perform on a packet.

from—(Optional) Match packet fields to values. If not included, all packets are considered to match and the actions and action modifiers in the **then** statement are taken.

match-conditions—One or more conditions to make a match.

only-at-create—(Optional) Specifies that the term is added only when the fast update filter is first created. No subsequent changes can be made to the term in the filter. Use this option only for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (for example, counting the default drop packets).

term-name—Name that identifies the term. The name can contain letters, numbers, and hyphens (-), and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (" ").

then—(Optional) Actions to take on matching packets. If not included and a packet matches all the conditions in the **from** statement, the packet is accepted.

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

- Related Topics**
- Configuring Fast Update Filters on page 603
 - Configuring Terms for Fast Update Filters on page 606
 - Fast Update Filter Match Conditions on page 607
 - Fast Update Filter Actions and Action Modifiers on page 607

Part 9

Class of Service for Subscriber Access

- Class of Service for Subscriber Access Overview on page 629
- Configuring Class of Service for Subscriber Access on page 639
- Class of Service for Subscriber Access Examples on page 661
- Class of Service Shaping-Rate Adjustments Overview on page 683
- Configuring Class of Service Shaping-Rate Adjustments on page 687
- Class of Service Shaping-Rate Adjustments Examples on page 695
- Summary of Class of Service for Subscriber Access Configuration Statements on page 699

Chapter 43

Class of Service for Subscriber Access Overview

- CoS for Subscriber Access Overview on page 629
- Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 630
- Changing CoS Services Overview on page 633
- Guidelines for Configuring CoS for Subscriber Access on page 636
- CoS and Static IP Demux Interface Set Overview on page 636
- CoS for PPPoE Subscriber Interfaces Overview on page 637

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 Subscriber Access

To configure CoS for dynamic subscriber access, you must have an Enhanced Queuing Distributed Port Controllers (EQ DPC) on the MX Series Ethernet Services Router.

To configure CoS for static PPPoE subscriber interfaces, you must have an IQ2 PIC on the M120 router or M320 router. To configure hierarchical CoS, you must have an IQ2E PIC on the M120 router or M320 router.

- Related Topics**
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639
 - Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641

Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure interface-specific CoS parameters that the router obtains when subscribers log in at appropriately configured static or dynamic subscriber interfaces. This feature is supported only for interfaces on Enhanced Queuing Dense Port Concentrators (EQ DPCs) in MX Series Ethernet Services Routers.

To configure a subscriber access dynamic profile to providing initial CoS Services, make sure you understand the following concepts:

- Dynamic Configuration of Initial CoS in Access Profiles on page 630
- Predefined Variables for Dynamic Configuration of Initial Traffic Shaping on page 630
- Predefined Variables for Dynamic Configuration of Initial Scheduling and Queuing on page 631

Dynamic Configuration of Initial CoS in Access Profiles

When a router interface receives a join message from a DHCP subscriber, the JUNOS Software applies the values configured in the dynamic profile associated with that router interface. A dynamic profile that is activated through its association with a subscriber interface is known as an *access dynamic profile*. You can associate a dynamic profile with a subscriber interface on the router by including statements at the [edit dynamic-profiles *profile-name* class-of-service interfaces] hierarchy level.

The JUNOS Software supports a set of predefined variables for obtaining a scheduler-map name and traffic-shaping parameters from the RADIUS authentication server, and another set of predefined variables for obtaining a scheduler name and scheduler parameters from the RADIUS authentication server. When a client authenticates over a router interface associated with the access dynamic profile, the router replaces the predefined variables with interface-specific values obtained from the RADIUS server.



NOTE: To associate dynamically configured initial CoS features with a subscriber interface, reference *JUNOS predefined variables*—and not *user-defined variables*—in an *access* dynamic profile for that interface.

Predefined Variables for Dynamic Configuration of Initial Traffic Shaping

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The JUNOS Software obtains this information

from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS traffic-shaping parameter values (attribute number 26–108) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler map name and traffic shaping parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the JUNOS predefined variables for CoS listed in Table 35 on page 631 in an access dynamic profile associated with the subscriber interface.

Table 35: CoS Predefined Variables for Scheduler Map and Traffic Shaping

Variable	Description
\$junos-cos-scheduler-map	Scheduler-map name to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. NOTE: The scheduler map referenced by the <code>scheduler-map</code> statement can be defined dynamically (at the [edit dynamic-profiles <i>profile-name</i> class-of-service scheduler-maps] hierarchy level) or statically (at the [edit class-of-service scheduler-maps] hierarchy level).
\$junos-cos-shaping-rate	Shaping rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-guaranteed-rate	Guaranteed rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-delay-buffer-rate	Delay-buffer rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

Predefined Variables for Dynamic Configuration of Initial Scheduling and Queuing

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS scheduling and queuing parameter values (attribute number 26–146) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the JUNOS predefined variables listed in Table 36 on page 632 in an access dynamic profile associated with the subscriber interface.

Table 36: CoS Predefined Variables for Scheduler Map and Traffic Shaping

Variable	Description
\$junos-cos-scheduler	Name of a scheduler to be dynamically configured in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-transmit-rate	Transmit rate to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-bs	Buffer size, as a percentage of total buffer, to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-pri	Packet-scheduling priority value to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-dropfile-low	<p>Name of the drop profile for RED for loss-priority level low to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers <i>scheduler-name</i> drop-profiles] hierarchy level) for loss-priority low.</p>
\$junos-cos-scheduler-dropfile-medium-low	<p>Name of the drop profile for RED for loss-priority level medium-low to be dynamically configured for the scheduler in the access dynamic profile. The JUNOS Software obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers <i>scheduler-name</i> drop-profiles] hierarchy level).</p>

Table 36: CoS Predefined Variables for Scheduler Map and Traffic Shaping (continued)

Variable	Description
\$junos-cos-scheduler-dropfile-medium-high	<p>Name of the drop profile for RED for loss-priority level medium-high to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers <i>scheduler-name</i> drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-dropfile-high	<p>Name of the drop profile for RED for loss-priority level high to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers <i>scheduler-name</i> drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-dropfile-any	<p>Name of the drop profile for RED for loss-priority level any to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers <i>scheduler-name</i> drop-profiles] hierarchy level).</p>

- Related Topics**
- Activating Subscribers and Managing Services in an Access Network on page 7
 - Dynamic Profiles Overview on page 467
 - Dynamic Variables Overview on page 468
 - JUNOS Predefined Variables on page 469
 - Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 649
 - Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 669

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 *subscriber 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 JUNOS internal dynamic variables for RADIUS-provided CoS parameters, you also enable the service to be activated for those subscribers at login.

To enable subscribers to activate a service or upgrade to different services through RADIUS change-of-authorization (CoA) messages after login, configure a *subscriber service profile* that includes user-defined variables.

Types of CoS Variables Used in a Service Profile

You can configure variables for the following CoS parameters in a service 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** statements in the dynamic profile referenced by DHCP. When you specify the **aggregate-clients merge** statement, the scheduler map names specified in the dynamic profile are appended. When you specify the **aggregate-clients replace** statement, the scheduler map names are replaced. In both cases, 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 37 on page 635 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 37: CoS Services and Variables

Scenario	Static CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients merge Statement)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients replace Statement)
Subscriber login	<ul style="list-style-type: none"> ■ 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 	<ul style="list-style-type: none"> ■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map and schedulers in access profile 	<ul style="list-style-type: none"> ■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map and schedulers in access profile 	<ul style="list-style-type: none"> ■ Configure RADIUS values or default values for all parameters in access profile ■ Configure scheduler map and schedulers in access profile
RADIUS CoA for service or variable change	Replaces the following parameters: <ul style="list-style-type: none"> ■ Delay buffer rate ■ Guaranteed rate ■ Scheduler map ■ Shaping rate 	Replaces the following parameters: <ul style="list-style-type: none"> ■ Delay buffer rate ■ Guaranteed rate ■ Shaping rate ■ Scheduler map 	Combines the values of the following parameters to their maximum scalar value: <ul style="list-style-type: none"> ■ Delay buffer rate ■ Guaranteed rate ■ Shaping rate Appends the scheduler map parameter	Replaces the following parameters: <ul style="list-style-type: none"> ■ Delay buffer rate ■ Guaranteed rate ■ Shaping rate ■ Scheduler map
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 NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

- Related Topics**
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639
 - Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641
 - Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 64

- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 35
- Guidelines for Configuring CoS for Subscriber Access on page 636

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.
- You must use a service dynamic profile with a different profile name for each RADIUS CoA request over the same logical interface.

- Related Topics**
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639

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 38 on page 636 shows the scheduler mapping for interface sets of IP demux interfaces.

Table 38: Scheduler Mapping for Interface Sets

Level	Type	Mapping
L4	Queues	Demux interface

Table 38: Scheduler Mapping for Interface Sets (*continued*)

Level	Type	Mapping
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 656

CoS for PPPoE Subscriber Interfaces Overview

You can configure CoS functionality for static PPPoE subscriber interfaces configured on Gigabit Ethernet Intelligent Queuing 2 (IQ2) and Ethernet Enhanced IQ2 (IQ2E) PICs on the M120 and M320 routers.

For both IQ2 and IQ2E PICs, you can attach an output traffic control profile that contains basic shaping and scheduling properties directly to a PPPoE interface. In this type of scenario, you could use each PPPoE interface to represent a household and shape all of the household traffic to an aggregate rate. Each forwarding class is mapped to a queue, and represents one type of services provided to a household customer.

The IQ2E PIC supports hierarchical scheduling functionality that is not available on the IQ2 PIC. To shape customer or DSLAM traffic at different levels of the PPPoE interface hierarchy, you can attach traffic control profiles to interface sets that contain PPPoE members.



NOTE: For PPPoE underlying logical interfaces, use PPPoE interface sets.

Related Topics ■ Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 659

■ For more information about the IQ2 and IQ2E PICs, see the *JUNOS Class of Service Configuration Guide*

Chapter 44

Configuring Class of Service for Subscriber Access

- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639
- Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 642
- Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644
- Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 649
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 653
- Applying CoS to an Interface in a Dynamic Profile on page 656
- Configuring CoS on a Set of Static IP Demux Interfaces on page 656
- Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links on page 658
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 659
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 660

Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You can configure CoS in dynamic profiles 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 539 and “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 543.

3. Configure CoS parameters in a dynamic profile.

- a. Configure the dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

- 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 Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile” on page 643.

- 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 656.

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 User-Defined CoS Variables in a Dynamic Service Profile” on page 653.

- Related Topics**
- CoS for Subscriber Access Overview on page 629
 - Example: Configuring Static Scheduling and Queuing for Subscriber Access on page 661

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 539 and “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 543.

2. Configure CoS parameters in a dynamic profile.

- a. Configure the dynamic profile.

See “Configuring a Basic Dynamic Profile” on page 481.

- b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

See “Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile” on page 643.

- c. Configure the schedulers and scheduler map in the dynamic profile.

You can configure the schedulers using dynamic variables or a combination of both static values and dynamic variables.

See “Configuring Schedulers for Subscriber Access in a Dynamic Profile” on page 644.

- 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 656.

3. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.



NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

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 User-Defined CoS Variables in a Dynamic Service Profile” on page 653

- b. (Optional) Enable multiple clients for the same subscriber (logical interface) to aggregate attributes 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 75.

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 629
 - Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access on page 663

Configuring Traffic Scheduling and Shaping for Subscriber Access

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.

You can choose to configure static values or dynamic variables for the shaping parameters. The values for the dynamic variables are obtained from RADIUS when a subscriber logs in or when a subscriber changes services.

You cannot configure a traffic-control profile that contains a combination of static and dynamic parameters.

This topic includes the following tasks:

- Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643
- Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 644

Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile

To configure static traffic shaping and scheduling parameters in a traffic-control 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 profile-name
```

2. Do one of the following:

- Reference a static 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
profile-name]
user@host# set scheduler-map map-name
```

- Reference a dynamic scheduler map in the dynamic profile. The scheduler map is dynamically configured in the [edit dynamic-profiles *profile-name* class-of-service scheduler-maps] hierarchy.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set scheduler-map (map-name)
```

3. Configure the shaping rate to be used in the dynamic profile.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set shaping-rate (percent percentage | rate)
```

4. Configure the guaranteed rate to be used in the dynamic profile.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set guaranteed-rate (percent percentage | rate)
```

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
profile-name]
user@host# set delay-buffer-rate (percent percentage | rate)
```

Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile

You can configure variables for the traffic shaping and scheduling parameters. The values for the parameters are dynamically obtained by RADIUS when a subscriber logs in or changes a service.

To configure dynamic traffic-control profiles in a dynamic profile:

1. Create the traffic-control profile.

```
[edit dynamic-profiles business-profile class-of-service]
user@host# edit traffic-control-profiles profile-name
```

2. Configure the scheduler map variable.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set scheduler-map $junos-cos-scheduler-map
```

3. Configure the shaping rate variable.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set shaping-rate $junos-cos-shaping-rate
```

4. Configure the guaranteed rate variable.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set guaranteed-rate $junos-cos-guaranteed-rate
```

5. (Optional) Configure a variable for 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
profile-name]
user@host# set delay-buffer-rate $junos-cos-delay-buffer-rate
```

- Related Topics**
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639
 - Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641
 - CoS for Subscriber Access Overview on page 629

Configuring Schedulers for Subscriber Access in a Dynamic Profile

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.

You can choose to define a scheduler definition that contains only static values, only dynamic variables, or a combination of static values and dynamic variables.

- Configuring Static Schedulers in a Dynamic Profile on page 645
- Configuring Dynamic Schedulers in a Dynamic Profile on page 646
- Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition on page 647

Configuring Static Schedulers in a Dynamic Profile

This topic describes how to configure schedulers with static values in a dynamic profile for subscriber access.

To configure static 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 profile-name class-of-service]
user@host# set schedulers scheduler-name
```

- b. Configure the buffer size.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set buffer-size remainder
```

- c. Configure the drop-profile map and drop profile.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set drop-profile-map loss-priority any protocol any drop-profile
d3
```

- d. Configure the priority.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set priority low
```

- e. Configure the transmit rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set transmit-rate percent 40
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# set scheduler-maps data-smap
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps map-name]
```

```
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps map-name
 forwarding-class forwarding-class-name]
user@host# set scheduler be_sch
```

Configuring Dynamic Schedulers in a Dynamic Profile

You can configure variables for the dynamic scheduler parameters. These values are dynamically obtained by RADIUS when a subscriber logs in or changes a service.

To configure dynamic scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.

- a. Specify the scheduler name using a variable.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# set schedulers $junos-cos-scheduler
```

- b. Configure the variable for the buffer size.

```
[edit dynamic-profiles profile-name class-of-service schedulers
 $junos-cos-scheduler]
user@host# set buffer-size $junos-cos-scheduler-bs
```

- c. Configure the variables for the drop-profile maps and the drop profile.

```
[edit dynamic-profiles profile-name class-of-service schedulers
 $junos-cos-scheduler]
user@host# set drop-profile-map loss-priority low protocol any drop-profile
 $junos-cos-scheduler-low
user@host# set drop-profile-map loss-priority medium-low protocol any
 drop-profile $junos-cos-scheduler-medium-low
user@host# set drop-profile-map loss-priority medium-high protocol any
 drop-profile $junos-cos-scheduler-medium-high
user@host# set drop-profile-map loss-priority high protocol any drop-profile
 $junos-cos-scheduler-high
user@host# set drop-profile-map loss-priority any protocol any drop-profile
 "$junos-cos-scheduler-any"
```

- d. Configure the variable for the priority.

```
[edit dynamic-profiles profile-name class-of-service schedulers
 $junos-cos-scheduler]
user@host# set priority $junos-cos-scheduler-pri
```

- e. Configure the variable for the transmit rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers
 $junos-cos-scheduler]
user@host# set transmit-rate $junos-cos-scheduler-tx
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# set scheduler-maps data-smap
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap]
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap
forwarding-class be]
user@host# set scheduler $junos-cos-scheduler
```

Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition

Within a dynamic profile, you can choose to configure one dynamic scheduler definition, or combine static and dynamic scheduler parameters in many static scheduler definitions.

Combining static and dynamic scheduler parameters enables you to provide subscribers with unique rate configurations that the RADIUS definitions for predefined variables do not allow.

To configure a scheduler definition that contains static and dynamic scheduling and queuing parameters:

1. Configure the scheduler definition.
 - a. Specify the scheduler name.



NOTE: To configure a static scheduler that contains both static and dynamic parameters, you must specify a unique scheduler name, not the `$junos-cos-scheduler` variable.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# set schedulers scheduler-name
```

- b. Configure the buffer size.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set buffer-size $junos-cos-scheduler-bs
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set buffer-size $junos-cos-scheduler-bs
```

- c. Configure the drop-profile maps, the drop profile, and the priority.

Do either of the following:

- Configure static values.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set drop-profile-map loss-priority any protocol any
drop-profile d3
```

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set priority low
```

- Configure variables.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set drop-profile-map loss-priority low protocol any
drop-profile $junos-cos-scheduler-low
user@host# set drop-profile-map loss-priority medium-low protocol any
drop-profile $junos-cos-scheduler-medium-low
user@host# set drop-profile-map loss-priority medium-high protocol any
drop-profile $junos-cos-scheduler-medium-high
user@host# set drop-profile-map loss-priority high protocol any
drop-profile $junos-cos-scheduler-high
user@host# set drop-profile-map loss-priority any protocol any
drop-profile "$junos-cos-scheduler-any
```

- d. Configure the priority.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set priority
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers
scheduler-name]
user@host# set priority $junos-cos-scheduler-pri
```

- e. Configure the variable for the transmit rate.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers
  scheduler-name]
user@host# set transmit-rate
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers
  scheduler-name]
user@host# set transmit-rate $juno-cos-scheduler-tx
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# set scheduler-maps data-smap
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap]
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap
  forwarding-class be]
user@host# set scheduler $junos-cos-scheduler
```

- Related Topics**
- Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641
 - Changing CoS Services Overview on page 633

Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure a subscriber interface so that subscribers receive initial CoS parameters that the router obtains from the RADIUS authentication server when subscribers log in using that logical interface on the router.

This topic includes the following tasks:

1. Configuring a RADIUS Authentication Server with Values for Initial CoS on page 650
2. Associating an Access Dynamic Profile with a Subscriber Interface That Supports Hierarchical CoS on page 650
3. Applying a Traffic-Control Profile to the Subscriber Interface on page 651
4. Configuring Initial Traffic-Shaping Parameters to be Obtained from RADIUS on page 651

5. Configuring Static Forwarding Classes and Scheduler Maps on page 652
6. Configuring Initial Scheduling and Queuing Parameters to be Obtained from RADIUS on page 652

Configuring a RADIUS Authentication Server with Values for Initial CoS

You can configure external RADIUS server VSAs with values that you expect subscribers to log in with.

- To configure a RADIUS authentication server to include CoS traffic-shaping parameters in authentication grants on certain subscriber interfaces, configure Juniper Networks VSA 26–108.
- To configure a RADIUS authentication server to include CoS scheduling and queuing parameters in authentication grants a certain subscriber interfaces, configure Juniper Networks VSA 28–146.

See “Configuring Router or Switch Interaction with RADIUS Servers” on page 19 and “Configuring RADIUS Server Parameters for Subscriber Access” on page 22.

See “Extended DHCP Local Server Overview” on page 58 and “Juniper Networks VSAs Supported by the AAA Service Framework” on page 38.

Associating an Access Dynamic Profile with a Subscriber Interface That Supports Hierarchical CoS

You need to use different configuration statements and JUNOS predefined variables to associate an access dynamic profile with a static or dynamic subscriber interface:

- To associate an access dynamic profile with a static subscriber interface, configure the interface at the static [edit interfaces] hierarchy level and reference the interface at the [edit dynamic-profiles *profile-name*] hierarchy level by using the JUNOS predefined variables `$junos-interface-ifd-name` and `$junos-underlying-interface-unit` to specify the interface name and logical unit number:

```
[edit]
interfaces {
  ... supported_interface_configuration ...
}
dynamic-profiles {
  profile-name {
    interfaces { # Specify interface on which DHCP DISCOVER arrives
      "$junos-interface-ifd-name" { # Physical interface name
        unit "$junos-underlying-interface-unit" { # Logical unit number
          family inet { #
            ... logical_interface_ip_address_configuration ...
          }
        }
      }
    }
  }
}
```


- To associate an access dynamic profile with a dynamic subscriber interface, create the interface at the [edit dynamic-profiles *profile-name*] hierarchy level by using the JUNOS predefined variables `$junos-underlying-interface`, `$junos-interface-unit`, and `$junos-subscriber-ip-address` to specify the interface name, interface logical unit number, and subscriber IP address:

```
[edit]
dynamic-profiles {
  profile-name {
    interfaces {
      demux0 { # The logical demux interface
        unit "$junos-underlying-interface-unit" { # Logical unit number
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet { #
            demux-source {
              $junos-subscriber-ip-address;
            }
          }
        }
      }
    }
  }
}
```

Applying a Traffic-Control Profile to the Subscriber Interface

To apply a traffic-control profile to the subscriber interface when a subscriber logs, include the output-traffic-control-profile in the [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*] hierarchy level:

```
[edit]
dynamic-profiles {
  profile-name {
    class-of-service {
      interfaces { # Interface-specific CoS for incoming packets
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            output-traffic-control-profile tc-profile-name;
          }
        }
      }
    }
  }
}
```

Configuring Initial Traffic-Shaping Parameters to be Obtained from RADIUS

Configure a traffic-control profile to specify initial traffic-shaping parameters to be dynamically obtained from RADIUS when a subscriber logs in. To configure, include statements at the [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *tc-profile-name*] hierarchy level:

```
[edit]
```

```

dynamic-profiles {
  profile-name {
    class-of-service {
      traffic-control-profiles {
        tc-profile-name {
          scheduler-map "$juno-cos-scheduler-map";
          shaping-rate "$junos-cos-shaping-rate";
          guaranteed-rate "$junos-cos-guaranteed-rate";
          delay-buffer-rate "$junos-cos-delay-buffer-rate";
        }
      }
    }
  }
}

```

Configuring Static Forwarding Classes and Scheduler Maps

Configure forwarding classes and scheduler maps at the static [edit class-of-service scheduler-maps] hierarchy level:

```

[edit]
class-of-service {
  forwarding-class ( # Include a queue for each class and associate queue numbers
    with class names
    queue number scheduler-name;
  }
  scheduler-maps { # Associates queues with scheduler
    smap-name {
      forwarding-class class-name scheduler scheduler-name;
    }
  }
}

```

Configuring Initial Scheduling and Queuing Parameters to be Obtained from RADIUS

Configure a scheduler to specify initial scheduling and queuing parameters to be dynamically obtained from RADIUS when a subscriber logs in. To configure, include statements at the [edit dynamic-profiles *profile-name* class-of-service schedulers] hierarchy level:

```

[edit]
dynamic-profiles {
  profile-name {
    class-of-service {
      schedulers {
        "$junos-cos-scheduler" {
          buffer-size "$junos-cos-scheduler-bs";
          priority "$junos-cos-scheduler-pri";
          transmit-rate "$juno-cos-scheduler-tx";
          drop-profile-map loss-priority low protocol any "$junos-cos-scheduler-low";
          drop-profile-map loss-priority medium-low protocol any
            "$junos-cos-scheduler-medium-low";
          drop-profile-map loss-priority medium-high protocol any
            "$junos-cos-scheduler-medium-high";
          drop-profile-map loss-priority high protocol any "$junos-cos-scheduler-high";
        }
      }
    }
  }
}

```

```

drop-profile-map loss-priority any protocol any "$junos-cos-scheduler-any";
    }
}
}
}
}

```

- Related Topics**
- Activating Subscribers and Managing Services in an Access Network on page 7
 - Dynamic Profiles Overview on page 467
 - Dynamic Variables Overview on page 468
 - JUNOS Predefined Variables on page 469
 - Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 630
 - Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 669

Configuring User-Defined CoS Variables in a Dynamic Service Profile

You can configure user-defined variables in the dynamic service profile for traffic scheduling and shaping parameters.



NOTE: The JUNOS predefined variables for dynamic CoS are only to be used in dynamic access profiles and not in dynamic service profiles.

You can use variables in a dynamic service profile in two ways:

- To enable subscribers to upgrade or downgrade services after login using a RADIUS change of authorization (CoA), configure user-defined variables for CoS parameters as RADIUS attributes.
- To provide subscribers with default values for CoS parameters, configure user-defined variables for CoS parameters with static default values. 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 service profile.

To configure user-defined 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 2
```



NOTE: You can configure user-defined values for RADIUS tags that are different than the values that are required in access profiles with predefined variables. For example, in a dynamic service profile, you could assign the shaping rate with a tag of 1 rather than 2, which is required for the `$junos-shaping-rate` variable. When you configure user-defined values, the VSA that is sent from RADIUS must share the same definition.

- 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 3
```

- 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 4
```

- 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 1
```

- 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 633
 - Guidelines for Configuring CoS for Subscriber Access on page 636

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 that you want to apply CoS attributes to an interface in the dynamic profile.

```
user@host# edit dynamic-profiles profile-name class-of-service
```

2. Configure the interface name and logical interface using a variable, and 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 profile-name class-of-service interfaces]
user@host# set interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit output-traffic-control-profile profile-name
```

- Related Topics**
- Configuring Static Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 639
 - Configuring Dynamic Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 641
 - CoS for Subscriber Access Overview on page 629

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 a Subscriber Interface Using a Set of Static IP Demux Interfaces” on page 542.

To configure CoS on a set of static IP demux interfaces:

1. Define the CoS parameters for the interface set.

```
[edit]
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.

```
[edit]
class-of-service {
  interfaces {
    interface-set demux-set1 {
      output-traffic-control-profile t2;
    }
    interface-set 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*

Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links

You can configure hierarchical CoS on a subscriber interface with an underlying aggregated Ethernet interface.

This procedure is specific to subscriber interfaces on MX-series routers with EQ DPCs. On these DPCs, you must enable link protection on the aggregated Ethernet interface for hierarchical CoS to operate.

Before you begin, configure the subscriber interface with aggregated Ethernet:

- For static VLAN interfaces, see “Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet” on page 555.
- For static and dynamic IP demux interfaces, see “Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet” on page 556.

1. Configure hierarchical CoS on the link aggregation (LAG) bundle.
 - a. Specify that you want to access the LAG bundle.

```
user@host#edit interfaces aex
```

- b. Configure the link aggregation (LAG) bundle with hierarchical scheduler mode.


```
[edit interfaces aex]
user@host#set hierarchical-scheduler
```

2. Configure the aggregated Ethernet options to support the hierarchical CoS parameters.

For the subscriber interface to support static or dynamic hierarchical CoS, all links must operate in link-protect mode.

- a. Specify that you want to configure the aggregated Ethernet options.

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

- b. Configure the link protection mode.

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

You can now attach static or dynamic traffic shaping and scheduling parameters at the aggregated Ethernet logical interface or its underlying physical interface. See:

- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 642
- Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644
- Applying CoS to an Interface in a Dynamic Profile on page 656

Related Topics ■ CoS for Subscriber Access Overview on page 629

Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface

You can configure hierarchical CoS on a static PPPoE subscriber interface.

This procedure is supported on IQ2E PICs on M120 and M320 routers only.

Before you begin:

- Configure the static PPPoE subscriber interface.

See Configuring PPPoE.

To configure hierarchical CoS on a static PPPoE subscriber interface:

1. Specify the PPPoE interface that you want to configure.

```
user@host#edit interfaces pppoe-interface-name
```

2. Configure the hierarchical scheduler for the interface.

```
[edit interfaces interface-name]
user@host#set hierarchical-scheduler
```

3. (Optional) Group the PPPoE interfaces in an interface set.

[edit]

user@host#**edit interfaces interface-set interface-set-name**

You can now configure static traffic and scheduling parameters for each traffic-control profile, and attach each traffic-control profile to the PPPoE interface or the PPPoE interface set. For more information, see the *JUNOS Class of Service Configuration Guide*.

- Related Topics**
- CoS for PPPoE Subscriber Interfaces Overview on page 637
 - Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface on page 674
 - Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface on page 676
 - Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces on page 679
 - Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Underlying Static PPPoE Subscriber Interfaces

Verifying the Scheduling and Shaping Configuration for Subscriber Access

- Purpose** View the class-of-service (CoS) configurations that are referenced in a dynamic profile for subscriber access.
- Action**
- To display the entire CoS configuration, including static and dynamic parameters:
 user@host> **show class-of-service**
 - To display the mapping of schedulers to forwarding classes and a summary of scheduler parameters for each entry:
 user@host> **show class-of-service scheduler-map**
 - To display traffic shaping and scheduling profiles:
 user@host> **show class-of-service traffic-control-profile**

Chapter 45

Class of Service for Subscriber Access Examples

- Example: Configuring Static Scheduling and Queuing for Subscriber Access on page 661
- Example: Configuring Dynamic Scheduling and Queuing for Subscriber Access on page 663
- Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 669
- Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile on page 671
- Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces on page 672
- Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface on page 674
- Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface on page 676
- Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces on page 679

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 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 RADIUS administrator supplies the initial values on the RADIUS server, and the service activation is performed at subscriber 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 interfaces for the access profile.

```
[edit]
dynamic-profiles access-profile {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
        family inet;
      }
    }
  }
}
```

- b. Configure the class of service parameters in the access profile. In this example, you configure JUNOS predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

Include the configurations for the interfaces, schedulers, and the scheduler maps.

```
[edit]
dynamic-profiles access-profile {
  class-of-service {
    traffic-control-profiles {
      tcp1 {
        scheduler-map $junos-cos-scheduler-map;
        shaping-rate $junos-cos-shaping-rate;
        guaranteed-rate $junos-cos-guaranteed-rate;
        delay-buffer-rate $junos-cos-delay-buffer-rate;
      }
    }
  }
  interfaces {
```

```

$junos-interface-ifd-name {
  unit $junos-underlying-interface-unit {
    output-traffic-control-profile tcp1;
  }
}
}
schedulers {
  $junos-cos-scheduler {
    buffer-size percent $junos-cos-scheduler-bs;
    priority $junos-cos-scheduler-pri;
    transmit-rate percent $junos-cos-scheduler-tx;
    drop-profile-map loss-priority low protocol any
      $junos-cos-scheduler-low;
    drop-profile-map loss-priority medium-low protocol any
      $junos-cos-scheduler-medium-low;
    drop-profile-map loss-priority medium-high protocol any
      $junos-cos-scheduler-medium-high;
    drop-profile-map loss-priority high protocol any
      $junos-cos-scheduler-high;
  }
}
scheduler-maps {
  data_voice_smap {
    forwarding-class be scheduler be_sch;
    forwarding-class ef scheduler ef_sch;
  }
}
}
}

```

Table 39 on page 664 lists the initial values defined by the RADIUS administrator for the scheduler map and shaping rates.

Table 39: Initial Scheduler Map and Shaping Values at Subscriber Login

Predefined Variable	RADIUS Tag	Value
\$junos-cos-scheduler-map	T01	data_voice_smap
\$junos-cos-shaping-rate	T02	6m
\$junos-cos-guaranteed-rate	T03	4m
\$junos-cos-delay-buffer-rate	T04	4m

Table 40 on page 664 lists the initial values defined by the RADIUS administrator for the voice (expedited forwarding) scheduler.

Table 40: Initial CoS Values for the Voice Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	ef_sch

Table 40: Initial CoS Values for the Voice Scheduler at Subscriber Login *(continued)*

Predefined Variable	Tag	Value
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium-high
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 41 on page 665 lists the initial values defined by the RADIUS administrator for the data (best effort) scheduler.

Table 41: Initial CoS Values for the Data Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	be_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	low
\$junos-cos-scheduler-dropfile-low	T04	d0
\$junos-cos-scheduler-dropfile-medium-low	T05	d1
\$junos-cos-scheduler-dropfile-medium-high	T06	d2
\$junos-cos-scheduler-dropfile-high	T07	d3

2. Configure the forwarding classes in the static [edit class-of-service] hierarchy.

```
[edit]
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;
    }
}
}

```

3. Configure the service profile enable RADIUS to activate the video service after login. The video service corresponds to assured forwarding PHB.

In this example, you configure JUNOS predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

```

[edit]
dynamic-profiles service-af {
    variables {
        af_fc default-value video;
        af_sch default-value af_sch;
        sch-drop-any default-value all;
        sch-pri-2 default-value strict-high;
        sch-bs-2 default-value 40;
        sch-tx-2 default-value 3m;
        smap default-value any
    }
    class-of-service {
        scheduler-maps {
            "$smap" {
                forwarding-class "$af_fc" scheduler "$af_sch";
            }
        }
        schedulers {
            "$af_sch" {
                transmit-rate percent "$sch-tx-2";
                buffer-size percent "$sch-bs-2";
                priority "$sch-pri-2";
                drop-profile-map loss-priority any protocol any drop-profile
                    "$sch-drop-any";
            }
        }
    }
}

```



```

    }
  }
}

```

After the three services are activated, subscribers receive upgraded values for the 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 42 on page 667 lists the upgraded values defined by the RADIUS administrator.

Table 42: Upgraded CoS Values for the Video Service

Variable	RADIUS Tag	Value
junos-cos-scheduler-map	T01	data_voice_smap
junos-cos-shaping-rate	T02	14m
junos-cos-guaranteed-rate	T03	13m
junos-cos-delay-buffer-rate	T04	12m

Table 43 on page 667 lists the values defined by the RADIUS administrator for the video (assured forwarding) scheduler.

Table 43: Upgraded CoS Values for the Video Scheduler

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	af_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 44 on page 668 lists the values defined by the RADIUS administrator for the expedited forwarding scheduler in the CoA message. The values are the same as the initial service.

Table 44: Initial CoS Values for the Expedited Forwarding Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	ef_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium-high
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 45 on page 668 lists the values defined by the RADIUS administrator for the best effort scheduler in the CoA message. The values are the same as the initial service.

Table 45: Initial CoS Values for the Best Effort Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	be_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	low
\$junos-cos-scheduler-dropfile-low	T04	d0
\$junos-cos-scheduler-dropfile-medium-low	T05	d1
\$junos-cos-scheduler-dropfile-medium-high	T06	d2
\$junos-cos-scheduler-dropfile-high	T07	d3

- Related Topics**
- Changing CoS Services Overview on page 633
 - Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 653

Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

The following configuration is an example of a client dynamic profile in which initial CoS parameters are dynamically obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is applied.

For this example, assume that the RADIUS authentication server has been configured with traffic-shaping parameters (at Juniper Networks VSA 26-108) and CoS scheduling and queuing parameters (at Juniper Networks VSA 26-146).

The subscriber interface is a single-unit static gigabit Ethernet VLAN interface on an EQ DPC port:

```
[edit]
interfaces {
  ge-9/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      family inet {
        address 192.168.32.2/24;
      }
    }
  }
}
```

The client dynamic profile `residential_silver` attaches the traffic-control profile `tcp_1` to the subscriber interface:

```
[edit]
dynamic-profiles {
  residential_silver {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    class-of-service {
      interfaces {
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            output-traffic-control-profile tcp1;
          }
        }
      }
    }
  }
}
```

The traffic-control profile `tcp_1`, references JUNOS predefined variables to obtain a scheduler-map name and traffic-shaping parameter values from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server replaces the JUNOS predefined variable `$junos-cos-scheduler-mapscheduler-map` name `business_smap_1`. The scheduler map `business_smap_1` is configured in the client dynamic profile:

```
[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      traffic-control-profiles {
        tcp_1 {
          scheduler-map "$junos-cos-scheduler-map"; # 'business_smap_1'
          shaping-rate "$junos-cos-shaping-rate";
          guaranteed-rate "$junos-cos-guaranteed-rate";
          delay-buffer-rate "$junos-cos-delay-buffer-rate";
        }
      }
      scheduler-maps {
        business_smap_1 {
          forwarding-class best-effort scheduler be_sched;
          forwarding-class ef scheduler home_sched
        }
      }
    }
  }
}
```

A scheduler definition references JUNOS predefined variables to obtain scheduler configurations from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server provides scheduler configurations for schedulers named `be_sched` and `home_sched`, which are included in the scheduler map `business_smap_1`:

```
[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      schedulers {
        "$junos-cos-scheduler" { # 'be_sched' and 'home_sched'
          transmit-rate "$junos-cos-scheduler-tx";
          buffer-size "$junos-cos-scheduler-bs";
          priority "$junos-cos-scheduler-pri";
          drop-profile-map loss-priority low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-low";
          drop-profile-map loss-priority medium-low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-low";
          drop-profile-map loss-priority medium-high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-high";
          drop-profile-map loss-priority high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-high";
        }
      }
    }
  }
}
```

Static configurations for CoS consist of configurations for the forwarding classes used in the scheduler map `business_smap_1` and configurations for drop-profile names provided by RADIUS for as part of the scheduler configurations provided (for `be_sched` and `home_sched`) when a subscriber logs in:

```
[edit]
class-of-service {
  forwarding-classes {
    queue 0 best-effort;
    queue 1 ef;
  }
  drop-profiles {
    . . . configurations_for_drop_profile_names_provided_by_RADIUS . . .
  }
}
```

- Related Topics**
- Activating Subscribers and Managing Services in an Access Network on page 7
 - Dynamic Profiles Overview on page 467
 - Dynamic Variables Overview on page 468
 - JUNOS Predefined Variables on page 469
 - Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 630
 - Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 649

Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile

Combining static and dynamic schedulers in a dynamic profile enables you to provide subscribers with services that have unique scheduler definitions.

In this example, the network administrator configures the data service with a `transmit-rate` that is rate controlled using the `$junos-cos-scheduler-tx` predefined variable. RADIUS dynamically supplies the percentage value for the transmission rate that is specified in the RADIUS VSA to the data scheduler when the subscriber logs in.

For the best-effort service, the network administrator assigns the remaining transmission rate that is available.

```
schedulers {
  data-scheduler {
    transmit-rate percent rate-limit $junos-cos-scheduler-tx;
    buffer-size percent $junos-cos-scheduler-bs;
    priority $junos-cos-scheduler-pri;
    drop-profile-map loss-priority low protocol any drop-profile d0;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile d2;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile all;
  }
}
```

```

best-effort-scheduler {
    transmit-rate remainder;
    buffer-size percent $junos-cos-scheduler-bs;
    priority medium-high;
    drop-profile-map loss-priority low protocol any drop-profile
        $junos-cos-scheduler-dropfile-low;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile
        $junos-cos-scheduler-dropfile-medium-high;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile
        $junos-cos-scheduler-dropfile-any;
}

```

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.

```

[edit]
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 {
            address 1.1.1.1/24;
            demux-source {
                1.1.1.0/24;
            }
        }
    }
}

```

```

    }
    unit 1 {
        demux-options {
            underlying-interface ge-2/0/1.1;
        }
        family inet {
            address 1.1.2.1/24;
            demux-source {
                1.1.2.0/24;
            }
        }
    }
}
}
}
class-of-service {
    traffic-control-profiles {
        T1 {
            scheduler-map m1;
            shaping-rate 5m;
        }
        T2 {
            shaping-rate 60m;
        }
    }
    interfaces {
        interface-set 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 Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queuing and scheduler parameters by configuring traffic control profile and binding it directly to a PPPoE subscriber interface.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class can represent one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. All of the PPPoE interfaces on the physical interfaces are shaped to the underlying physical interface rate.

Table 46 on page 674 lists the scheduler and queue mapping for this configuration.

Table 46: Scheduler Per Logical Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	—
1	Scheduler	Underlying physical interface

```

interfaces {
    ge-3/0/3 {
        hierarchical-scheduler;
        vlan-tagging;
        unit 0 {
            encapsulation ppp-over-ether;
            vlan-id 100;
        }
    }
}
pp0 {
    unit 0 {
        pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
        }
    }
}

```



```

    }
    family inet {
        address 120.20.20.20/32 {
            destination 120.20.20.21;
        }
    }
}
unit 1 {
    pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
    }
    family inet {
        address 130.30.30.30/32 {
            destination 130.30.30.31;
        }
    }
}
unit 2 {
    pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
    }
    family inet {
        address 140.40.40.40/32 {
            destination 140.40.40.41;
        }
    }
}
}
}
class-of-service {
    traffic-control-profiles {
        tcp {
            scheduler-map data_smap;
            shaping-rate 50k;
            guaranteed-rate 10k;
        }
    }
    interfaces {
        pp0 {
            unit 0 {
                output-traffic-control-profile tcp;
            }
            unit 1 {
                output-traffic-control-profile tcp;
            }
            unit 2 {
                output-traffic-control-profile tcp;
            }
        }
        forwarding-classes {
            queue 0 be;
            queue 1 ef;
            queue 3 nc;
            queue 2 af;
        }
    }
}

```

```

}
scheduler-maps {
  data_smap {
    forwarding-class be scheduler be_sch;
  }
  voice_data_smap {
    forwarding-class be scheduler be_sch;
  }
  vid_data_smap {
    forwarding-class ef scheduler ef_sch;
  }
}
schedulers {
  be_sch {
    transmit-rate percent 10;
    buffer-size remainder;
    priority low;
  }
  ef_sch {
    transmit-rate percent 10;
    buffer-size remainder;
    priority low;
  }
  af_sch {
    transmit-rate percent 10;
    buffer-size remainder;
    priority low;
  }
  nc_sch {
    transmit-rate percent 10;
    buffer-size remainder;
    priority low;
  }
}

```

- Related Topics**
- CoS for PPPoE Subscriber Interfaces Overview on page 637
 - Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 659

Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring a traffic control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic control profile on the underlying interface where a group of PPPoE interfaces reside.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. The underlying logical interface where a group

of PPPoE interface resides represents a DSLAM and provides shaping to the DSLAM rate.

Table 47 on page 677 lists the scheduler and queue mapping for this configuration.

Table 47: Scheduler Per Underlying Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	Underlying logical interface
1	Scheduler	Underlying interface

```

interfaces {
  ge-3/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 0 {
      encapsulation ppp-over-ether;
      vlan-id 100;
    }
    unit 1 {
      vlan-id 101;
    }
  }
  pp0 {
    hierarchical-scheduler;
    unit 0 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 120.20.20.20/32 {
          destination 120.20.20.21;
        }
      }
    }
    unit 1 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 130.30.30.30/32 {
          destination 130.30.30.31;
        }
      }
    }
    unit 2 {

```

```

    pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
    }
    family inet {
        address 140.40.40.40/32 {
            destination 140.40.40.41;
        }
    }
}
}

class-of-service {
    traffic-control-profiles {
        tcp1 {
            scheduler-map data_smap;
            shaping-rate 50k;
            guaranteed-rate 10k;
        }
        tcp2 {
            scheduler-map data_smap;
            shaping-rate 50m;
            guaranteed-rate 10m;
        }
    }
}

interfaces {
    pp0 {
        unit 0 {
            output-traffic-control-profile tcp1;
        }
        unit 1 {
            output-traffic-control-profile tcp1;
        }
        unit 2 {
            output-traffic-control-profile tcp1;
        }
        ge-3/0/3 {
            unit 0 {
                output-traffic-control-profile tcp2;
            }
        }
    }
    ...
}

```

- Related Topics**
- CoS for PPPoE Subscriber Interfaces Overview on page 637
 - Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 659

Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring traffic-control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic-control profile on a set of PPPoE interfaces.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. In addition, the PPPoE interface-set configuration provides shaping of traffic for a group of PPPoE interface on a DSLAM to a DSLAM aggregate rate.

Table 48 on page 679 lists the scheduler and queue mapping for this configuration.

Table 48: Scheduler per Logical Interface with Interface Set Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	Set of PPPoE interfaces
1	Scheduler	Underlying physical interface

```

interfaces {
  interface-set iflset1 {
    interface pp0 {
      unit 0;
      unit 1;
      unit 2;
    }
  }
  pp0 {
    unit 0 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 120.20.20.20/32 {
          destination 120.20.20.21;
        }
      }
    }
  }
}

```

```

    unit 1 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 130.30.30.30/32 {
          destination 130.30.30.31;
        }
      }
    }
    unit 2 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 140.40.40.40/32 {
          destination 140.40.40.41;
        }
      }
    }
  }
  ge-3/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 0 {
      encapsulation ppp-over-ether;
      vlan-id 100;
    }
    unit 1 {
      vlan-id 101;
    }
    unit 2 {
      vlan-id 102;
    }
  }
}
class-of-service {
  traffic-control-profiles {
    tcp1 {
      scheduler-map data_smap;
      shaping-rate 50k;
      guaranteed-rate 10k;
    }
    tcp2 {
      scheduler-map data_smap;
      shaping-rate 50m;
      guaranteed-rate 10m;
    }
  }
}
interfaces {
  pp0 {
    unit 0 {
      output-traffic-control-profile tcp1;
    }
  }
}

```

```
unit 1 {  
    output-traffic-control-profile tcp1;  
}  
unit 2 {  
    output-traffic-control-profile tcp1;  
}  
interface-set iflset1 {  
    output-traffic-control-profile tcp2;  
}  
...  
}
```

- Related Topics**
- CoS for PPPoE Subscriber Interfaces Overview on page 637
 - Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 659

Chapter 46

Class of Service Shaping-Rate Adjustments Overview

- Hierarchical CoS Shaping-Rate Adjustments Overview on page 683
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685

Hierarchical CoS Shaping-Rate Adjustments Overview

This overview describes how MX Series Ethernet Services Routers installed as an edge router in a subscriber access network can adjust hierarchical class-of-service (CoS) policy to prevent bandwidth contention at subscriber interfaces on Enhanced Queuing Dense Port Concentrator (EQ DPC) ports.

High-speed data service subscribers typically receive some combination of voice, data, and video services from an access network. Subscriber traffic is delivered from the access network, through a router, through a switched Ethernet network, to an Ethernet digital subscriber line access multiplexer (DSLAM). The DSLAM, in turn, forwards the subscriber's traffic to the residential gateway over a digital subscriber line (DSL). An MX Series router that is installed in a subscriber access network as an edge router can perform subscriber management functions that include subscriber identification and per-subscriber CoS.

To an MX Series router in a subscriber access network, a subscriber is an authenticated user—a user that has logged into the access network at a subscriber interface and then been verified by the configured authentication server and subsequently granted initial CoS services. Subscribers can be identified statically or dynamically. You can create a subscriber interface over a static VLAN interface, a static IP demux interface, a static interface set, or a dynamic IP demux interface that is created when a subscriber logs in using a Dynamic Host Configuration Protocol (DHCP) access method.

Hierarchical, per-subscriber CoS is supported only for subscriber interfaces on EQ DPC ports operating in hierarchical scheduler mode. These types of subscriber interfaces can be static VLAN interfaces or static interface sets. Hierarchical CoS enables you to apply traffic shaping parameters (which can include a delay-buffer bandwidth) and packet transmission scheduling parameters (which can include buffer management parameters) to an individual subscriber interface rather than to all interfaces configured on the port.

The characteristics of voice, data, and video applications vary widely in their requirements for traffic throughput, bandwidth management, delay and jitter tolerance, and buffer depth. To enhance the flexibility of the hierarchical CoS implementation in a subscriber access network, you can configure the MX Series router to perform real-time adjustments to the shaping rate configured for subscriber interfaces for residential gateways. Enabling a shaping-rate adjustment option on the router can prevent bandwidth contention at the interface from causing degradation of the subscriber's voice, data, or video services.

- Related Topics**
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
 - Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
 - Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
 - Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
 - Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping on page 693
 - Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview

This overview describes how an MX Series Ethernet Services Router installed as an edge router can adjust hierarchical CoS policy for subscriber interfaces for subscriber local loops. You can configure the router to throttle the traffic sent to subscriber local loops so that the traffic does not exceed the current data transmission rate of those lines. This feature ensures that changes to subscriber local loop speeds do not cause bandwidth contention at the subscriber's residential gateway.

In a typical subscriber access network, traffic destined to a subscriber is delivered from the access network, through an edge router, to a DSLAM. The DSLAM multiplexes subscriber traffic through a DSL, also known as a *local loop*, to the subscriber's residential gateway. When line noise or cross talk in a subcarrier causes the error rate on a DSL to exceed a certain threshold, the DSLAM can adapt itself by lowering the data transmission rate to that carrier device. A lower data transmission rate is less susceptible to induced errors.

You can configure an MX Series router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. Whenever a DSLAM resynchronizes a subscriber local loop speed, the router adjusts the configured shaping rate for that line so that the aggregate egress traffic to those subscribers is shaped to the local loop speed before the traffic reaches the DSLAM. Unless the maximum amount of bandwidth allocated to the subscriber interface on the router is throttled to the local loop speed, bandwidth contention can occur at the subscriber's residential gateway, which can cause the DSLAM to drop packets. This type of shaping-rate adjustment requires the topology discovery and traffic-monitoring features of the Access Node Control Protocol (ANCP).

You can configure ANCP to communicate the subscriber local loop speed to the MX Series router, which in turn throttles traffic destined to the associated subscriber interface so that it matches the subscriber local loop speed. ANCP acquires subscriber

line rate information from DSLAMs and then communicates this data transmission rate for use with CoS.

For more information about the ANCP protocol, see the “ANCP Topology Discovery and Traffic Monitoring Overview” on page 737.

- Related Topics**
- Hierarchical CoS Shaping-Rate Adjustments Overview on page 683
 - Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
 - Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
 - Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
 - Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops

These guidelines apply to configuring an MX Series Ethernet Services Router installed as an edge router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. This shaping-rate feature uses the topology discovery and traffic-monitoring features of the ANCP.

Keep the following points in mind when you enhance hierarchical CoS policy by configuring ANCP-driven shaping-rate adjustments:

- Shaping-rate adjustments are supported only for subscriber local loops that terminate at DSLAMs that you have configured as ANCP neighbors of the MX Series router.
- Shaping-rate adjustments are supported only for scheduler nodes for which you have configured an initial shaping rate by including the **shaping-rate** statement in a traffic-control profile applied to the scheduler node. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.
- Shaping-rate adjustments are supported only for scheduler nodes that are static logical interface sets that you have configured to operate at Level 3 of the scheduler hierarchy on the router. If an interface set is configured with a logical interface (such as unit 0) and queue, then the interface-set is an internal scheduler node (as opposed to a root node or a leaf node) at Level 2 of the hierarchy. However, if there are no traffic control profiles configured on logical interfaces in an interface set, then the interface set is an internal scheduler node at Level 3 of the hierarchy.
- Shaping-rate adjustments are supported only for subscriber interfaces over physical interfaces that you have configured to operate in hierarchical scheduler mode. Only ports on EQ DPCs in MX Series routers support hierarchical scheduler mode.
- After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the **shaping-rate** statement in a traffic-control profile and then

applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.

- The Layer 2 Tunneling Protocol (L2TP) is often used to carry traffic securely between an L2TP Network Server (LNS) and an L2TP Access Concentrator (LAC). The QoS adjustment feature supports the shaping overhead options that you can use to add a specified number of bytes to the actual packet length when determining shaped session packet length. ANCP shaping-rate adjustments are not supported for ingress traffic, only for egress traffic. To configure the number of bytes to add to the packet at the egress side of the tunnel, include the **egress-shaping-overhead** and **mode** statements at the **[edit chassis fpc slot-number pic *pic-number* traffic-manager]** hierarchy level. Use the shaping overhead options if you need to account for encapsulation overhead.

For more information about the ANCP protocol, see the “ANCP Topology Discovery and Traffic Monitoring Overview” on page 737.

Related Topics

- Hierarchical CoS Shaping-Rate Adjustments Overview on page 683
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

Chapter 47

Configuring Class of Service Shaping-Rate Adjustments

- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
- Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping on page 693

Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops

You can enhance a CoS implementation by enabling an MX Series Ethernet Services Router to adjust the hierarchical CoS policy shaping rate configured for static interface sets that consist of two or more VLANs and represent subscriber local loops. Whenever the digital subscriber line access multiplexer (DSLAM) resynchronizes its data transmission rate to a digital subscriber line (DSL), the router adjusts the shaping rate for the associated subscriber interface so that the maximum bandwidth allocation cannot exceed the current data rate for the associated subscriber local loop. This feature ensures that data transmission rate adjustments by the DSLAM do not cause bandwidth contention at the subscriber's residential gateway.

This topic includes the following tasks:

- Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops on page 688
- Configuring the Logical Interfaces That Compose the Static Logical Interface Sets on page 688
- Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops on page 689
- Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Displaying Configuration Information About ANCP on page 692
- Displaying Configuration Information About Shaping-Rate Adjustments for Subscriber Local Loops on page 692

Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops

To configure a logical interface set, begin by including the `interface-set` statement with the `interface-set-name` option at the `[edit interfaces]` hierarchy level.

An interface set is composed of two or more logical interfaces on the same physical interface. Each logical interface in an interface set corresponds to an individual subscriber service, such as voice, video, or data. To specify either a list of logical unit numbers or the single outer VLAN tag used to identify the logical interfaces that compose the interface set, include statements at the `[edit interfaces interface-set interface-set-name]` hierarchy level:

- For an interface set composed of a list of logical interfaces identified by an inner VLAN tag on Ethernet frames (called the customer VLAN, or C-VLAN, tag), you must specify each logical interface by including the `unit` statement with the `logical-unit-number` option.

```
[edit]
interfaces {
  interface-set interface-set-name {
    interface ethernet-interface-name { # EQ DPC port
      unit logical-unit-number;
      unit logical-unit-number;
      ...
    }
    ...
  }
}
```

- For an interface set composed of a set of VLANs grouped at the DSLAM and identified by the same service VLAN (S-VLAN) tag), you must specify the S-VLAN tag as the outer VLAN tag for each VLAN by including the `vlan-tags-outer` statement with the `vlan-tag` option.

```
[edit]
interfaces {
  interface-set interface-set-name {
    interface ethernet-interface-name { # EQ DPC port
      vlan-tags-outer vlan-tag; # Identify the DSLAM
    }
    ...
  }
}
```

For more information about configuring CoS hierarchical schedulers, see the *JUNOS Class of Service Configuration Guide*.

Configuring the Logical Interfaces That Compose the Static Logical Interface Sets

Each underlying physical interface must be configured to operate in hierarchical scheduler mode and to support stacked VLAN tagging on all logical interfaces. To

configure, include the `hierarchical-scheduler` statement and the `stacked-vlan-tagging` statement at the `[edit interfaces ethernet-interface-name]` hierarchy level.

To associate the individual logical interfaces of an interface set with specific subscriber services provided by the subscriber local loop, bind an S-VLAN tag and a C-VLAN tag to each logical interface that belongs to a scheduler node that represents a subscriber local loop. Ethernet frames sent from the logical interfaces contain an outer VLAN tag that identifies a DSLAM and an inner VLAN tag that identifies a subscriber port on the DSLAM. To configure, include the `vlan-tags` statement at each logical interface:

```
[edit]
interfaces {
  ethernet-interface-name { # EQ DPC port underlying an interface set
    hierarchical-scheduler;
    stacked-vlan-tagging; # Support 802.1Q VLAN dual-tagged frames
    unit logical-unit-number { # Bind S-VLAN and C-VLAN tags to logical interface
      vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
    }
    ...
  }
}
```

For more information about configuring 802.1Q VLANs, see the *JUNOS Network Interfaces Configuration Guide*.

Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops

To configure hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for a subscriber local loop:

1. For each scheduler node that represents a subscriber local loop, configure an initial shaping rate.



NOTE: The CoS shaping-rate feature is supported only for scheduler nodes with a configured shaping rate. The initial shaping rate must be configured by applying a traffic-control profile that includes the `shaping-rate` statement. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.

- To enable traffic heading downstream (from the router to the DSLAM) to be gathered into an interface set, include the `interface-set` statement and define the logical interface set name as the `interface-set-name` option at the `[edit class-of-service interfaces]` hierarchy level.
- To apply output traffic scheduling and shaping parameters at the logical interface set level (rather than at the logical unit level), include the `output-traffic-control-profile` statement and specify the name of a traffic-control profile as the `profile-name` option at the `[edit class-of-service interfaces interface-set interface-set-name]` hierarchy level.

To configure, include the following statements:

```

interfaces { # Configure interface-specific CoS for incoming packets
  interface-set interface-set-name { # Configure a hierarchical scheduler
    output-traffic-control-profile tc-profile-name; # Level 3 scheduler node
  }
  ...
}
traffic-control-profiles { # Define traffic-control profiles
  tc-profile-name { # Specify a scheduler map and traffic-shaping parameters
    scheduler-map map-name;
    shaping-rate rate; # This is the "configured shaping rate"
    guaranteed-rate (percent percentage | rate);
    delay-buffer-rate (percent percentage | rate);
  }
  ...
}

```

You can include the statements at the following hierarchy levels:

- [edit class-of-service]
 - [edit dynamic-profiles *profile-name* class-of-service]
2. Configure the scheduler maps referenced in the traffic-control profiles applied to the interface sets, the schedulers referenced in those scheduler maps, and the drop profiles referenced in those schedulers.
 - A scheduler map establishes the traffic output queues (forwarding classes) for a scheduler node and associates each queue with a specific scheduler map.
 - A scheduler defines queue properties (transmit rate, buffer size, priority, and drop profile) that specify how traffic is treated in the output queue.
 - A drop profile specifies how aggressively the MX Series router drops packets that are managed by a particular scheduler by defining either a segmented or interpolated graph that maps output queue fullness to packet drop probability.

To configure, include the statements at the static [edit class-of-service] hierarchy level:

```

[edit]
class-of-service {
  scheduler-maps { # Assign queuing characteristics to output queues
    map-name { # Map output queues to
      forwarding-class class-name scheduler scheduler-name;
      forwarding-class class-name scheduler scheduler-name;
    }
    ...
  }
  schedulers { # Define queuing characteristics
    scheduler-name { # Specify queuing and buffer management
      transmit-rate transmit-rate-option;
      buffer-size buffer-size-option;
    }
  }
}

```



```

        priority priority-level;
        drop-profile-map loss-priority loss-priority-option protocol any drop-profile
            drop-profile-name;
        ...
    }
}
drop-profiles { # Define random early detection (RED) for the delay buffer
    drop-profile-name { # Specify how to drop packets from an output queue
        drop-profile-name ( # Map a queue fullness to a drop probability
            fill-level percentage drop-probability percentage; # Option 1: segmented
            fill-level percentage drop-probability percentage;
            ...
        }
        interpolate { # Option 2: interpolated
            drop-probability [ values ];
            fill-level [ values ];
        }
    }
    ...
}
}

```

For more information about configuring scheduler maps, schedulers, and drop profiles, see the *JUNOS Class of Service Configuration Guide*.

Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops

To configure the Access Node Control Protocol (ANCP) functionality that supports and drives the shaping-rate adjustments for subscriber local loops:

- Enable ANCP to monitor subscriber local loop rates at the DSLAMs and communicate this information to CoS.
- Configure each DSLAM as an ANCP neighbor of the router so that TCP connections can be established between the router and each DSLAM.
- Identify the subscriber interface sets whose traffic is monitored and shaped by ANCP, and associate those interface sets with the corresponding identifiers configured on the access node (DSLAM) to uniquely identify the subscriber local loops within the access network.

ANCP uses this information to build a mapping of subscribers to subscriber interfaces. When ANCP receives port management messages from a DSLAM or other access node, it uses the access identifier contained in the message to determine which hierarchical scheduler node corresponds to the subscriber.

To configure, include statements at the [edit protocols ancp] hierarchy level:

```

[edit]
protocols {
    ancp {
        qos-adjust; # Enable ANCP to monitor and adjust CoS shaping rates
        neighbor ip-address; # Configure each DSLAM as an ANCP neighbor
    }
}

```

```

...
interfaces { # Identify subscribers for which ANCP can adjust shaping rates
  interface-set {
    interface-set-name {
      access-identifier identifier-string; # DSLAM ID for the local loop
    }
  }
  ...
}
...
}
...
}

```

Displaying Configuration Information About ANCP

If ANCP is enabled, the following operational commands display or clear information about the ANCP configuration:

- To display ANCP neighbor information, issue the **show ancp neighbor** operational command.
- To clear ANCP neighbors, issue the **clear ancp neighbor** operational command.
- To display ANCP subscriber information, issue the **show ancp subscriber** operational command.
- To display ANCP class-of-service information, issue the **show ancp cos** operational command.

If ANCP is not yet enabled, the process starts when you commit a configuration that contains the **protocols ancp** stanza.

For more information about ANCP, see “ANCP Topology Discovery and Traffic Monitoring Overview” on page 737 and “Configuring ANCP” on page 741.

Displaying Configuration Information About Shaping-Rate Adjustments for Subscriber Local Loops

To display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS, issue the **show class-of-service interface-set** operational command.



NOTE: After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the **shaping-rate** statement in a traffic-control profile and then applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.

- Related Topics**
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
 - Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
 - Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
 - Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops

To disable hierarchical CoS shaping-rate adjustments for subscriber local loops:

- Disable hierarchical CoS traffic-shaping adjustment by ANCP:

```
[edit protocols ancp]
user@host# delete qos-adjust
```

Traffic-shaping parameters for all subscriber local loops revert to their current configured values.

- Related Topics**
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
 - Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
 - Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
 - Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping

You can disable hierarchical bandwidth adjustment for all subscriber interfaces with reverse OIF mapping enabled on a specified multicast interface. Reverse OIF mapping is used to determine the subscriber VLAN interface and the multicast traffic bandwidth on the interface.

To disable hierarchical bandwidth adjustment:

1. Specify that you want to access the subscriber interfaces with reverse-OIF mapping enabled.

```
[edit routing-instances routing-instance routing-options multicast interface
interface-name]
user@host# edit reverse-oif-mapping
```

2. Disable hierarchical bandwidth adjustment for all subscriber interfaces on the interface.

```
user@host# set no-qos-adjust
```

- Related Topics**
- Hierarchical CoS Shaping-Rate Adjustments Overview on page 683
 - Managing Subscriber Overcommitment

Chapter 48

Class of Service Shaping-Rate Adjustments Examples

- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 695

Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops

This example shows how you can enable shaping-rate adjustments for static logical interface sets that represent subscriber local loops:

1. Configure static logical interface sets to serve as CoS hierarchical scheduler nodes for subscriber local loops.

This example uses a single scheduler node that represents two subscriber local loops. The scheduler node is a static logical interface composed of two logical interfaces. The underlying physical interface is port 0 on a Gigabit Ethernet EQ DPC in slot 4, PIC 0:

```
[edit]
interfaces {
  interface-set ifset-of-logical-interfaces {
    interface ge-4/0/0 {
      unit 1;
      unit 2;
    }
  }
  ge-4/0/0 {
    description "access interface ge-4/0/0";
    hierarchical-scheduler;
    stacked-vlan-tagging;
    unit 1 {
      description "DSL type ADSL1 = 0x01";
      proxy-arp;
      vlan-tags outer 1 inner 1; # S-VLAN tag is '1' and C-VLAN tag is '1'
      family inet { # Specify a secondary loopback address
        unnumbered-address lo0.0 preferred-source-address 192.168.7.3;
      }
    }
    unit 2 {
      description "DSL type ADSL1 = 0x01";
      proxy-arp;
    }
  }
}
```

```

        vlan-tags outer 1 inner 2; # S-VLAN tag is '1' and C-VLAN tag is '2'
        family inet { # Specify a secondary loopback address
            unnumbered-address lo0.0 preferred-source-address 192.168.7.4;
        }
    }
}

```

2. Begin configuring hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for the group of subscriber local loops.

```

[edit]
class-of-service {
    interfaces {
        interface-set ifset-of-logical-interfaces {
            output-traffic-control-profile tcp-premium-with-4-queues;
        }
    }
}

```

3. Configure the traffic-control profiles that can be applied to the scheduler node:

```

[edit]
class-of-service {
    traffic-control-profiles {
        tcp-basic-rate { # Specify a scheduler map and traffic controls
            shaping-rate 10m;
        }
        tcp-premium-with-4-queues { # Specify a scheduler map and traffic controls
            scheduler-map smap-premium-4q;
            shaping-rate 20m;
            guaranteed-rate 10m;
            delay-buffer-rate 5m;
        }
    }
}

```

In this example, the **tcp-premium-with-4-queues** traffic-control profile is applied to the interface set. The other profile provides a lower shaping rate and no guaranteed rate.

4. Configure the scheduler map **smap-premium-4q** that is referenced in the traffic-control profile for the scheduler node:

```

[edit]
class-of-service {
    scheduler-maps { # Define the queues that comprise each scheduler node
        smap-premium-4q { # Map each queue in the scheduler node to a scheduler
            forwarding-class be scheduler be_sch;
            forwarding-class af scheduler af_sch;
            forwarding-class ef scheduler ef_sch;
            forwarding-class nc scheduler nc_sch;
        }
    }
}

```

5. Configure the four schedulers (referenced in the scheduler map) that define the four output queues for the scheduler node:

```
[edit]
class-of-service {
  schedulers { # Define scheduling characteristics of each queue
    be_sch { # Transmit rate and buffer management parameters
      transmit-rate percent 10;
      buffer-size remainder;
      priority low;
    }
    ef_sch { # Transmit rate and buffer management parameters
      ...
    }
    af_sch { # Transmit rate and buffer management parameters
      ...
    }
    nc_sch { # Transmit rate and buffer management parameters
      ...
    }
  }
}
```

6. Enable ANCP to communicate with the DSLAM to adjust the CoS shaping rate for the scheduler node.

You must enable the ANCP feature for performing CoS traffic shaping adjustments, configure the DSLAM as an ANCP neighbor, and specify the DSLAM-assigned identifier for the subscriber local loop represented by the scheduler node:

```
[edit]
protocols {
  ancp {
    qos-adjust; # Enable ANCP to adjust CoS shaping rates
    neighbor 10.2.3.4; # Configure the DSLAM as an ANCP neighbor
    interfaces { # Identify subscribers for which ANCP can adjust shaping rates
      interface-set {
        ifset-of-logical-interfaces {
          access-identifier "dslam port 2/3"; # DSLAM ID for the local loop
        }
      }
    }
  }
}
```



NOTE: If ANCP is not yet enabled, the process starts when you commit a configuration that contains the `protocols ancp` stanza.

7. You can display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS, issue the `show class-of-service interface-set operational` command.

- Related Topics**
- Hierarchical CoS Shaping-Rate Adjustments Overview on page 683
 - CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
 - Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
 - Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687

Chapter 49

Summary of Class of Service for Subscriber Access Configuration Statements

buffer-size

Syntax	buffer-size (percent <i>percentage</i> remainder temporal <i>microseconds</i> \$junos-cos-scheduler-bs);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.3. The \$junos-cos-scheduler-bs predefined variable added in JUNOS Release 9.4.
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	<p>percent <i>percentage</i>—Buffer size as a percentage of total buffer.</p> <p>remainder—Remaining buffer available.</p> <p>temporal <i>microseconds</i>—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.</p> <p>Range: The ranges vary by platform as follows:</p> <ul style="list-style-type: none"> ■ For IQ PICs on T Series routers and M320 routers: 1 through 50,000 microseconds. ■ For IQ PICs on other M Series routers: 1 through 100,000 microseconds. ■ For other M Series routers: 1 through 200,000 microseconds. <p>\$junos-scheduler-bx—JUNOS predefined variable that is replaced with the buffer size obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468 ■ scheduler

class-of-service

Syntax	class-of-service { ... }
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] 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 639

delay-buffer-rate

Syntax	delay-buffer-rate (percent <i>percentage</i> <i>rate</i> \$junos-cos-delay-buffer-rate);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]
Release Information	Statement introduced in JUNOS 7.6. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.2. The \$junos-cos-delay-buffer-rate variable added in JUNOS Release 9.4.
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	<p>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).</p> <p>Range: 1000 through 160,000,000,000 bps</p> <p>\$junos-cos-delay-buffer-rate—JUNOS predefined variable that is replaced with the delay-buffer rate obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643 ■ Dynamic Variables Overview on page 468 ■ output-traffic-control-profile

drop-profile

Syntax	<code>drop-profile (<i>profile-name</i> <i>variable</i>);</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> 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 <i>profile-name</i>] hierarchy added in JUNOS Release 9.3. The <code>\$junos-cos-scheduler-dropfile-low</code> , <code>\$junos-cos-scheduler-dropfile-medium-low</code> , <code>\$junos-cos-scheduler-dropfile-medium-high</code> , <code>\$junos-cos-scheduler-dropfile-high</code> , and <code>\$junos-cos-scheduler-dropfile-any</code> predefined variable added in JUNOS Release 9.4.
Description	<p>Within the drop-profile map, specify the name of the drop profile to use for random early detection (RED) for a specific packet-loss priority (PLP) level and protocol type. A drop profile maps a fill level (fullness of a queue) to a drop probability (probability that a packet will be dropped). 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.</p> <p>You enable RED by applying a drop profile to a scheduler.</p> <p>You configure drop profiles statically (at the [edit class-of-service drop-profiles] hierarchy level).</p>
Options	<p><i>profile-name</i>—Name of the drop profile.</p> <p><i>variable</i>—One of the following JUNOS predefined variable that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached:</p> <ul style="list-style-type: none"> ■ <code>\$junos-cos-scheduler-dropfile-low</code>—Name of the drop profile for PLP level <code>low</code> and protocol <code>any</code>, specified for a scheduler configured in a dynamic profile for subscriber access. ■ <code>\$junos-cos-scheduler-dropfile-medium-low</code>—Name of the drop profile for PLP level <code>medium-low</code> and protocol <code>any</code>, specified for a scheduler configured in a dynamic profile for subscriber access. ■ <code>\$junos-cos-scheduler-dropfile-medium-high</code>—Name of the drop profile for PLP level <code>medium-high</code> and protocol <code>any</code>, specified for a scheduler configured in a dynamic profile for subscriber access. ■ <code>\$junos-cos-scheduler-dropfile-high</code>—Name of the drop profile for PLP level <code>high</code> and protocol <code>any</code>, specified for a scheduler configured in a dynamic profile for subscriber access. ■ <code>\$junos-cos-scheduler-dropfile-lny</code>—Name of the drop profile for PLP level <code>any</code> and protocol <code>any</code>, specified for a scheduler configured in a dynamic profile for subscriber access.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468 ■ scheduler ■ For more information about configuring drop profiles and drop-profile maps, see the <i>JUNOS Class of Service Configuration Guide</i> .

drop-profile-map

Syntax	drop-profile-map loss-priority (any low medium-low medium-high high) protocol (any non-tcp tcp) drop-profile (<i>profile-name</i> <i>variable</i>);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.3. The \$junos-cos-scheduler-dropfile-low, \$junos-cos-scheduler-dropfile-medium-low, \$junos-cos-scheduler-dropfile-medium-high, \$junos-cos-scheduler-dropfile-high, and \$junos-cos-scheduler-dropfile-any predefined variable added in JUNOS Release 9.4.
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	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468 ■ scheduler

forwarding-class

Syntax	<code>forwarding-class <i>class-name</i>;</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> class-of-service scheduler-maps <i>map-name</i>]</code>
Release Information	Statement introduced before JUNOS Release 7.4. The <code>[edit dynamic-profiles <i>profile-name</i>]</code> hierarchy added in JUNOS Release 9.3.
Description	Associate a scheduler with a scheduler map.
Options	<i>class-name</i> —Name of the forwarding class.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644

guaranteed-rate

Syntax	<code>guaranteed-rate (rate \$junos-cos-guaranteed-rate);</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>]</code>
Release Information	Statement introduced in JUNOS 7.6. The <code>[edit dynamic-profiles <i>profile-name</i>]</code> hierarchy added in JUNOS Release 9.2 The <code>\$junos-cos-guaranteed-rate</code> variable added in JUNOS Release 9.4.
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 <code>delay-buffer-rate</code> statement, the logical interface receives a minimal delay-buffer rate and minimal bandwidth equal to 2 MTU-sized packets.
Options	<p>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).</p> <p>Range: 1000 through 160,000,000,000 bps</p> <p>\$junos-cos-guaranteed-rate—JUNOS predefined variable that is replaced with the guaranteed rate obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643 ■ Dynamic Variables Overview on page 468 ■ output-traffic-control-profile

interfaces (Dynamic CoS)

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 656

loss-priority

Syntax	loss-priority (any low medium-low medium-high high);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] 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 for Subscriber Access in a Dynamic Profile on page 644

output-traffic-control-profile

Syntax	output-traffic-control-profile <i>profile-name</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in JUNOS Release 7.6. The [edit dynamic-profiles <i>profile-name</i>] 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	<i>profile-name</i> —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 656 ■ traffic-control-profiles

priority

Syntax	<code>priority (<i>priority-level</i> <code>\$junos-cos-scheduler-priority</code>);</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]</code>
Release Information	Statement introduced before JUNOS Release 7.4. The <code>[edit dynamic-profiles <i>profile-name</i>]</code> hierarchy added in JUNOS Release 9.3. The <code>\$junos-cos-scheduler-bs</code> predefined variable added in JUNOS Release 9.4.
Description	Specify packet-scheduling priority value in a dynamic profile.
Options	<p><i>priority-level</i>—one of the following packet-scheduling priority values:</p> <ul style="list-style-type: none"> ■ <code>low</code>—Scheduler has low priority. ■ <code>medium-low</code>—Scheduler has medium-low priority. ■ <code>medium-high</code>—Scheduler has medium-high priority. ■ <code>high</code>—Scheduler has high priority. Assigning high priority to a queue prevents the queue from being underserved. ■ <code>strict-high</code>—Scheduler has strictly high priority. Configure a <code>high</code> priority queue with unlimited transmission bandwidth available to it. As long as it has traffic to send, the <code>strict-high</code> priority queue receives precedence over <code>low</code>, <code>medium-low</code>, and <code>medium-high</code> priority queues, but not <code>high</code> priority queues. You can configure <code>strict-high</code> priority on only one queue per interface. <p><code>\$junos-cos-scheduler-pri</code>—JUNOS predefined variable that is replaced with the packet-scheduling priority value obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468 ■ scheduler

protocol

Syntax	protocol (any non-tcp tcp);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> drop-profile-map]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] 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.



NOTE: Protocol types `non-tcp` and `tcp` are not supported on MX Series routers.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644

scheduler

Syntax	scheduler <i>scheduler-name</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.2.
Description	Associate a scheduler with a scheduler map in a dynamic profile.
Options	<i>scheduler-name</i> —Either the specific name of the scheduler configuration block or the scheduler variable (\$junos-cos-scheduler).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468

scheduler-map

Syntax	<code>scheduler-map (map-name);</code>
Hierarchy Level	<code>[edit dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name]</code>
Release Information	Statement introduced before JUNOS Release 7.4. The <code>[edit dynamic-profiles profile-name]</code> hierarchy added in JUNOS Release 9.3. The <code>\$junos-cos-scheduler-map</code> variable added in JUNOS Release 9.4.
Description	For EQ DPC interfaces only, associate a scheduler map name with a traffic-control profile in a dynamic profile. The scheduler map can be defined dynamically (at the <code>[edit dynamic-profiles profile-name class-of-service scheduler-maps]</code> hierarchy level) or statically (at the <code>[edit class-of-service scheduler-maps]</code> hierarchy level).
Options	<i>map-name</i> —Name of the scheduler map or the JUNOS predefined variable (<code>\$junos-cos-scheduler-map</code>). When you specify the variable, the scheduler-map name is obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643 ■ Dynamic Variables Overview on page 468 ■ <code>output-traffic-control-profile</code>

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 for Subscriber Access in a Dynamic Profile on page 644
- Dynamic Variables Overview on page 468

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*;
 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.
 The \$junos-cos-scheduler predefined variable added in JUNOS Release 9.4.

Description Specify scheduler name and parameter values in a dynamic profile.

Options *scheduler-name*—Name of the scheduler to be configured or the JUNOS predefined variable (\$junos-cos-scheduler). The predefined variable is replaced with the scheduler name obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.

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 for Subscriber Access in a Dynamic Profile on page 644
- Dynamic Variables Overview on page 468
- scheduler

shaping-rate

Syntax	shaping-rate (<i>rate</i> \$junos-cos-shaping-rate);
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]
Release Information	Statement introduced in JUNOS Release 7.6. The [edit dynamic-profiles <i>profile-name</i> class-of-service traffic-control-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.2. The \$junos-cos-shaping-rate variable added in JUNOS Release 9.4.
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	<p><i>rate</i>—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</p> <p>\$junos-cos-shaping-rate—JUNOS internal variable that is replaced with the shaping rate obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643 ■ Dynamic Variables Overview on page 468 ■ 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 Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 643
- output-traffic-control-profile

transmit-rate (Dynamic Scheduler)

Syntax	transmit-rate (<i>rate</i> percent <i>percentage</i> remainder percent <i>percentage</i> \$junos-cos-scheduler-tx) <exact rate-limit>;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i>]
Release Information	Statement introduced before JUNOS Release 7.4. rate-limit option introduced in JUNOS Release 8.3. The [edit dynamic-profiles <i>profile-name</i>] hierarchy added in JUNOS Release 9.3. The \$junos-cos-scheduler-tx predefined variable added in JUNOS Release 9.4.
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	<p><i>rate</i>—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</p> <p>percent <i>percentage</i>—Percentage of transmission capacity. A percentage of zero drops all packets in the queue. Range: 0 through 100 percent</p> <p>remainder—Use remaining rate available.</p> <p>\$junos-cos-scheduler-tx—JUNOS predefined variable that is replaced with the transmission rate obtained from the RADIUS server when a subscriber authenticates over the subscriber interface to which the subscriber access dynamic profile is attached</p> <p>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.</p> <p>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.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring Schedulers for Subscriber Access in a Dynamic Profile on page 644 ■ Dynamic Variables Overview on page 468 ■ scheduler

unit (Dynamic CoS)

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 656

Part 10

Protocols for Subscriber Access

- Dynamic IGMP Configuration Overview on page 721
- Summary of IGMP Dynamic Profile Statements on page 723
- ANCP Overview on page 737
- Configuring ANCP on page 741
- Summary of ANCP Configuration Statements on page 751

Chapter 50

Dynamic IGMP Configuration Overview

- Dynamic IGMP Configuration Overview on page 721

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 467
 - Configuring a Dynamic Profile for Client Access on page 485
 - For general information about configuring IGMP, see the *JUNOS Multicast Protocols Configuration Guide*

Chapter 51

Summary of IGMP Dynamic Profile Statements

accounting

Syntax	accounting;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 8.5. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] 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	<ul style="list-style-type: none">■ Configuring a Dynamic Profile for Client Access on page 485■ For information about recording IGMP join and leave events, see “Recording IGMP Join and Leave Events” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

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 485
- 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 485
- For information about configuring static group membership, see “Enabling IGMP Static Group Membership” in the *JUNOS Multicast Protocols Configuration Guide*

group-policy

Syntax	<code>group-policy <i>policy-name</i>;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 9.1. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] hierarchy added in JUNOS Release 9.2.
Description	<p>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).</p> <p>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).</p>
Options	<i>policy-name</i> —Name of the group policy.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about rejecting unwanted reports for an IGMP interface, see “Filtering Unwanted IGMP Reports at the IGMP Interface Level” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

igmp

Syntax

```
igmp {
  interface interface-name {
    accounting;
    disable;
    group-policy;
    immediate-leave;
    no-accounting;
    oif-map;
    passive;
    promiscuous-mode;
    ssm-map ssm-map-name;
    static {
      group group {
        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 485
- 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	<code>immediate-leave;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 8.3. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] hierarchy added in JUNOS Release 9.2.
Description	<p>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.</p> <p>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.</p>



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	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about configuring IGMP immediate leave, see “Specifying Immediate-Leave Host Removal” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

interface

Syntax interface *interface-name* {
 accounting;
 disable;
 group-policy;
 immediate-leave
 no-accounting;
 oif-map;
 passive;
 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 485
 ■ 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 <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 8.5. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] 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	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about disabling IGMP accounting on an interface, see “Enabling or Disabling IGMP Accounting on Individual Interfaces” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

oif-map

Syntax	oif-map <i>map-name</i> ;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>],
Release Information	Statement introduced in JUNOS Release 9.6.
Description	Associates an OIF map to the IGMP interface using a dynamic profile. The OIF map is a routing policy statement that can contain multiple terms.
Options	<i>map-name</i> —Name of the OIF map.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.

passive

Syntax `passive <allow-receive> <send-general-query> <send-group-query>;`

Hierarchy Level `[edit dynamic-profiles profile-name protocols igmp interface interface-name],`

Release Information Statement introduced in JUNOS Release 9.6.
`allow-receive`, `send-general-query`, and `send-group-query` options were added in JUNOS Release 10.0.

Description Dynamically specify that IGMP run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as IGMP reports, queries, and leaves.



NOTE: You can selectively activate up to two out of the three available options for the **passive** statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the **passive** statement.

Options `allow-receive`—Enables IGMP to receive control traffic on the interface.

`send-general-query`—Enables IGMP to send general queries on the interface.

`send-group-query`—Enables IGMP to send group-specific and group-source-specific queries on the interface.

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

Related Topics

- Configuring Multicast Outgoing Interface Mapping
- For general information about configuring IGMP, see the *JUNOS Multicast Protocols Configuration Guide*.

promiscuous-mode

Syntax	promiscuous-mode;
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 8.3. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] 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	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about how to use IGMP promiscuous mode, see “Accepting IGMP Messages from Remote Subnetworks” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

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],
[edit logical-systems *logical-system-name*],

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	<code>source <i>source</i>;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i> static], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static], [edit protocols igmp interface <i>interface-name</i> static]
Release Information	Statement introduced before JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i> static] hierarchy added in JUNOS Release 9.2.
Description	Specify the IP version 4 (IPv4) unicast address to send data on an interface.
Options	<i>source</i> —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	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about defining an IGMP source, see “Enabling IGMP Static Group Membership” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

ssm-map

Syntax	<code>ssm-map <i>ssm-map-name</i>;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in JUNOS Release 7.4. The [edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>] hierarchy added in JUNOS Release 9.2.
Description	Apply an SSM map to an IGMP interface.
Options	<i>ssm-map-name</i> —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	<ul style="list-style-type: none"> ■ Configuring a Dynamic Profile for Client Access on page 485 ■ For information about configuring SSM maps, see “Source-Specific Multicast Groups Overview” in the <i>JUNOS Multicast Protocols Configuration Guide</i>

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 485
 ■ 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 485
- For information about specifying a different IGMP version, see “Changing the IGMP Version” in the *JUNOS Multicast Protocols Configuration Guide*

Chapter 52

ANCP Overview

- ANCP Topology Discovery and Traffic Monitoring Overview on page 737

ANCP Topology Discovery and Traffic Monitoring Overview

This topic describes ANCP as a means to monitor and modify subscriber traffic in the access network.

Access Node Control Protocol (ANCP) acts as a control plane between a service-oriented layer 3 edge device and a layer 2 access node. Queuing and scheduling mechanisms for subscriber traffic must avoid congestion within the access network while contending with multiple flows and distinct CoS requirements. These mechanisms require the edge device—a network access server (NAS)—to provide information about the access network and subscriber traffic.

The NAS uses topology discovery to get this information from the access node, typically a DSL access multiplexer (DSLAM). The information includes:

- Topology of the access network
- DSL line state
- Actual upstream and downstream net data rates of a synchronized DSL link
- Maximum attainable upstream and downstream net data rates
- Interleaving delay

The NAS receives the service profile for the subscribers from a RADIUS server. Most of the services are enforced by the NAS itself. The NAS shapes the aggregate egress traffic to subscribers based on the local loop throughput reported by the DSLAM. This traffic shaping optimizes traffic flow while avoiding traffic drops in the access node.

Some service attributes, such as interleaving delay and multicast channel information, are enforced at the access node. ANCP provides the line configuration mechanism that the edge device can use to pass the line configuration on to the access nodes. Typically multiple profiles are provisioned on the access node. The NAS instructs the access node which profile to use for a given subscriber.

Subscribers typically receive some combination of voice, data, and video services. Each service can be provisioned on a VLAN. A subscriber might receive only a single service over a single VLAN configured on a logical interface. A group of VLANs carrying

services to a subscriber is an *interface set*. Subscribers are identified based on the unique access identifier that is configured on the access node through which they receive traffic. You must configure this access identifier to associate it with the logical interface or interface set. When ANCP receives a port management message from an access node, it uses the access identifier contained in the message to determine which logical interface or interface set corresponds to the subscriber.

You can configure a logical interface by specifying the interface name at the `[edit protocols ancp interfaces]` hierarchy level. Include the `access-identifier` statement when you do so to associate the access identifier with the interface. You can configure an interface set by including the `interface-set` statement at the `[edit protocols ancp interfaces]` hierarchy level. Associate the access identifier with the interface set by including the `access-identifier` statement at the `[edit protocols ancp interfaces interface-sets interface-set-name]` hierarchy level. Because the access identifier must be unique for a given neighbor, you must also include the `neighbor` statement with the `access-identifier` statement in both cases.

Some access nodes might not be running the current IETF implementation of ANCP. Instead, they run an earlier version. You can enable ANCP to operate in backwards-compatible mode with all neighbors by including the `pre-ietf-mode` statement at the `[edit protocols ancp]` hierarchy level.

You can control how many discovery table entries are accepted from any neighbor by including the `maximum-discovery-table-entries` statement at the `[edit protocols ancp]` hierarchy level.

When you include the `qos-adjust` statement at the `[edit protocols ancp]` hierarchy level, ANCP updates CoS based on monitoring the subscriber traffic. CoS can adjust the traffic shaping rate that it applies to a particular VLAN or set of VLANs to avoid traffic drops in the access node. ANCP can affect only the shaping rate. When ANCP removes a shaping rate that it previously applied, then the traffic shaping rate reverts to that configured in the CLI. If ANCP remains running but loses a connection to a particular neighbor whose subscriber traffic is adjusted as a result of ANCP, the adjusted rate remains in effect. The rate changes only if ANCP restores the connection and sends fresh updates to CoS, or if you remove the `qos-adjust` statement.

ANCP sends a keepalive message to CoS at specific intervals. If CoS does not receive a keepalive in the expected time, it reverts the shaping rate changes it made in response to ANCP. You can adjust how long CoS waits for a keepalive message by including the `maximum-helper-restart-time` statement at the `[edit protocols ancp]` hierarchy level. The interval between keepalive messages is automatically set to one-third the value of the maximum helper restart time. For example, if you set the maximum helper restart time to 120 seconds, then ANCP sends keepalive messages every 40 seconds. In this example, if CoS does not receive a keepalive message within 120 seconds, then it reverts the ANCP-derived policy changes.

ANCP exchanges adjacency messages with neighbors. If an adjacency message is not received from a neighbor within the expected period, then the neighbor is considered to be down and is disconnected. You can adjust how long ANCP waits for adjacency messages from all neighbors by including the `adjacency-timer` statement at the `[edit protocols ancp]` hierarchy level. The interval between adjacency messages is automatically set to one-third the value of the adjacency timer.

ANCP can monitor and shape traffic only for access nodes that are configured as ANCP neighbors. Neighbors can establish TCP connections with the NAS. You can configure an access node as an ANCP neighbor by including the `neighbor` statement at the `[edit protocols ancp]` hierarchy level.

You can also configure parameters for a specific neighbor to override global or default configurations by including any of the following statements at the `[edit protocols ancp neighbor ip-address]` hierarchy level:

- `adjacency-timer`—Adjust the interval between adjacency messages exchanged with this neighbor.
- `ietf-mode`—Prevent ANCP from operating in a backwards-compatible mode for this neighbor; for neighbors that use the current IETF implementation of ANCP.
- `maximum-discovery-table-entries`—Specify how many discovery table entries are accepted from this neighbor.
- `pre-ietf-mode`—Enable ANCP to operate in a backwards-compatible mode for this neighbor; for neighbors that use the original IET implementation of ANCP rather than the current implementation.

You can monitor ANCP events and operations by including the `traceoptions` statement at the `[edit protocols ancp]` hierarchy level.

Related Topics

- [Configuring ANCP on page 741](#)
- [\[edit protocols ancp\] Hierarchy Level on page 779](#)

Chapter 53

Configuring ANCP

- Configuring ANCP on page 741
- Tracing ANCP Operations on page 742
- Configuring ANCP Neighbors on page 745
- Associating an Access Node with Subscribers for ANCP Operations on page 746
- Specifying the Interval Between ANCP Adjacency Messages on page 747
- Specifying the Maximum Number of Discovery Table Entries on page 747
- Configuring ANCP for Backward Compatibility on page 748
- Specifying How Long Processes Wait for ANCP Restart to Complete on page 748
- Configuring ANCP to Adjust CoS Traffic Shaping on page 749

Configuring ANCP

You can configure ANCP to enable a service-oriented Layer 3 edge device to discover information about the topology of a connected access network. ANCP can also provide details about subscriber traffic and enable the adjustment of QoS traffic shaping for subscribers.

To configure ANCP:

1. Specify each ANCP neighboring access node to be monitored and optionally configure neighbor parameters.

See “Configuring ANCP Neighbors” on page 745.

2. Specify the subscribers reached by a VLAN or a set of VLANs through a particular access node.

See “Associating an Access Node with Subscribers for ANCP Operations” on page 746.

3. Configure the adjacency timer.

See “Specifying the Interval Between ANCP Adjacency Messages” on page 747.

4. (Optional) Specify the maximum number of discovery table entries that are accepted.

See “Specifying the Maximum Number of Discovery Table Entries” on page 747

5. Configure ANCP to work with an early IETF draft.

See “Configuring ANCP for Backward Compatibility” on page 748.

6. Configure the graceful restart timer.

See “Specifying How Long Processes Wait for ANCP Restart to Complete” on page 748.

7. Configure ANCP to adjust QoS subscriber traffic shaping.

See “Configuring ANCP to Adjust CoS Traffic Shaping” on page 749.

8. Configure trace options for troubleshooting the configuration.

See “Tracing ANCP Operations” on page 742.

Tracing ANCP Operations

ANCP supports tracing operations. ANCP tracing operations track ANCP 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 **ancpd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file **ancpd** reaches 128 kilobytes (KB), it is renamed **ancpd.0**, then **ancpd.1**, and so on, until there are three trace files. Then the oldest trace file (**ancpd.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*.)

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

To configure ANCP tracing operations:

1. Specify that you want to configure tracing options.

```
[edit protocols ancp]
user@host# edit traceoptions
```

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

See “Configuring the ANCP Trace Log Filename” on page 743.

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

See “Configuring the Number and Size of ANCP Log Files” on page 743.

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

See “Configuring Access to the ANCP Log File” on page 744.

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

See “Configuring a Regular Expression for ANCP Lines to Be Logged” on page 744.

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

See “Configuring the ANCP Tracing Flags” on page 745.

The ANCP traceoptions operations are described in the following sections:

- Configuring the ANCP Trace Log Filename on page 743
- Configuring the Number and Size of ANCP Log Files on page 743
- Configuring Access to the ANCP Log File on page 744
- Configuring a Regular Expression for ANCP Lines to Be Logged on page 744
- Configuring the ANCP Tracing Flags on page 745

Configuring the ANCP Trace Log Filename

By default, the name of the file that records trace output for ANCP is `ancpd`. You can specify a different name with the `file` option.

To configure the filename for ANCP tracing operations:

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

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1
```

Configuring the Number and Size of ANCP 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 protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the ANCP Log File

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

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 world-readable
```

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

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

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for ANCP 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 to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 match regex
```

Configuring the ANCP 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
config	Trace configuration events
cos	Trace class-of-service events
general	Trace general flow.
packet	Trace ANCP packet transmit and receive events
process	Trace process internal events
protocol	Trace protocol operations
restart	Trace process restart flow
routing-socket	Trace routing socket events
session	Trace connection events and sessions
startup	Trace ANCP startup events and flow
subscriber	Trace subscriber events
timer	Trace timer processing

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit protocols ancp traceoptions]
user@host# set flag restart
```

Configuring ANCP Neighbors

You must configure each neighboring access node that you want ANCP to monitor and potentially shape traffic for. Some neighbor settings override globally configured values.

To configure an ANCP neighbor:

1. Specify the IP address of the neighbor.

```
[edit protocols ancp]
user@host# set neighbor 10.2.3.4
```

2. (Optional) Configure pre-ietf mode when the neighbor does not support the current IETF standard and pre-ietf mode is not configured globally.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set pre-ietf-mode
```

3. (Optional) Configure ietf mode when the neighbor supports the current IETF standard and pre-ietf-mode is configured globally.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set ietf-mode
```

4. (Optional) Configure the interval in seconds between ANCP adjacency messages exchanged with this neighbor.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set adjacency-timer 20
```

5. (Optional) Specify the maximum number of discovery table entries that are accepted from this neighbor.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set maximum-discovery-table-entries 10000
```

- Related Topics**
- Configuring ANCP on page 741
 - Configuring ANCP for Backward Compatibility on page 748
 - Specifying the Interval Between ANCP Adjacency Messages on page 747
 - Specifying the Maximum Number of Discovery Table Entries on page 747

Associating an Access Node with Subscribers for ANCP Operations

Subscribers are identified by a unique access loop identifier that is associated with a logical interface for a single VLAN or with a named set of VLANs through which traffic is sent to the subscribers. The access identifier must be unique either across the network or for individual ANCP neighbors. When the identifier is unique for a neighbor, you must specify the neighbor's IP address.

To associate the access identifier with subscribers, do one of the following:

- Specify the name for the set of VLANs and the unique access-loop identifier for the access node.

```
[edit protocols ancp interfaces]
user@host# set interface-set vlan5 access-identifier "dslam port 2/3"
```

- Specify the logical interface for a single VLAN and the unique access-loop identifier for the access node.

```
[edit protocols ancp interfaces]
```



```
user@host# set ge-1/0/4.12 vlan1 access-identifier "dslam port-2-10" neighbor
10.12.3.4
```

- Related Topics**
- Configuring ANCP on page 741
 - interfaces

Specifying the Interval Between ANCP Adjacency Messages

You can specify the interval between adjacency messages that are sent to all ANCP adjacency peers (neighbors) or to a specific neighbor.

To configure the interval between ANCP adjacency messages for all neighbors:

- Specify the time in seconds.
- ```
[edit protocols ancp]
user@host# set adjacency-timer 20
```

To configure the interval between ANCP adjacency messages for a specific neighbor:

- Specify the time in seconds.
- ```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set adjacency-timer 20
```

- Related Topics**
- Configuring ANCP on page 741
 - Configuring ANCP Neighbors on page 745

Specifying the Maximum Number of Discovery Table Entries

You can specify the maximum number of discovery table entries accepted from all neighbors or from a particular neighbor.

To configure the maximum number of entries for all neighbors:

- Specify the number of entries.
- ```
[edit protocols ancp]
user@host# set maximum-discovery-table-entries 5000
```

To configure the maximum number of entries for a specific neighbor:

- Specify the number of entries.
- ```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set maximum-discovery-table-entries 5000
```

- Related Topics**
- Configuring ANCP on page 741
 - Configuring ANCP Neighbors on page 745

Configuring ANCP for Backward Compatibility

You can configure ANCP to operate in a mode compatible with the protocol as it was initially proposed to operate. This pre-IETF mode is compatible with Internet draft draft-wadhwa-gsmp-l2control-configuration-00.txt, *GSMP extensions for layer2 control (L2C)*. Setting this backward-compatible mode enables interoperability with devices that are not compatible with the current Internet draft for ANCP, draft-ietf-ancp-protocol-02.txt, *Protocol for Access Node Control Mechanism in Broadband Networks*.

To configure ANCP to operate in a backwards-compatible mode for all neighbors:

- Specify the pre-IETF mode.

```
[edit protocols ancpl]
user@host# set pre-ietf-mode
```

To configure ANCP to operate in a backwards-compatible mode for a specific neighbor:

- Specify the pre-IETF mode.

```
[edit protocols ancpl neighbor 10.2.3.4]
user@host# set pre-ietf-mode
```

- Related Topics**
- Configuring ANCP on page 741
 - Configuring ANCP Neighbors on page 745

Specifying How Long Processes Wait for ANCP Restart to Complete

You can specify how long other processes wait for ANCP to restart. ANCP sends a keepalive message to CoS at intervals equal to one-third the value of the maximum helper restart time. For example, when you configure the maximum restart time to 120 seconds, ANCP sends a keepalive message every 40 seconds.

If CoS does not receive a keepalive message within the maximum helper restart time, it considers ANCP to be down and immediately reverts any traffic shaping updates that were implemented as a result of ANCP monitoring to the configured values. Consequently, traffic to the subscribers is not effectively shaped, potentially resulting in traffic drops in the DSLAMs. The configured values are maintained until ANCP comes back up and sends fresh traffic shaping updates to CoS.

To configure how long other processes wait for ANCP to restart:

- Specify the time in seconds.

```
[edit protocols ancpl]
user@host# set maximum-helper-restart-time 150
```

- Related Topics**
- Configuring ANCP on page 741

- Configuring ANCP to Adjust CoS Traffic Shaping on page 749
- qos-adjust

Configuring ANCP to Adjust CoS Traffic Shaping

You can specify that CoS policy for subscriber VLANs are adjusted based on information received from the access network in ANCP messages. Adding or removing this statement updates CoS shaping rate adjustments accordingly for all the subscribers in the network.

If CoS does not receive a keepalive message within the maximum helper restart time, it considers ANCP to be down and immediately reverts any traffic shaping updates that were implemented as a result of ANCP monitoring to the configured values. The configured values are maintained until ANCP comes back up and sends fresh traffic shaping updates to CoS.

Adjusted traffic shaping values remain in effect for subscribers in the event that ANCP remains running, but loses the connection to a neighbor. In this case, CoS does not revert to the configured values. The ANCP-adjusted values can change only if you remove the **qos-adjust** statement or if ANCP restores the connection to that neighbor and sends fresh shaping updates.

To configure CoS adjustment for subscriber traffic based on ANCP messages:

- Specify CoS adjustment.


```
[edit protocols ancp]
user@host# set qos-adjust
```

Related Topics

- Configuring ANCP on page 741
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 684
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 685
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 687
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 693
- Specifying How Long Processes Wait for ANCP Restart to Complete on page 748
- maximum-helper-restart-time

Chapter 54

Summary of ANCP Configuration Statements

access-identifier

Syntax `access-identifier identifier-string <neighbor ip-address>;`

Hierarchy Level [edit protocols ancp interfaces interface-set]

Release Information Statement introduced in JUNOS Release 9.4.

Description Associate the specified access node with the set of VLANs that carry traffic to the subscriber using that access node; identify a particular subscriber.

Options *identifier-string*—Unique identifier string for the access node; also configured on the access node.

ip-address—IP address of the ANCP neighbor.

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

Related Topics ■ Configuring ANCP on page 741
 ■ Associating an Access Node with Subscribers for ANCP Operations on page 746

adjacency-timer

Syntax	adjacency-timer <i>seconds</i> ;
Hierarchy Level	[edit protocols ancp], [edit protocols ancp neighbor]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify the interval between adjacency messages sent to ANCP adjacency peer (access node) for all peers or a specific peer.
Options	<i>seconds</i> —Number of seconds between adjacency messages. Range: 1 through 25 seconds Default: 10 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none">■ Configuring ANCP on page 741■ Specifying the Interval Between ANCP Adjacency Messages on page 747■ Configuring ANCP Neighbors on page 745

ancp

Syntax

```

ancp {
  adjacency-timer;
  interfaces {
    interface-set interface-set-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
    interface-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
  }
  maximum-discovery-table-entries entry-number;
  maximum-helper-restart-time;
  neighbor ip-address {
    adjacency-timer;
    discovery-mode;
    ietf-mode;
    maximum-discovery-table-entries entry-number;
    pre-ietf-mode;
  }
  pre-ietf-mode;
  qos-adjust;
  traceoptions {
    file <filename> <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}

```

Hierarchy Level [edit protocols]

Release Information Statement introduced in JUNOS Release 9.4.

Description Configure JUNOS ANCP features.

The remaining statements are described separately.

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

Related Topics ■ Configuring ANCP on page 741

discovery-mode

Syntax	discovery-mode;
Hierarchy Level	[edit protocols ancp neighbor]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Specify that topology discovery is supported for the neighbor. This statement currently has no function.
Default	By default, topology discovery is enabled for all neighbors and cannot be disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring ANCP on page 741

ietf-mode

Syntax	pre-ietf-mode
Hierarchy Level	[edit protocols ancp neighbor]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Configure ANCP to run in a mode that is not backward compatible with Internet draft draft-ietf-ancp-protocol-00.txt, <i>Protocol for Access Node Control Mechanism in Broadband Networks</i> . Include this statement when pre-ietf mode has been configured globally for ANCP, but you want one or more neighbors to run ANCP in the default mode.
Default	By default, ANCP does not run in a backwards-compatible mode.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	■ Configuring ANCP on page 741 ■ Configuring ANCP Neighbors on page 745

interface-set

Syntax `interface-set interface-set-name {
 access-identifier identifier-string (neighbor ip-address);
}`

Hierarchy Level [edit protocols ancp interfaces]

Release Information Statement introduced in JUNOS Release 9.4.

Description Identify a group of VLANs on which traffic is sent to a subscriber identified by the access identifier.

Options *interface-set-name*—Name of a group of VLANs that carry traffic to the subscriber identified by the access node identifier.

The remaining statement is described separately.

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

Related Topics

- Configuring ANCP on page 741
- Associating an Access Node with Subscribers for ANCP Operations on page 746

interfaces

Syntax interfaces {
 interface-set *interface-set-name* {
 access-identifier *identifier-string* <neighbor *ip-address*>;
 }
 interface-name {
 access-identifier *identifier-string* <neighbor *ip-address*>
 }
 }

Hierarchy Level [edit protocols ancp]

Release Information Statement introduced in JUNOS Release 9.4.

Description Identify the subscribers whose traffic is monitored and shaped by ANCP.

Options *interface-name*—Name of a logical interface supporting a single VLAN that carries traffic to the subscriber identified by the access node identifier.

The remaining statements are described separately.

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

Related Topics

- Configuring ANCP on page 741
- Associating an Access Node with Subscribers for ANCP Operations on page 746

maximum-discovery-table-entries

Syntax	maximum-discovery-table-entries <i>entry-number</i> ;
Hierarchy Level	[edit protocols ancp], [edit protocols ancp neighbor]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Specify the maximum number of discovery table entries accepted from a particular neighbor. The neighbor can continue to update previously created entries when the maximum has been exceeded, but no new entries are accepted.
Default	By default, no limit on the number of table entries is configured.
Options	<i>entry-number</i> —Maximum number of discovery table entries. Range: 1 through 100,000
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Configuring ANCP Neighbors on page 745

maximum-helper-restart-time

Syntax	maximum-helper-restart-time <i>seconds</i>
Hierarchy Level	[edit protocols ancp]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify how long other router processes wait for ANCP to restart before considering it to be down.
Options	<i>seconds</i> —Number of seconds other processes wait for ANCP to restart. Range: 45 through 600 seconds Default: 45 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Specifying How Long Processes Wait for ANCP Restart to Complete on page 748

neighbor

Syntax	neighbor <i>ip-address</i> { adjacency-timer; discovery-mode; ietf-mode; maximum-discovery-table-entries; pre-ietf-mode; }
Hierarchy Level	[edit protocols ancp]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Configure an ANCP neighbor to be monitored. The remaining statements are described separately.
Options	<i>ip-address</i> —IP address of the ANCP neighbor.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Configuring ANCP Neighbors on page 745

neighbor

Syntax	neighbor <i>ip-address</i> ;
Hierarchy Level	[edit protocols ancp interfaces interface-set <i>interface-set-name</i> access-identifier <i>identifier-string</i>], [edit protocols ancp interfaces <i>interface-name</i> access-identifier <i>identifier-string</i>]
Release Information	Statement introduced in JUNOS Release 9.5.
Description	Configure an ANCP neighbor to be monitored. The remaining statements are described separately.
Options	<i>ip-address</i> —IP address of the ANCP neighbor.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Associating an Access Node with Subscribers for ANCP Operations on page 746

pre-ietf-mode

Syntax	pre-ietf-mode
Hierarchy Level	[edit protocols ancp], [edit protocols ancp neighbor]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Configure ANCP to run in a mode that is backward compatible with Internet draft draft-ietf-ancp-protocol-00.txt, <i>Protocol for Access Node Control Mechanism in Broadband Networks</i> for all neighbors or for a specific neighbor.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Configuring ANCP for Backward Compatibility on page 748 ■ Configuring ANCP Neighbors on page 745

qos-adjust

Syntax	qos-adjust;
Hierarchy Level	[edit protocols ancp]
Release Information	Statement introduced in JUNOS Release 9.4.
Description	Specify that CoS policy for interfaces and interface sets is adjusted according to ANCP protocol messages. Updates QoS adjustments for all subscribers.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Topics	<ul style="list-style-type: none"> ■ Configuring ANCP on page 741 ■ Configuring ANCP to Adjust CoS Traffic Shaping on page 749

traceoptions

Syntax traceoptions {
 file <filename> <files number> <match regular-expression > <size maximum-file-size>
 <world-readable | no-world-readable>;
 flag flag <disable>;
 level (all | error | info | notice | verbose | warning);
 no-remote-trace;
 }

Hierarchy Level [edit protocols ancp]

Release Information Statement introduced in JUNOS Release 9.4.

Description Define tracing operations for ANCP 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.

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.
- config—Trace configuration events.
- general—Trace general flow.
- packet—Trace ANCP packet transmit and receive operations.
- process—Trace process internals.
- protocol—Trace protocol events.
- restart—Trace process restart flow
- routing-socket—Trace routing socket events.
- session—Trace connection events and flow.
- startup—Trace ANCP startup events and flow.
- subscriber—Trace subscriber events.
- timer—Trace timer processing.

level—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

size *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.

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

trace—To view this statement in the configuration.

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

Related Topics

- Configuring ANCP on page 741
- Tracing ANCP Operations on page 742

Part 11

Subscriber Access Examples

- Service Profile Examples on page 765

Chapter 55

Service Profile Examples

- Example: Configuring a Tiered Service Profile for Subscriber Access on page 765

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 629

Part 12

Complete Configuration Statement Hierarchy for Subscriber Access

- Subscriber Access Statement Hierarchy on page 771

Chapter 56

Subscriber Access Statement Hierarchy

- [edit access address-assignment] Hierarchy Level on page 771
- [edit access profile] Hierarchy Level on page 772
- [edit diameter] Hierarchy Level on page 773
- [edit dynamic-profiles] Hierarchy Level on page 774
- [edit dynamic-profiles profile-name protocols] Hierarchy Level on page 776
- [edit forwarding-options dhcp-relay] Hierarchy Level on page 777
- [edit protocols ancp] Hierarchy Level on page 779
- [edit jsr] Hierarchy Level on page 779
- [edit services mobile-ip] Hierarchy Level on page 780
- [edit services radius-flow-tap] Hierarchy Level on page 780
- [edit system services dhcp-local-server] Hierarchy Level on page 781
- [edit system services static-subscribers] Hierarchy Level on page 783

[edit access address-assignment] Hierarchy Level

```
address-assignment {
  pool pool-name {
    family family {
      dhcp-attributes {
        [protocol-specific attributes]
      }
      host hostname {
        hardware-address mac-address;
        ip-address ip-address;
        ipv6-address ipv6-address;
      }
      network address-or-prefix</subnet-mask>;
      prefix ipv6-prefix;
      range range-name {
        high upper-limit;
        low lower-limit;
        prefix-length prefix-length;
      }
    }
  }
}
```

[edit access profile] Hierarchy Level

```

profile profile-name {
  accounting {
    accounting-stop-on-access-deny;
    accounting-stop-on-failure;
    coa-immediate-update
    order [ accounting-method ];
    statistics (time | volume-time);
    update-interval minutes;
  }
  authentication-order [ authentication-methods ];
  authorization-order jsr;
  provisioning-order jsr;
  radius {
    authentication-server [ ip-address ];
    accounting-server [ ip-address ];
    options {
      accounting-session-id-format (decimal | description);
      client-accounting-algorithm (detail | round-robin);
      client-authentication-algorithm(detail | round-robin);
      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;
      }
      revert-interval interval;
      vlan-nas-port-stacked-format;
    }
  }
  attributes {
    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 ];
    }
    ignore {
        framed-ip-netmask;
        input-filter;
        logical-system:routing-instance;
        output-filter;
    }
}
}
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
    routing-instance routing-instance-name;
    secret password;
    source-address source-address;
    timeoutseconds;
}
}

```

[edit diameter] Hierarchy Level

```

diameter {
    network-element element-name {
        forwarding {
            route dne-route-name {
                destination realm realm-name <host hostname>;
                function function-name <partition partition-name>;
                metric route-metric;
            }
        }
        peer peer-name {
            priority priority-number;
        }
    }
    origin {
        host hostname;
        realm realm-name;
    }
    peer peer-name {
        address ip-address;
        connect-actively {
            port port-number;
        }
        logical-system logical-system-name <routing-instance routing-instance-name >;
        routing-instance routing-instance-name;
    }
}

```

```
}
```

[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;
        }
      }
    }
    scheduler-maps {
      map-name {
        forwarding-class class-name scheduler scheduler-name;
      }
    }
    schedulers {
      (scheduler-name) {
        buffer-size (seconds | percent percentage | remainder | temporal
          microseconds);
        drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
          protocol (any | non-tcp | tcp) drop-profile profile-name;
        priority priority-level;
        transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
      }
    }
    traffic-control-profiles profile-name {
      delay-buffer-rate (percent percentage | rate | $junos-cos-delay-buffer-rate);
      guaranteed-rate (percent percentage | rate | $junos-cos-guaranteed-rate);
      scheduler-map map-name;
      shaping-rate (percent percentage | rate | $junos-cos-shaping-rate);
    }
  }
  firewall {
    family family {
      fast-update-filter filter-name {
        interface-specific;
        match-order [match-order];
        term term-name {
          from {
            match-conditions;
          }
          then {
            action;
            action-modifiers;
          }
          only-at-create;
        }
      }
    }
  }
  interfaces {
```

```

interface-name {
  unit logical-unit-number {
    family family {
      address address;
      filter {
        input filter-name (
          precedence precedence;
        )
        output filter-name {
          precedence precedence;
        }
      }
      unnumbered-address interface-name preferred-source-address address;
      ppp-options {
        chap;
        pap;
      }
      vlan-id number;
    }
    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;
      }
    }
  }
}
}
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;
    }
}
}
protocols {
    igmp {
        interface interface-name {
            accounting;
            disable;
            group-policy policy-name;
            immediate-leave
            no-accounting;
            oif-map;
            passive;
            promiscuous-mode;
            ssm-map ssm-map-name;
            static {
                group group {
                    source source;
                }
            }
            version version;
        }
    }
}
routing-instances {
    interface interface-name;
}
routing-options {
    access {
        route prefix {
            next-hop next-hop;
            metric route-cost;
            preference route-distance;
        }
    }
    access-internal {
        route subscriber-ip-address {
            qualified-next-hop underlying-interface {
                mac-address address;
            }
        }
    }
}
}

```

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

```

igmp {
    interface interface-name {
        accounting;
        disable;
        group-policy;
        immediate-leave
        no-accounting;
        oif-map;
    }
}

```

```

passive;
promiscuous-mode;
ssm-map ssm-map-name;
static {
    group group {
        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 (merge | replace) | use-primary
    primary-profile-name);
  overrides {
    always-write-giaddr;
    always-write-option-82;
    client-discover-match;
    interface-client-limit number;
    layer2-unicast-replies;
    no-arp;
    proxy-mode;
    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 prefix;
        use-interface-description (logical | device);
    }
}
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;
                client-discover-match;
                disable-relay;
                interface-client-limit number;
                layer2-unicast-replies;
                no-arp;
                proxy-mode;
                trust-option-82;
            }
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
}
dynamic-profile profile-name (aggregate-clients (merge | replace) | 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 prefix;
        use-interface-description (logical | device);
    }
}

```



```

    }
  }
  interface interface-name [upto upto-interface-name] [exclude];
}
traceoptions {
  file filename <files number> <size size> <world-readable | no-world-readable>
    <match regex>;
  flag flag;
}
}

```

[edit protocols ancp] Hierarchy Level

```

ancp {
  adjacency-timer;
  interfaces {
    interface-set interface-set-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
    interface-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
  }
  maximum-discovery-table-entries entry-number;
  maximum-helper-restart-time;
  neighbor ip-address {
    adjacency-timer;
    discovery-mode;
    ietf-mode;
    maximum-discovery-table-entries entry-number;
    pre-ietf-mode;
  }
  pre-ietf-mode;
  qos-adjust;
  traceoptions {
    file <filename> <files number> <match regular-expression > <size
      maximum-file-size> <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}

```

[edit jsr] Hierarchy Level

```

jsr {
  partition partition-name {
    diameter-instance instance-name;
    destination-host hostname;
    destination-realm realm-name;
  }
}

```

[edit services mobile-ip] Hierarchy Level

```

mobile-ip {
  access-type {
    (generic | wimax);
  }
  authenticate {
    order (aaa | local);
  }
  dynamic-home-assignment {
    home-agent {
      nai (name@domain | @domain) {
        home-agent ip-address;
      }
    }
  }
  home-agent {
    enable-service interface-name;
    virtual-network {
      home-agent-address ip-address {
        registration-lifetime seconds;
        revocation-required;
        timestamp-tolerance seconds;
      }
    }
  }
  peer {
    (ip-address address | nai name@domain) {
      spi hexadecimal-value {
        algorithm (hmac-md5 | md5);
        entity-type (host | mobility-agent);
        key (hex | ascii) string;
        replay-method (none | timestamp seconds);
      }
    }
  }
  traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level <all | error | info | notice | verbose | warning>;
    no-remote-trace;
  }
}

```

[edit services radius-flow-tap] Hierarchy Level

```

radius-flow-tap {
  forwarding-class class-name;
  interfaces interface-name;
  source-ipv4-address ipv4-address;
}

```

[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;
    }
  }
  dhcpv6 {
    authentication {
      password password-string;
      username-include {
        circuit-type;
        client-id;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        relay-agent-interface-id;
        relay-agent-remote-id;
        relay-agent-subscriber-id;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
  }
  group group-name {
    authentication {
      password password-string;
      username-include {
        circuit-type;
        client-id;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        relay-agent-interface-id;
        relay-agent-remote-id;
        relay-agent-subscriber-id;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
  }
  interface interface-name <upto upto-interface-name> <exclude>;
  overrides {
    client-discover-match;
    interface-client-limit number;
    no-arp;
  }
}

```

```

    }
  }
}
overrides {
  client-discover-match;
  interface-client-limit number;
  no-arp;
}
}
dynamic-profile profile-name (aggregate-clients (merge | replace) | 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 (merge | replace) | use-primary
primary-profile-name);
  interface interface-name <upto upto-interface-name> <exclude>;
  overrides {
    client-discover-match;
    interface-client-limit number;
    no-arp;
  }
  reconfigure {
    attempts attempt-count;
    clear-on-abort;
    timeout timeout-value;
    token token-value;
    trigger {
      radius-disconnect;
    }
  }
}
}
overrides {
  client-discover-match;
  interface-client-limit number;
  no-arp;
}
pool-match-order {
  ip-address-first;
  option-82;
}
reconfigure {
  attempts attempt-count;

```

```

clear-on-abort;
timeout timeout-value;
token token-value;
trigger {
    radius-disconnect;
}
}
traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>
    <match regex>;
    flag flag;
}
}

```

[edit system services static-subscribers] Hierarchy Level

```

static-subscribers {
    access-profile profile-name;
    authentication {
        password password-string;
        username-include {
            domain-name domain-name;
            interface;
            logical-system-name;
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
}
dynamic-profile profile-name {
    aggregate-clients (merge | replace);
}
group group-name {
    access-profile profile-name;
    authentication {
        password password-string;
        username-include {
            domain-name domain-name;
            interface;
            logical-system-name;
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
}
dynamic-profile profile-name {
    aggregate-clients (merge | replace);
}
interface interface-name <exclude> <upto upto-interface-name>;
}
traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
}

```

}

Part 13

Index

- Index on page 787
- Index of Statements and Commands on page 801

Index

Symbols

#, comments in configuration statements.....	xliv
\$junos-cos-delay-buffer-rate predefined variable.....	702
\$junos-cos-guaranteed-rate predefined variable.....	706
\$junos-cos-scheduler predefined variable.....	630, 713
\$junos-cos-scheduler-bs predefined variable.....	630, 700
\$junos-cos-scheduler-dropfile-any predefined variable.....	630, 703
\$junos-cos-scheduler-dropfile-high predefined variable.....	630, 703
\$junos-cos-scheduler-dropfile-low predefined variable.....	630, 703
\$junos-cos-scheduler-dropfile-medium-high predefined variable.....	630, 703
\$junos-cos-scheduler-dropfile-medium-low predefined variable.....	630, 703
\$junos-cos-scheduler-map predefined variable.....	711
\$junos-cos-scheduler-pri predefined variable.....	630, 709
\$junos-cos-scheduler-tx predefined variable.....	630, 716
\$junos-cos-shaping-rate internal variable.....	714
(), in syntax descriptions.....	xliv
802.1Q VLANs	
VLAN tagging.....	585
< >, in syntax descriptions.....	xliv
[], in configuration statements.....	xliv
{ }, in configuration statements.....	xliv
(pipe), in syntax descriptions.....	xliv

A

AAA	
Mobile IP home agent and	418
with Diameter base protocol.....	321
AAA directed logout	
DHCP authentication services.....	66, 101
AAA Service Framework.....	18
dynamic service activation	
during login.....	31
access identifier	
configuring ANCP	746
access profile	
configuring global static subscriber.....	376
configuring static subscriber group.....	380

access profiles	
attaching.....	45
configuring.....	44
access statement	
dynamic profiles.....	157
access type	
configuring Mobile IP.....	435
access-identifier statement	
ANCP.....	751
access-internal statement	
dynamic profiles.....	158
access-profile statement	
static subscriber group.....	388
static subscribers.....	387
access-type statement	
Mobile IP.....	437
accounting	
configuring RADIUS.....	20
Mobile IP time-based.....	421
accounting method	
configuring Mobile IP.....	433
accounting methods.....	20
accounting statement	
access profile.....	159
IGMP (interface).....	723
accounting statistics.....	21
accounting-port statement.....	160
accounting-server statement.....	161
accounting-session-id-format statement.....	161
accounting-stop-on-access-deny statement.....	162
accounting-stop-on-failure statement.....	162
active server groups	
DHCP relay.....	121
active-server-group statement.....	163
address statement	
Diameter base protocol.....	335
interface.....	565
address-assignment pools	
client attributes.....	50
configuring.....	48
DHCP attributes.....	51
DHCP local server.....	62
DHCPv6 attributes.....	51
license requirements.....	52
name.....	48
named range.....	49

network address.....	48
static address.....	50
tracing operations.....	52
address-assignment statement	
address-assignment pools.....	164
adjacency timer	
ANCP global configuration.....	747
ANCP neighbor configuration.....	745, 747
adjacency-timer statement	
ANCP.....	752
Agent Circuit ID suboption	
DHCP relay.....	118
aggregate-clients statement	
DHCP local server.....	165
DHCP relay agent.....	166
static subscriber group.....	390
static subscribers.....	389
aggregated Ethernet logical interfaces <i>See</i> subscriber	
interfaces, IP demux over aggregated Ethernet <i>See</i>	
subscriber interfaces, VLAN over aggregated Ethernet	
algorithm statement	
Mobile IP.....	438
always-write-giaddr statement.....	167
always-write-option-82 statement.....	168
ANCP	
access identifier configuration.....	746
adjacency timer global configuration.....	747
adjacency timer neighbor configuration.....	747
adjusting subscriber traffic with.....	737
associating subscriber VLANs with access	
nodes.....	746
backwards compatibility global	
configuration.....	748
backwards compatibility neighbor	
configuration.....	745, 748
configuration overview.....	741
CoS shaping rate adjustment for subscriber local	
loops.....	737
CoS traffic shaping configuration.....	749
discovery table global configuration.....	747
discovery table neighbor configuration.....	745, 747
flags for tracing operations.....	745
log file access for tracing operations.....	744
log file size and number.....	743
log filenames for tracing operations.....	743
monitoring subscriber traffic with.....	737
neighbor configuration	
adjacency timer.....	745
discovery table entries.....	745
ietf mode.....	745
IP address.....	745
pre-ietf mode.....	745
overview.....	737
pre-ietf mode global configuration.....	748
pre-ietf mode neighbor configuration.....	745, 748
regular expressions for tracing operations.....	744
restart time global configuration.....	748
shaping-rate adjustments for subscriber local	
loops.....	684
tracing operations.....	742
ancp statement	
ANCP.....	753
attempts statement	
DHCP local server.....	169
attribute statement	
dynamic profile variables.....	495
attributes statement.....	170
authenticate statement	
Mobile IP.....	439
authentication	
configuring RADIUS.....	20
dynamic VLAN.....	522
Mobile IP home agent.....	418
authentication attributes	
local Mobile IP.....	433
authentication method	
configuring Mobile IP.....	432
authentication methods.....	20
authentication password <i>See</i> password	
configuring global static subscriber.....	378
configuring group static subscriber.....	382
authentication services	
with DHCP.....	66, 101
authentication statement	
DHCP local server.....	171
DHCP relay agent.....	173
static subscriber group.....	392
static subscribers.....	391
authentication-order statement	
access.....	174
authentication-server statement.....	175
authorization-order statement	
JSRC.....	361
auto logout	
DHCP.....	73, 110
DHCP relay agent option 82.....	111
AVPs	
Diameter.....	351
B	
backwards compatibility	
ANCP global configuration.....	748
ANCP neighbor configuration.....	745, 748
boot-file statement.....	175
boot-server statement.....	176
braces, in configuration statements.....	xliv
brackets	
angle, in syntax descriptions.....	xliii
square, in configuration statements.....	xliv
buffer-size statement	
dynamic CoS.....	700

C

- change of authorization *See* CoA
- chap statement
 - subscriber access.....176
- circuit-id statement
 - address-assignment pools.....177
 - DHCP relay agent.....178
- circuit-type statement
 - DHCP local server.....179
 - DHCP relay agent.....180
- class of service *See* CoS
- class-of-service statement
 - subscriber access.....701
- classic filters
 - components.....590
 - processing order.....591
 - types.....590
- classic firewall filters
 - configuration guidelines.....591
- clear-on-abort statement
 - DHCP local server.....181
- client attributes
 - address-assignment pools.....50
- client configuration information
 - DHCP.....60
- client usernames
 - DHCP
 - unique.....78
- client-accounting-algorithm statement
 - RADIUS.....182
- client-authentication-algorithm statement
 - RADIUS.....182
- client-discover-match statement
 - DHCP local server.....183
 - DHCP relay agent.....184
- client-id statement.....185
- CoA
 - messages.....32
 - RADIUS.....31
- coa-immediate-update statement
 - accounting.....186
- comments, in configuration statements.....xliv
- connect-actively statement
 - Diameter base protocol.....336
- conventions
 - text and syntax.....xlili
- CoS
 - IP demux
 - configuring.....656
 - overview.....636
 - RADIUS-provided parameters
 - configuring an access dynamic profile.....649
 - example.....669
 - overview.....630

- shaping-rate adjustments for subscriber local loops
 - configuration guidelines.....685
 - disabling.....693
 - enabling.....687
 - example.....695
 - overview.....684
- subscriber access
 - changing services.....633
 - configuration guidelines.....636
 - configuration overview.....639
 - configuring variables.....653
 - dynamic configuration overview.....641
 - interfaces.....656
 - overview.....629
 - static scheduling and queuing example.....661
 - traffic parameters.....643, 644
- CoS traffic shaping
 - with ANCP.....749
- curly braces, in configuration statements.....xliv
- customer support.....xliv
 - contacting JTAC.....xliv

D

- default-local-server-group statement.....187
- default-relay-server-group statement.....188
- default-value statement
 - dynamic profile variables.....495
- delay-buffer-rate statement
 - dynamic CoS.....702
- delimiter statement
 - DHCP local server.....189
 - DHCP relay agent.....190
- demux interfaces
 - unit statement.....582
- demux-options statement
 - dynamic demux interface.....567
- demux-source statement
 - dynamic demux interfaces.....568
- demux0 statement
 - dynamic demux interface.....566
- destination statement
 - Diameter base protocol.....336
- destination-host statement
 - JSRC.....362
- destination-realm statement
 - JSRC.....362
- DHCP
 - ARP table population
 - overriding.....71, 107
 - authentication services.....66, 101
 - AAA directed logout.....66, 101
 - auto logout.....73, 110
 - client configuration information.....60
 - grouping interfaces.....68, 102

maximum clients per interface		
overriding.....	70, 109	
unique client usernames.....	78	
user passwords.....	77	
DHCP local server		
address-assignment pool selection.....	67	
address-assignment pools.....	62	
ARP table population		
overriding.....	71, 107	
client auto logout.....	74, 112	
DHCPv6.....	63	
dynamic client reconfiguration		
authentication token configuration.....	85	
behavior on failure configuration.....	84	
configuration overview.....	82	
number of attempts configuration.....	83	
RADIUS-initiated disconnect		
configuration.....	84	
requesting.....	85	
dynamic profile attachment		
multiple subscribers.....	75, 122	
overview.....	64, 100	
use primary profile.....	75, 122	
graceful Routing Engine switchover.....	86	
grouping interfaces		
options.....	103	
how components interact.....	94	
Layer 2 unicast transmission.....	107	
matching option 60 strings.....	114	
maximum clients per interface		
overriding.....	70, 109	
nonmatching option 60 strings.....	117	
option 60 information.....	113	
option 82		
auto logout.....	111	
option 82 information.....	117	
option 82 prefix.....	119	
option 82 textual description.....	120	
overriding broadcast bit.....	107	
overriding default configuration.....	104	
overriding option 82.....	106	
overview.....	94	
overwrite giaddr.....	105	
replacing IP source address.....	106	
server groups.....	121	
tracing operations.....	87, 125	
trusting option 82.....	107	
verifying configuration.....	124	
DHCP relay proxy.....	266	
enabling.....	122	
how components interact.....	96	
overview.....	96	
DHCP subscriber		
auto logout.....	74, 112	
dhcp-attributes statement		
address-assignment pools.....	191	
dhcp-local-server statement.....	192	
dhcp-relay statement.....	195	
DHCPv6 local server		
overview.....	63	
dhcpv6 statement.....	198	
Diameter		
AVPs.....	351	
message sequences for JSRC.....	354	
messages used by JSRC and the SAE.....	350	
Diameter base protocol.....	321	
configuration overview.....	323	
event log access.....	328	
filtering trace operation output.....	328	
function information		
verifying.....	331	
instance information		
verifying.....	330	
log file size.....	327	
log filenames.....	327	
maximum clients per interface		
overriding.....	70, 109	
nonmatching option 60 strings.....	117	
option 60 information.....	113	
option 82		
auto logout.....	111	
option 82 information.....	117	
option 82 prefix.....	119	
option 82 textual description.....	120	
overriding broadcast bit.....	107	
overriding default configuration.....	104	
overriding option 82.....	106	
overview.....	94	
overwrite giaddr.....	105	
replacing IP source address.....	106	
server groups.....	121	
tracing operations.....	87, 125	
trusting option 82.....	107	
verifying configuration.....	124	
DHCP relay proxy.....	266	
enabling.....	122	
how components interact.....	96	
overview.....	96	
DHCP subscriber		
auto logout.....	74, 112	
dhcp-attributes statement		
address-assignment pools.....	191	
dhcp-local-server statement.....	192	
dhcp-relay statement.....	195	
DHCPv6 local server		
overview.....	63	
dhcpv6 statement.....	198	
Diameter		
AVPs.....	351	
message sequences for JSRC.....	354	
messages used by JSRC and the SAE.....	350	
Diameter base protocol.....	321	
configuration overview.....	323	
event log access.....	328	
filtering trace operation output.....	328	
function information		
verifying.....	331	
instance information		
verifying.....	330	
log file size.....	327	
log filenames.....	327	

- network element configuration.....325
- network element information
 - verifying.....333
- node information
 - verifying.....330
- origin attribute configuration.....324
- peer configuration.....324
- peer information
 - verifying.....332
- route information
 - verifying.....330
- trace operation event logs.....328
- tracing operations.....326
- troubleshooting configuration.....329
- troubleshooting connectivity.....330
- diameter statement
 - Diameter base protocol.....337
- diameter-instance statement
 - JSRC.....363
- directed logout
 - AAA.....66, 101
- disable statement
 - IGMP.....724
- disable-relay statement.....200
- discovery table
 - ANCP global configuration.....747
 - ANCP neighbor configuration.....745, 747
- discovery-mode statement
 - ANCP.....754
- dns-server statement.....200
- documentation
 - comments on.....xliv
- domain-name statement
 - address-assignment pools.....201
 - DHCP local server.....202
 - DHCP relay agent.....203
 - static subscriber group.....394
 - static subscribers.....393
- drop statement.....204
- drop-profile statement
 - dynamic CoS.....703
 - RED.....703
- drop-profile-map statement
 - dynamic CoS.....704
- dynamic client reconfiguration
 - DHCP local server
 - attempts configuration.....83
 - authentication token configuration.....85
 - behavior on failure configuration.....84
 - configuration overview.....82
 - RADIUS-initiated disconnect
 - configuration.....84
 - requesting.....85
- dynamic firewall filters
 - applying fast update filters.....614
 - attaching statically created.....599
 - attaching with RADIUS.....600
 - basic syntax.....592
 - classic filters.....590
 - components.....590, 594
 - configuration guidelines.....591, 595
 - configuring fast update filters.....603
 - examples.....617
 - fast update filter example.....619
 - fast update filters.....593, 597
 - fast update filters syntax.....596
 - ordering.....601
 - overview.....589
 - permitting expected traffic.....608
 - processing order.....591, 594
 - types.....590
- dynamic home assignment
 - configuring Mobile IP.....434
- Dynamic Host Control Protocol *See* DHCP
- dynamic profile
 - configuring global static subscriber.....377, 381
 - configuring static subscriber group.....380
- dynamic profiles
 - associating fast update filters.....614
 - components.....8
 - configuring basic.....481
 - configuring for client access.....485
 - configuring services levels.....487
 - DHCP attachment.....75, 122
 - overview.....64, 100
 - examples.....491, 492, 493
 - interface support.....467
 - overview.....64, 100
 - modifying.....488
 - overview.....467
 - PPP.....130
 - PPP attachment.....129, 132
 - PPPoE.....492
 - PPPoE interfaces.....129
 - predefined variables.....469
 - router predefined variables.....8
 - tiered service example.....765
 - user-defined variables.....478
 - VLAN.....509
- dynamic protocols
 - overview.....721
- dynamic requests
 - RADIUS.....30, 34
- dynamic service activation
 - during login.....31
- dynamic stacked VLAN
 - password authentication.....518
- dynamic variables
 - configuring.....482, 483
 - overview.....468

dynamic VLAN	
authentication.....	522
dynamic profiles.....	509
any TPID configuration.....	511
any TPID example.....	527
stacked configuration.....	513
stacked VLAN example.....	528
standard TPID configuration.....	510
standard TPID example.....	527
using routing instances.....	514
Ethernet packet types	
configuring.....	517
single-tag dynamic profiles.....	517
stacked dynamic profiles.....	518
general procedure.....	507
interfaces	
configuring.....	516
flexible tagging example.....	529
single-tag example.....	528
single-tag VLAN dynamic profiles.....	516
stacked tagging example.....	528
stacked VLAN dynamic profiles.....	516
overview.....	507
password authentication.....	518
ranges.....	519
mixed VLAN.....	521
single-level VLAN.....	520
stacked VLAN.....	520
standard ethernet type example.....	529
verifying configuration.....	525
dynamic-home-assignment statement	
Mobile IP.....	440
dynamic-profile statement	
DHCP local server.....	206
DHCP relay agent.....	207
PPP.....	205
static subscriber group.....	396
static subscribers.....	395
dynamic-profiles	
interfaces statement.....	572
dynamic demux.....	574
dynamic-profiles statement.....	496

E

enable-service statement	
Mobile IP.....	441
entity-type statement	
Mobile IP.....	442
Ethernet interfaces	
unnumbered	
preferred source address.....	577
VLAN tagging.....	585
ethernet-port-type-virtual statement.....	208
exclude statement.....	209

external-authority statement	
DHCP local server pool matching.....	208

F

family statement	
address-assignment pools.....	211
dynamic demux interfaces.....	570
dynamic profiles.....	569
dynamic profiles (firewalls).....	621
Fast Ethernet interfaces	
VLAN tagging.....	585
fast update filters.....	589
actions.....	597, 607
adding a term once.....	598
applying to interfaces.....	614
associating to dynamic profiles.....	614
basic syntax.....	596
components.....	594
configuration guidelines.....	595
configuring.....	603
configuring match order.....	605
configuring terms.....	606
conflict errors.....	609, 612
evaluating terms.....	609
example.....	619
implied wildcard.....	610
match conditions.....	597, 607
implied wildcard.....	597
names.....	595
only-at-create.....	598
overlapping terms.....	609, 612
overview.....	593
processing order.....	594
fast-update-filter statement.....	622
filter statement.....	571
filters	
verifying configuration.....	615
firewall	
fast update filter actions.....	607
fast update filter match conditions.....	607
firewall filters <i>See</i> dynamic firewall filters	
classic filters.....	590
configuring fast update filters.....	603
fast update filters.....	589, 593
overview.....	590
firewall statement	
dynamic profiles.....	623
flow-tap service <i>See</i> subscriber secure policy	
font conventions.....	xlili
forwarding statement	
Diameter base protocol.....	338
forwarding-class statement	
dynamic CoS.....	705
subscriber secure policy.....	212

function statement
 Diameter base protocol.....338

G

generic statement
 Mobile IP.....443
 Gigabit Ethernet interfaces
 VLAN tagging.....585
 grace-period statement.....213
 graceful Routing Engine switchover
 DHCP.....86
 group
 configuring static subscriber.....379
 group statement
 DHCP local server.....214
 DHCP relay agent.....216
 IGMP (with source).....725
 IGMP (without source).....725
 static subscribers.....397
 group-policy statement
 IGMP.....726
 guaranteed-rate statement
 dynamic CoS.....706

H

hardware-address statement.....218
 home agent
 configuration overview.....432
 home agent, Mobile IP *See* Mobile IP home agent
 home-agent statement
 Mobile IP
 dynamic home assignment rule.....445
 IP address rule.....446
 networks.....444
 home-agent-address statement
 Mobile IP.....447
 host statement
 address-assignment pools.....218
 Diameter base protocol.....339

I

icons defined, notice.....xliv
 ietf-mode statement
 ANCP.....754
 IGMP
 enabling.....727, 733
 version.....736
 igmp statement.....727
 ignore statement.....219
 immediate-leave statement
 IGMP.....728
 immediate-update statement
 accounting.....220

interface groups
 DHCP local server
 options.....69
 DHCP relay
 options.....103
 enabling static subscribers to log in.....384
 forcing static subscribers to log out.....384
 interface statement
 DHCP local server.....221
 DHCP relay agent.....222
 dynamic profiles.....499
 IGMP.....729
 static subscriber group.....398
 static subscriber group username.....399
 static subscribers username.....400
 interface-client-limit statement
 DHCP local server.....223
 DHCP relay agent.....224
 interface-description-format statement.....225
 interface-set statement
 ANCP.....755
 interface-specific statement
 fast update filters.....623
 interfaces
 enabling static subscribers to log in.....383
 forcing static subscribers to log out.....383
 unit statement.....581
 interfaces statement
 ANCP.....756
 dynamic CoS.....707
 dynamic demux.....574
 dynamic profiles.....572
 subscriber secure policy.....225
 Internet Group Management Protocol *See* IGMP
 ip-address statement.....226
 ip-address-first statement.....226
 ipv6-address statement
 address-assignment pools.....227

J

JSRC
 configuration overview.....357, 371
 Diameter message sequences.....354
 Diameter messages.....350
 interactions with the SAE.....354
 managing subscribers.....349
 provisioning services.....349
 provisioning static subscribers.....367
 jsrc statement
 JSRC.....364
 jsrc-partition statement
 JSRC.....364
 Juniper Networks VSAs.....35
 supported.....38

K

keepalives statement	
dynamic profiles.....	227
key statement	
Mobile IP.....	448

L

layer2-unicast-replies statement.....	228
license requirements	
address-assignment pools.....	52
subscriber access.....	6
subscriber secure policy.....	137
local-server-group statement.....	229
log files	
access to Diameter base protocol.....	328
access to Mobile IP.....	430
configuring Mobile IP.....	428
filenames for Diameter base protocol.....	327
filenames for Mobile IP.....	429
for Diameter base protocol events.....	328
for Mobile IP events.....	431
number of ANCP.....	743
number of Diameter base protocol.....	327
number of Mobile IP.....	430
number of static subscribers.....	374
size of ANCP.....	743
size of Diameter base protocol.....	327
size of Mobile IP.....	430
size of static subscribers.....	374
logical-system statement	
Diameter base protocol.....	339
logical-system-name statement	
DHCP local server.....	231
DHCP relay agent.....	230
static subscriber group.....	401
static subscribers.....	400
loss-priority statement	
dynamic CoS.....	708

M

MAC address validation	
dynamic subscriber interfaces	
configuring.....	545
overview.....	536
static subscriber interfaces	
configuring.....	544
mac-address statement	
access internal routes.....	234
DHCP local server.....	232
DHCP relay agent.....	233
mac-validate statement.....	575
mandatory statement	
dynamic profile variables.....	499

manuals	
comments on.....	xliv
match conditions	
fast update filters	
implied wildcard.....	597
match-order statement.....	624
maximum-discovery-table-entries statement	
ANCP.....	757
maximum-helper-restart-time statement	
ANCP.....	757
maximum-lease-time statement.....	234
metric statement	
Diameter base protocol.....	340
dynamic profiles.....	235
Mobile IP	
access type configuration.....	435
accounting method.....	433
authentication method.....	432
configuration overview.....	427
dynamic home assignment configuration.....	434
event log access.....	430
event logging.....	428
filtering trace operation output.....	430
local authentication attributes.....	433
log file size.....	430
log filenames.....	429
registration request authentication.....	432
trace operation event logs.....	431
tracing operations.....	428
WiMAX operation.....	435
Mobile IP home agent	
AAA.....	418
accounting.....	421
agent discovery.....	415
authentication.....	418
home address assignment.....	415
mobile node registration.....	418
overview.....	415
mobile-ip statement	
Mobile IP.....	449
mode statement.....	575

N

nai statement	
Mobile IP.....	451
name-server statement.....	235
nas-identifier statement.....	236
nas-port-extended-format statement.....	237
neighbor	
parameters for ANCP.....	745
neighbor statement	
ANCP	
for all neighbors.....	758
for unique access identifier.....	758
netbios-node-type statement.....	238

- network element
 - configuring Diameter.....325
- network statement.....238
- network-element statement
 - Diameter base protocol.....341
- next-hop statement
 - dynamic profiles.....239
- no-accounting statement
 - IGMP (interface).....730
- no-arp statement
 - DHCP local server.....239
 - DHCP relay agent.....240
- notice icons defined.....xlii

O

- oif-map statement
 - IGMP (interface).....730
- option 60 information
 - DHCP relay.....113
- option 60 strings
 - DHCP relay.....114, 117
- option 82
 - DHCP relay
 - auto logout.....111
- option 82 information
 - DHCP relay.....117
- option 82 prefix
 - DHCP relay.....119
- option 82 textual description
 - DHCP relay.....120
- option statement.....241
- option-60 statement
 - DHCP local server.....242
 - DHCP relay agent.....243
- option-82 statement
 - address-assignment pools.....244
 - DHCP local server authentication.....245
 - DHCP local server pool matching.....246
 - DHCP relay agent.....247
- option-match statement.....248
- options
 - RADIUS server.....24, 25
- options statement
 - RADIUS.....249
- order statement
 - accounting.....250
 - Mobile IP.....452
- origin attributes
 - configuring Diameter endpoint.....324
- origin statement
 - Diameter base protocol.....342
- output-traffic-control-profile statement
 - dynamic CoS.....708
- overrides statement
 - DHCP local server.....251
 - DHCP relay agent.....253

P

- pap statement
 - subscriber access.....254
- parentheses, in syntax descriptions.....xliv
- partition statement
 - JSRC.....365
- passive statement
 - IGMP (interface).....731
- password
 - configuring global static subscriber
 - authentication.....378
 - configuring static subscriber group
 - authentication.....382
 - stacked VLAN range.....518
 - VLAN range.....518
- password statement
 - DHCP local server.....255
 - DHCP relay agent.....256
 - static subscriber group.....403
 - static subscribers.....402
- passwords
 - DHCP users.....77
- peer
 - configuring Diameter.....324
- peer statement
 - Diameter base protocol
 - network element.....343
 - remote peer.....342
 - Mobile IP.....453
- physical interfaces
 - VLAN tagging.....585
- pool statement
 - address-assignment pools.....257
- pool-match-order statement.....258
- port statement
 - Diameter base protocol.....343
 - RADIUS server.....259
- PPP
 - access and access-internal routes.....15
 - dynamic profile attachment.....129, 132
 - dynamic profile creation.....130
 - verifying subscriber management
 - configuration.....132
- ppp-options statement
 - subscriber access.....259
- PPPoE
 - dynamic profiles.....492
- pre-ietf mode
 - ANCP global configuration.....748
 - ANCP neighbor configuration.....745, 748

pre-ietf-mode statement	
ANCP.....	759
precedence statement.....	576, 625
predefined variables.....	469
preference statement	
dynamic profiles.....	260
preferred-source-address statement.....	577
prefix statement.....	261
address-assignment pools.....	260
priority statement	
Diameter base protocol.....	344
dynamic CoS.....	709
profile statement	
subscriber access.....	263
promiscuous-mode statement	
IGMP (interface).....	732
protocol statement	
dynamic CoS.....	710
protocols statement.....	733
provisioning-order statement	
JSRC.....	365
proxy-arp statement.....	578
proxy-mode statement.....	266

Q

qos-adjust statement	
ANCP.....	759
qualified-next-hop statement	
dynamic profiles.....	267

R

RADIUS	
CoA.....	31
CoS parameters for initial services	
configuring an access dynamic profile.....	649
example.....	669
overview.....	630
dynamic requests.....	30, 34
RADIUS attributes.....	35
ignoring and excluding.....	27
supported.....	35
RADIUS dynamic request information	
verifying.....	35
RADIUS server	
configuration example.....	147
configuring interaction with.....	19
configuring parameters.....	22
options.....	24, 25
RADIUS servers <i>See</i> subscriber secure policy	
specifying.....	23
radius statement	
dynamic profile variables.....	500
subscriber access.....	268

radius-disconnect statement	
DHCP local server.....	270
radius-flow-tap statement.....	271
RADIUS-initiated disconnect.....	33
messages.....	33
radius-server statement	272
range statement	
address-assignment pools.....	273
realm statement	
Diameter base protocol.....	344
reconfigure statement	
DHCP local server.....	274
registration	
Mobile IP mobile node.....	418
registration-lifetime statement	
Mobile IP.....	454
relay-agent-interface-id statement.....	275
relay-agent-remote-id statement.....	276
relay-agent-subscriber-id statement.....	277
relay-option-60 statement.....	278
relay-option-82 statement	
deleting.....	117, 279
relay-server-group statement.....	280
remote-id statement.....	281
replace-ip-source-with statement.....	282
replay-method statement	
Mobile IP.....	455
restart time	
ANCP global configuration.....	748
retry statement.....	283
revert-interval statement.....	284
revocation-required statement	
Mobile IP.....	456
route statement	
access internal	
dynamic profiles.....	286
Diameter base protocol.....	345
dynamic profiles.....	285
router statement.....	287
routing-instance statement.....	287
Diameter base protocol peer.....	345
routing-instance-name statement	
DHCP local server.....	288
DHCP relay agent.....	289
static subscriber group.....	404
static subscribers.....	404
routing-instances statement	
dynamic profiles.....	501
rpf-check statement.....	579

S

SAE	
interactions with JSRC.....	354
scheduler statement	
dynamic CoS.....	710

- scheduler-map statement
 - dynamic CoS
 - association with traffic-control profile.....711
- scheduler-maps statement
 - dynamic CoS
 - scheduler map configuration.....712
- schedulers statement
 - dynamic CoS.....713
- secret statement
 - access.....290
- server groups
 - DHCP relay.....121
- server-group statement.....291
- service provisioning
 - static subscribers with JSRC.....367
 - with JSRC.....349
- shaping-rate adjustments.....683
 - for subscriber local loops.....737
 - configuration guidelines.....685
 - disabling.....693
 - enabling.....687
 - example.....695
 - overview.....684
- shaping-rate statement
 - dynamic CoS.....714
- sip-server-address statement.....291
- sip-server-domain-name statement.....292
- source statement
 - IGMP (interface).....734
- source-address statement.....292
- source-ipv4-address statement.....293
- spi statement
 - Mobile IP.....457
- SRC
 - SAE interactions with JSRC.....354
 - static subscriber management with JSRC.....367
 - subscriber management with JSRC.....349
- ssm-map statement
 - IGMP (interface).....734
- static statement
 - IGMP (interface).....735
- static subscribers.....367
 - configuring interface groups.....379
 - flags for tracing operations.....376
 - forcing logout.....383
 - forcing logout for interface groups.....384
 - global access profile.....376
 - global authentication password.....378
 - global dynamic profile.....377, 381
 - global username.....378
 - group.....379
 - group access profile.....380
 - group authentication password.....382
 - group dynamic profile.....380
 - group username.....382
 - log file access for tracing operations.....375
 - log file size and number.....374
 - log filenames for tracing operations.....374
 - regular expressions for tracing operations.....375
 - resetting login state for an interface.....383
 - resetting login state for interface groups.....384
 - tracing operations.....373
- static-subscribers statement.....405
- statistics statement
 - access.....293, 458
- subscriber AAA information
 - verifying.....45
- subscriber access
 - configuration overview.....9
 - configuring.....15
 - environment.....4
 - license requirements.....6
 - managing access and services.....7
 - operation flow.....6
 - overview.....3
 - support.....5
- subscriber access management
 - overview.....15
- subscriber interfaces
 - configuring in dynamic profiles.....539
- example
 - gigabit Ethernet VLAN.....547
 - gigabit Ethernet VLAN with multiple logical
 - units.....547
 - gigabit Ethernet VLAN with no
 - autonegotiation.....548
 - IP demux over aggregated Ethernet.....562
 - loopback.....548
 - VLAN over aggregated Ethernet.....559
- IP demux
 - configuring.....542
 - guidelines.....536
 - overview.....535
- IP demux over aggregated Ethernet
 - example.....562
 - overview.....553
- overview.....5, 533
- VLAN
 - configuring.....540
 - overview.....534
- VLAN over aggregated Ethernet
 - configuring.....555
 - example.....559
 - overview.....551
- subscriber local loops
 - CoS shaping-rate adjustments
 - configuration guidelines.....685
 - disabling.....693
 - enabling.....687
 - example.....695
 - overview.....684
 - CoS shaping-rate adjustments with ANCP.....737

subscriber management	
static.....	367
with JSRC.....	349
subscriber secure policy	
architecture.....	137
configuration guidelines.....	143
configuring.....	142
considerations.....	141
flow-tap service configuration.....	144
license requirements.....	137
overview.....	136
RADIUS server configuration.....	145
RADIUS-initiated.....	140
system resources.....	143
terminating.....	146
subscribers	
identifying ANCP.....	746
support, technical <i>See</i> technical support	
syntax conventions.....	xlili

T

tag statement	
dynamic profile variables.....	501
technical support	
contacting JTAC.....	xliv
term statement	
fast update filters.....	626
tftp-server statement.....	294
time-based accounting	
Mobile IP.....	433
timeout statement.....	294
DHCP local server.....	295
timestamp-tolerance statement	
Mobile IP.....	459
token statement	
DHCP local server.....	296
trace operations	
filtering output for Diameter base protocol.....	328
filtering output for Mobile IP.....	430
tracoptions statement	
address-assignment pools.....	297
ANCP.....	760
DHCP local server.....	300
DHCP relay agent.....	303
Diameter base protocol.....	346
Mobile IP.....	460
static subscribers.....	406
tracing operations	
address-assignment pools.....	52
ANCP.....	742
DHCP local server.....	87, 125
DHCP relay.....	87, 125
Diameter base protocol.....	326
Mobile IP.....	428
static subscribers.....	373

traffic mirroring <i>See</i> subscriber secure policy	
traffic shaping	
ANCP CoS.....	749
traffic-control-profiles statement	
dynamic CoS.....	715
transmit-rate statement	
dynamic CoS.....	716
trigger statement	
DHCP local server.....	305
trust-option-82 statement.....	306

U

underlying-interface statement	
dynamic profiles.....	580
unit statement	
demux interfaces.....	582
dynamic CoS.....	717
interfaces.....	581
unnumbered interfaces	
Ethernet	
preferred source address.....	577
unnumbered-address statement.....	583
update-interval statement.....	306
use-interface-description statement.....	307
use-primary statement	
DHCP local server.....	309
DHCP relay agent.....	308
user-defined variables.....478 <i>See</i> variables,	
u s e r - d e f i n e d	
user-prefix statement	
DHCP local server.....	310
DHCP relay agent.....	311
static subscriber group.....	411
static subscribers.....	410
username	
configuring global static subscriber.....	378
configuring static subscriber group.....	382
username information	
AAA authentication.....	524
username-include statement	
DHCP local server.....	312
DHCP relay agent.....	314
static subscriber group.....	409
static subscribers.....	408

V

variables	
overview.....	468
predefined.....	469
user-defined.....	478
variables statement	
dynamic profile variables.....	502

variables, JUNOS internal	
dynamic CoS (traffic-control-profiles)	
\$junos-cos-shaping-rate.....	714
variables, JUNOS predefined	
dynamic CoS (schedulers)	
\$junos-cos-scheduler.....	630, 713
\$junos-cos-scheduler-bs.....	630, 700
\$junos-cos-scheduler-dropfile-any.....	630, 703
\$junos-cos-scheduler-dropfile-high.....	630, 703
\$junos-cos-scheduler-dropfile-low.....	630, 703
\$junos-cos-scheduler-dropfile-medium-high.....	630, 703
\$junos-cos-scheduler-dropfile-medium-low.....	630, 703
\$junos-cos-scheduler-pri.....	630, 709
\$junos-cos-scheduler-tx.....	630, 716
configuring an access dynamic profile.....	649
example.....	669
overview.....	630
dynamic CoS (traffic-control-profiles)	
\$junos-cos-delay-buffer-rate.....	702
\$junos-cos-guaranteed-rate.....	706
\$junos-cos-scheduler-map.....	711
configuring an access dynamic profile.....	649
example.....	669
overview.....	630
variables, user-defined.....	478
vendor-id statement	
dynamic profile variables.....	503
vendor-option statement.....	315
vendor-specific attributes	
supported.....	38
version statement	
IGMP (interface).....	736
virtual-network statement	
Mobile IP.....	463
VLAN <i>See</i> dynamic VLAN	
VLAN tagging.....	585
vlan-id statement.....	503, 584
vlan-nas-port-stacked-format statement.....	316
vlan-tagging statement.....	585
vlan-tags statement.....	504
VSAs	
supported.....	38

W

wimax statement	
Mobile IP.....	462
wins-server statement.....	317
wireless roaming	
Mobile IP.....	415

Index of Statements and Commands

A

access statement	
dynamic profiles.....	157
access-identifier statement	
ANCP.....	751
access-internal statement	
dynamic profiles.....	158
access-profile statement	
static subscriber group.....	388
static subscribers.....	387
access-type statement	
Mobile IP.....	437
accounting statement	
access profile.....	159
IGMP (interface).....	723
accounting-port statement.....	160
accounting-server statement.....	161
accounting-session-id-format statement.....	161
accounting-stop-on-access-deny statement.....	162
accounting-stop-on-failure statement.....	162
active-server-group statement.....	163
address statement	
Diameter base protocol.....	335
interface.....	565
address-assignment statement	
address-assignment pools.....	164
adjacency-timer statement	
ANCP.....	752
aggregate-clients statement	
DHCP local server.....	165
DHCP relay agent.....	166
static subscriber group.....	390
static subscribers.....	389
algorithm statement	
Mobile IP.....	438
always-write-giaddr statement.....	167
always-write-option-82 statement.....	168
ancp statement	
ANCP.....	753
attempts statement	
DHCP local server.....	169
attribute statement	
dynamic profile variables.....	495
attributes statement.....	170

authenticate statement	
Mobile IP.....	439
authentication statement	
DHCP local server.....	171
DHCP relay agent.....	173
static subscriber group.....	392
static subscribers.....	391
authentication-order statement	
access.....	174
authentication-server statement.....	175
authorization-order statement	
JSRC.....	361

B

boot-file statement.....	175
boot-server statement.....	176
buffer-size statement	
dynamic CoS.....	700

C

circuit-id statement	
address-assignment pools.....	177
DHCP relay agent.....	178
circuit-type statement	
DHCP local server.....	179
DHCP relay agent.....	180
class-of-service statement	
subscriber access.....	701
clear-on-abort statement	
DHCP local server.....	181
client-accounting-algorithm statement	
RADIUS.....	182
client-authentication-algorithm statement	
RADIUS.....	182
client-discover-match statement	
DHCP local server.....	183
DHCP relay agent.....	184
client-id statement.....	185
coa-immediate-update statement	
accounting.....	186
connect-actively statement	
Diameter base protocol.....	336

D

default-local-server-group statement.....	187
default-relay-server-group statement.....	188
default-value statement	
dynamic profile variables.....	495
delay-buffer-rate statement	
dynamic CoS.....	702
delimiter statement	
DHCP local server.....	189
DHCP relay agent.....	190
demux interfaces	
unit statement.....	582
demux-options statement	
dynamic demux interface.....	567
demux-source statement	
dynamic demux interfaces.....	568
demux0 statement	
dynamic demux interface.....	566
destination statement	
Diameter base protocol.....	336
destination-host statement	
JSRC.....	362
destination-realm statement	
JSRC.....	362
dhcp-attributes statement	
address-assignment pools.....	191
dhcp-local-server statement.....	192
dhcp-relay statement.....	195
dhcpv6 statement.....	198
diameter statement	
Diameter base protocol.....	337
diameter-instance statement	
JSRC.....	363
disable statement	
IGMP.....	724
disable-relay statement.....	200
discovery-mode statement	
ANCP.....	754
dns-server statement.....	200
domain-name statement	
address-assignment pools.....	201
DHCP local server.....	202
DHCP relay agent.....	203
static subscriber group.....	394
static subscribers.....	393
drop statement.....	204
drop-profile statement	
dynamic CoS.....	703
drop-profile-map statement	
dynamic CoS.....	704
dynamic-home-assignment statement	
Mobile IP.....	440
dynamic-profile statement	
DHCP local server.....	206
DHCP relay agent.....	207
PPP.....	205

static subscriber group.....	396
static subscribers.....	395
dynamic-profiles statement.....	496

E

enable-service statement	
Mobile IP.....	441
entity-type statement	
Mobile IP.....	442
ethernet-port-type-virtual statement.....	208
exclude statement.....	209
external-authority statement	
DHCP local server pool matching.....	208

F

family statement	
address-assignment pools.....	211
dynamic demux interfaces.....	570
dynamic profiles.....	569
dynamic profiles (firewalls).....	621
fast-update-filter statement.....	622
filter statement.....	571
firewall statement	
dynamic profiles.....	623
forwarding statement	
Diameter base protocol.....	338
forwarding-class statement	
dynamic CoS.....	705
subscriber secure policy.....	212
function statement	
Diameter base protocol.....	338

G

generic statement	
Mobile IP.....	443
grace-period statement.....	213
group statement	
DHCP local server.....	214
DHCP relay agent.....	216
IGMP (with source).....	725
IGMP (without source).....	725
static subscribers.....	397
group-policy statement	
IGMP.....	726
guaranteed-rate statement	
dynamic CoS.....	706

H

hardware-address statement.....	218
---------------------------------	-----

home-agent statement	
Mobile IP	
dynamic home assignment rule.....	445
IP address rule.....	446
networks.....	444
home-agent-address statement	
Mobile IP.....	447
host statement	
address-assignment pools.....	218
Diameter base protocol.....	339
I	
ietf-mode statement	
ANCP.....	754
igmp statement.....	727
ignore statement.....	219
immediate-leave statement	
IGMP.....	728
immediate-update statement	
accounting.....	220
interface statement	
DHCP local server.....	221
DHCP relay agent.....	222
dynamic profiles.....	499
IGMP.....	729
static subscriber group.....	398
static subscriber group username.....	399
static subscribers username.....	400
interface-client-limit statement	
DHCP local server.....	223
DHCP relay agent.....	224
interface-description-format statement.....	225
interface-set statement	
ANCP.....	755
interface-specific statement	
fast update filters.....	623
interfaces statement	
ANCP.....	756
dynamic CoS.....	707
dynamic demux.....	574
dynamic profiles.....	572
subscriber secure policy.....	225
ip-address statement.....	226
ip-address-first statement.....	226
ipv6-address statement	
address-assignment pools.....	227

J

jsrc statement	
JSRC.....	364
jsrc-partition statement	
JSRC.....	364

K

keepalives statement	
dynamic profiles.....	227
key statement	
Mobile IP.....	448

L

layer2-unicast-replies statement.....	228
local-server-group statement.....	229
logical-system statement	
Diameter base protocol.....	339
logical-system-name statement	
DHCP local server.....	231
DHCP relay agent.....	230
static subscriber group.....	401
static subscribers.....	400
loss-priority statement	
dynamic CoS.....	708

M

mac-address statement	
access internal routes.....	234
DHCP local server.....	232
DHCP relay agent.....	233
mac-validate statement.....	575
mandatory statement	
dynamic profile variables.....	499
match-order statement.....	624
maximum-discovery-table-entries statement	
ANCP.....	757
maximum-helper-restart-time statement	
ANCP.....	757
maximum-lease-time statement.....	234
metric statement	
Diameter base protocol.....	340
dynamic profiles.....	235
mobile-ip statement	
Mobile IP.....	449
mode statement.....	575

N

nai statement	
Mobile IP.....	451
name-server statement.....	235
nas-identifier statement.....	236
nas-port-extended-format statement.....	237
neighbor statement	
ANCP	
for all neighbors.....	758
for unique access identifier.....	758
netbios-node-type statement.....	238
network statement.....	238

network-element statement	
Diameter base protocol.....	341
next-hop statement	
dynamic profiles.....	239
no-accounting statement	
IGMP (interface).....	730
no-arp statement	
DHCP local server.....	239
DHCP relay agent.....	240

O

oif-map statement	
IGMP (interface).....	730
option statement.....	241
option-60 statement	
DHCP local server.....	242
DHCP relay agent.....	243
option-82 statement	
address-assignment pools.....	244
DHCP local server authentication.....	245
DHCP local server pool matching.....	246
DHCP relay agent.....	247
option-match statement.....	248
options statement	
RADIUS.....	249
order statement	
accounting.....	250
Mobile IP.....	452
origin statement	
Diameter base protocol.....	342
output-traffic-control-profile statement	
dynamic CoS.....	708
overrides statement	
DHCP local server.....	251
DHCP relay agent.....	253

P

partition statement	
JSRC.....	365
passive statement	
IGMP (interface).....	731
password statement	
DHCP local server.....	255
DHCP relay agent.....	256
static subscriber group.....	403
static subscribers.....	402
peer statement	
Diameter base protocol	
network element.....	343
remote peer.....	342
Mobile IP.....	453
pool statement	
address-assignment pools.....	257
pool-match-order statement.....	258

port statement	
Diameter base protocol.....	343
RADIUS server.....	259
pre-ietf-mode statement	
ANCP.....	759
precedence statement.....	576, 625
preference statement	
dynamic profiles.....	260
preferred-source-address statement.....	577
prefix statement.....	261
address-assignment pools.....	260
priority statement	
Diameter base protocol.....	344
dynamic CoS.....	709
profile statement	
subscriber access.....	263
promiscuous-mode statement	
IGMP (interface).....	732
protocol statement	
dynamic CoS.....	710
protocols statement.....	733
provisioning-order statement	
JSRC.....	365
proxy-arp statement.....	578
proxy-mode statement.....	266

Q

qos-adjust statement	
ANCP.....	759
qualified-next-hop statement	
dynamic profiles.....	267

R

radius statement	
dynamic profile variables.....	500
subscriber access.....	268
radius-disconnect statement	
DHCP local server.....	270
radius-flow-tap statement.....	271
radius-server statement	272
range statement	
address-assignment pools.....	273
realm statement	
Diameter base protocol.....	344
reconfigure statement	
DHCP local server.....	274
registration-lifetime statement	
Mobile IP.....	454
relay-agent-interface-id statement.....	275
relay-agent-remote-id statement.....	276
relay-agent-subscriber-id statement.....	277
relay-option-60 statement.....	278
relay-server-group statement.....	280
remote-id statement.....	281

replace-ip-source-with statement.....	282
replay-method statement	
Mobile IP.....	455
retry statement.....	283
revert-interval statement.....	284
revocation-required statement	
Mobile IP.....	456
route statement	
access internal	
dynamic profiles.....	286
Diameter base protocol.....	345
dynamic profiles.....	285
router statement.....	287
routing-instance statement.....	287
Diameter base protocol peer.....	345
routing-instance-name statement	
DHCP local server.....	288
DHCP relay agent.....	289
static subscriber group.....	404
static subscribers.....	404
routing-instances statement	
dynamic profiles.....	501
rpf-check statement.....	579

S

scheduler statement	
dynamic CoS.....	710
scheduler-map statement	
dynamic CoS	
association with traffic-control profile.....	711
scheduler-maps statement	
dynamic CoS	
scheduler map configuration.....	712
schedulers statement	
dynamic CoS.....	713
secret statement	
access.....	290
server-group statement.....	291
shaping-rate statement	
dynamic CoS.....	714
sip-server-address statement.....	291
sip-server-domain-name statement.....	292
source statement	
IGMP (interface).....	734
source-address statement.....	292
source-ipv4-address statement.....	293
spi statement	
Mobile IP.....	457
ssm-map statement	
IGMP (interface).....	734
static statement	
IGMP (interface).....	735
static-subscribers statement.....	405
statistics statement	
access.....	293, 458

T

tag statement	
dynamic profile variables.....	501
term statement	
fast update filters.....	626
tftp-server statement.....	294
timeout statement.....	294
DHCP local server.....	295
timestamp-tolerance statement	
Mobile IP.....	459
token statement	
DHCP local server.....	296
traceoptions statement	
address-assignment pools.....	297
ANCP.....	760
DHCP local server.....	300
DHCP relay agent.....	303
Diameter base protocol.....	346
Mobile IP.....	460
static subscribers.....	406
traffic-control-profiles statement	
dynamic CoS.....	715
transmit-rate statement	
dynamic CoS.....	716
trigger statement	
DHCP local server.....	305
trust-option-82 statement.....	306

U

underlying-interface statement	
dynamic profiles.....	580
unit statement	
demux interfaces.....	582
dynamic CoS.....	717
interfaces.....	581
unnumbered-address statement.....	583
update-interval statement.....	306
use-interface-description statement.....	307
use-primary statement	
DHCP local server.....	309
DHCP relay agent.....	308
user-prefix statement	
DHCP local server.....	310
DHCP relay agent.....	311
static subscriber group.....	411
static subscribers.....	410
username-include statement	
DHCP local server.....	312
DHCP relay agent.....	314
static subscriber group.....	409
static subscribers.....	408

V

variables statement	
dynamic profile variables.....	502
vendor-id statement	
dynamic profile variables.....	503
vendor-option statement.....	315
version statement	
IGMP (interface).....	736
virtual-network statement	
Mobile IP.....	463
vlan-id statement.....	503, 584
vlan-nas-port-stacked-format statement.....	316
vlan-tagging statement.....	585
vlan-tags statement.....	504

W

wimax statement	
Mobile IP.....	462
wins-server statement.....	317