JunosE™ Software for E Series™ Broadband Services Routers

Subscriber Interfaces

Release
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The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

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

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About the Documentation

E Series and JunosE Documentation and Release Notes

For a list of related JunosE documentation, see http://www.juniper.net/techpubs/software/index.html.

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

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Audience

This guide is intended for experienced system and network specialists working with Juniper Networks E Series Broadband Services Routers in an Internet access environment.

E Series and JunosE Text and Syntax Conventions

Table 1 on page xii defines notice icons used in this documentation.

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 xii defines text and syntax conventions that we use throughout the E Series and JunosE documentation.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents commands and keywords in text.	• Issue the **clock source** command. • Specify the keyword **exp-msg**.
Bold text like this	Represents text that the user must type.	**host1(config)#traffic class low-loss1**

`Fixed-width text like this`	Represents information as displayed on your terminal's screen.	**host1#show ip ospf 2**
		`Routing Process OSPF 2 with Router ID 5.5.0.250`
		`Router is an Area Border Router (ABR)`

Italic text like this	• Emphasizes words. • Identifies variables. • Identifies chapter, appendix, and book names.	• There are two levels of access: *user* and *privileged*. • *clusterId, ipAddress.* • *Appendix A, System Specifications*
Plus sign (+) linking key names	Indicates that you must press two or more keys simultaneously.	Press Ctrl + b.
Syntax Conventions in the Command Reference Guide		
Plain text like this	Represents keywords.	terminal length
Italic text like this	Represents variables.	*mask*, *accessListName*

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

Convention	Description	Examples
| (pipe symbol)	Represents a choice to select one keyword or variable to the left or to the right of this symbol. (The keyword or variable can be either optional or required.)	diagnostic | line
[ ] (brackets)	Represent optional keywords or variables.	[internal | external]
[ ]* (brackets and asterisk)	Represent optional keywords or variables that can be entered more than once.	[level1 | level2 | l1]*
{ } (braces)	Represent required keywords or variables.	{ permit | deny } { in | out } { *clusterId* | *ipAddress* }

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- Document or topic name
- URL or page number
- Software release version

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- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
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- Find 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/

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

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

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

PART 1

Overview

CHAPTER 1

Understanding Static and Dynamic Subscriber Interfaces

Subscriber Interfaces Overview

You can configure E Series routers to create subscriber interfaces statically or dynamically.

The following list shows the underlying (layer 2) interfaces on which you can currently configure each type of subscriber interface.

- Static subscriber interfaces
  - Bridged Ethernet over ATM (with and without VLANs)
  - Fast Ethernet (with and without VLANs)
  - Gigabit Ethernet (with and without VLANs)
  - 10-Gigabit Ethernet (with and without VLANs)
  - IP over ATM
  - POS
  - Generic Routing Encapsulation (GRE) tunnels
- Dynamic subscriber interfaces
  - Bridged Ethernet over ATM (with and without VLANs)
  - Fast Ethernet (with and without VLANs)
  - Gigabit Ethernet (with and without VLANs)

- 10-Gigabit Ethernet (with and without VLANs)
- GRE tunnels

For information about platform support for subscriber interfaces, see "Subscriber Interfaces Platform Considerations" on page 11.

Related Documentation

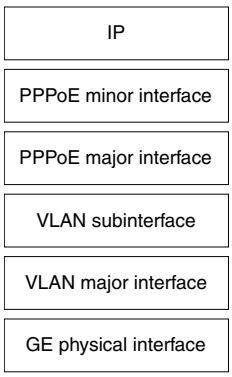
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8
- Subscriber Interfaces References on page 10

Dynamic Interfaces and Dynamic Subscriber Interfaces Overview

Dynamic interfaces are created automatically and transparently in response to external events. For example, the router creates dynamic interfaces when a lower-layer link such as an ATM or VLAN receives data. The layers of a dynamic interface are created based on the packets received on the link and can be configured using profiles, RADIUS, or a combination of the two. Dynamic interfaces are used to terminate Broadband Residential Access Server (B-RAS) access such as: Point-to-Point Protocol over Ethernet (PPPoE), Point-to-Point Protocol over ATM (PPPoA), and Point-to-Point Protocol over Ethernet over ATM (PPPoEoA). A PPP session acts as logical separation between one subscriber session and the next. Multiple services using policies and QoS can be applied to the IP interface that is associated with the PPP session.

An example of a dynamic interface configuration is a PPPoE session running on top of a Gigabit Ethernet VLAN interface. Figure 1 on page 4 shows an example of the dynamic interface stack.

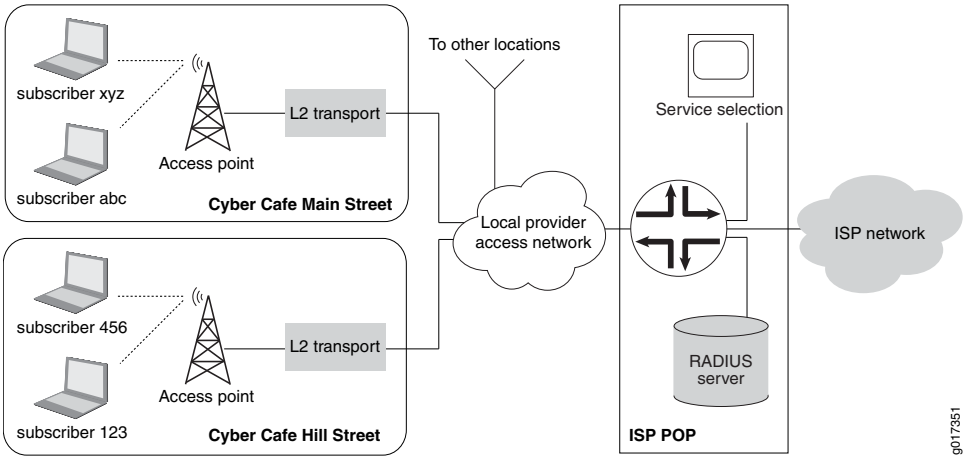
Figure 1: Example of a Dynamic Interface Stack



You can configure the lower layers of the stack (GE physical interface and VLAN major interface) either dynamically or statically, and dynamically configure the upper layers (VLAN subinterface, PPPoE, and IP). An interface is considered dynamic if at least one of the layers in the interface stack is configured dynamically.

The router creates dynamic subscriber interfaces (DSIs) on demand, in response to external events, such as when a Dynamic Host Configuration Protocol (DHCP) event occurs or when the router detects a packet. DSIs function in a manner similar to dynamic interfaces. However, DSIs have a more specific application than dynamic interfaces. You use DSIs when there are no PPPoE, PPPoA, or PPPoEoA sessions to provide separation between layers and when subscriber management is required. For example, on an Ethernet VLAN, multiple subscribers can enter the network from a Wi-Fi hotspot, as shown in Figure 2 on page 5:

Figure 2: Example of a Dynamic Subscriber Interface



In Figure 2 on page 5, multiple subscribers share the same broadcast segment. Each subscriber is identified by an individual IP address or a group of subscribers can be identified with an IP network. When each subscriber is identified by an individual IP address, a dynamic subscriber interface is created for each subscriber. You can manage a group of subscribers identified with an IP network, on a single DSI. You can also manage a group of subscribers using a static subscriber interface (SSI). However, you must manually configure the SSI and you cannot use the same dynamic profiles and RADIUS that DSIs use.

Subscribers can be connected to a single broadcast segment without using dynamic or static subscriber interfaces. This configuration is useful when subscriber management is not required. Subscriber management usually refers to (but is not limited to) tailoring IP policies and QoS profiles to a specific address or a very small group of addresses. For detailed information about the uses for Dynamic Subscriber interfaces, see "Example: Configuring Dynamic Subscriber Interfaces" on page 31.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8
- Subscriber Interfaces References on page 10

Characteristics of Subscriber Interfaces

The following sections describe the characteristics of subscriber interfaces:

Relationship to Shared IP Interfaces

A subscriber interface is an extension of a *shared IP interface*. A shared IP interface is one of a group of IP interfaces that use the same layer 2 interface.

Shared IP interfaces are unidirectional—they can transmit but not receive traffic. In contrast, subscriber interfaces are bidirectional—they can both receive and transmit traffic.

For details about shared IP interfaces, see the *Shared IP Interfaces* section in *JunosE IP, IPv6, and IGP Configuration Guide* .

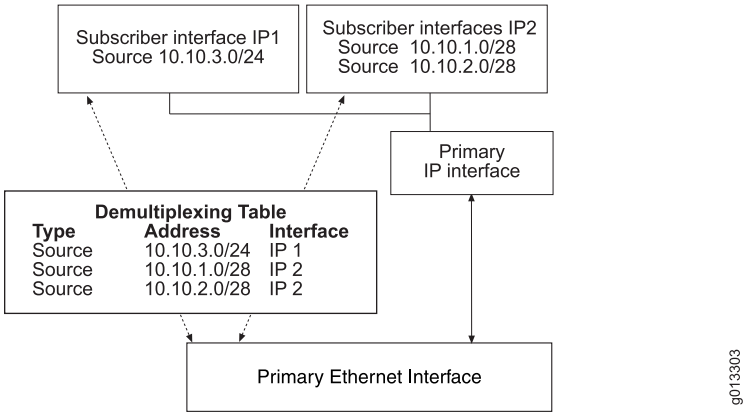
Relationship to Primary IP Interfaces

A subscriber interface operates only with a *primary IP interface*—a normal IP interface on a supported layer 2 interface, such as Ethernet. You create a primary interface by assigning an IP address to the Ethernet interface. Although you can configure a subscriber interface directly on an Ethernet interface, the subscriber interface does not operate until you assign an IP address to the Ethernet interface.

To configure a subscriber interface you must associate either a source address or a destination address with the interface. The router receives packets on a subscriber interface after demultiplexing the packet according to the specified source address or destination address. You can associate multiple source addresses or multiple destination addresses with a subscriber interface. However, a single primary interface and its associated subscriber interfaces can only demultiplex source addresses or destination addresses at any given time.

For example, Figure 3 on page 7 illustrates the relationship between subscriber interfaces, an associated primary IP interface, and an associated Ethernet interface.

Figure 3: Subscriber Interfaces over Ethernet



When the router receives traffic on a primary interface, the primary interface performs a lookup in its demultiplexing table. If the result of the lookup is a subscriber interface, the traffic is received on the associated subscriber interface.

NOTE: You can use the **set dhcp relay giaddr-selects-interface** command to specify that the primary interface is identified by information in the giaddr field of DHCP ACK messages. By default, the router identifies the primary interface based on the interface used by the DHCP-destined packets. See the *Using the Giaddr to Identify the Primary Interface for Dynamic Subscriber Interfaces* section in DHCP Relay and BOOTP Relay Overview.

Ethernet Interfaces and VLANs

In the absence of VLANs, Ethernet does not have a demultiplexing layer. A subscriber interface adds a demultiplexing layer for an Ethernet interface that is configured without VLANs. Using subscriber interfaces, the router can demultiplex or separate the traffic associated with different subscribers.

You can configure subscriber interfaces with VLANs. If you do so, the E Series router demultiplexes packets by using first the VLAN and then the subscriber interface.

Moving Interfaces

A shared IP interface that has associated subscriber demultiplexing attributes retains these attributes when it moves.

For details about moving shared IP interfaces, see the *Moving IP Interfaces* section in *JunosE IP, IPv6, and IGP Configuration Guide* .

Preventing IP Spoofing

You can prevent IP spoofing on subscriber interfaces by using media access control (MAC) address validation.

For information about configuring MAC address validation, see the *MAC Address Validation* section in *JunosE IP, IPv6, and IGP Configuration Guide*.

For information about the relationship between the MAC address validation state and dynamically created subscriber interfaces, see the *Inheritance of MAC Address Validation State for Dynamic Subscriber Interfaces* section in DHCP Relay and BOOTP Relay Overview.

Routing Protocols

You configure unicast routing protocols on subscriber interfaces in the same way that you configure routing protocols on primary IP interfaces, provided that you configure them to use unicast addressing when communicating with a peer. You can also enable multicast routing protocols such as IGMP on subscriber interfaces; however, we do not recommend this type of configuration.

Policies and QoS

You can configure policies, such as rate limiting and filtering, and quality of service (QoS) for subscriber interfaces in the same way that you do for primary IP interfaces. For more information, see the *JunosE Policy Management Configuration Guide* and the *JunosE Quality of Service Configuration Guide*.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8
- Example: Configuring Static Subscriber Interfaces on page 23
- Example: Configuring Dynamic Subscriber Interfaces on page 31

Applications for Subscriber Interfaces

In a cable modem network, service providers can use subscriber interfaces to:

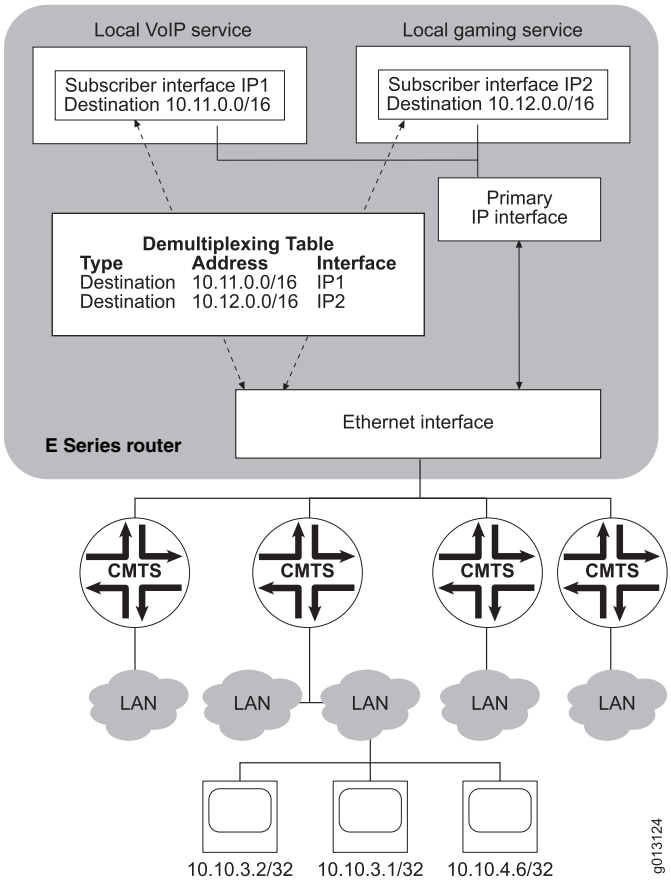
- Direct traffic toward special local content in the network
- Differentiate traffic for virtual private networks (VPNs)

Directing Traffic Toward Special Local Content

Figure 4 on page 9 shows an example of a cable modem network. Multiple cable modem termination systems (CMTSs) connect to multiple shared media access LANs. Many subscribers connect to each LAN.

In this example, the service provider uses subscriber interfaces to direct traffic toward special local content on the network: a voice over Internet Protocol (VoIP) service on network 10.11.0.0/16, or a local gaming service on network 10.12.0.0/16. Rate limits and policies on the subscriber interface customize the service level for the associated service. In this application, the E Series router is the first-hop router for the subscribers, and the subscriber interfaces demultiplex traffic based on the destination address.

Figure 4: Subscriber Interfaces in a Cable Modem Network



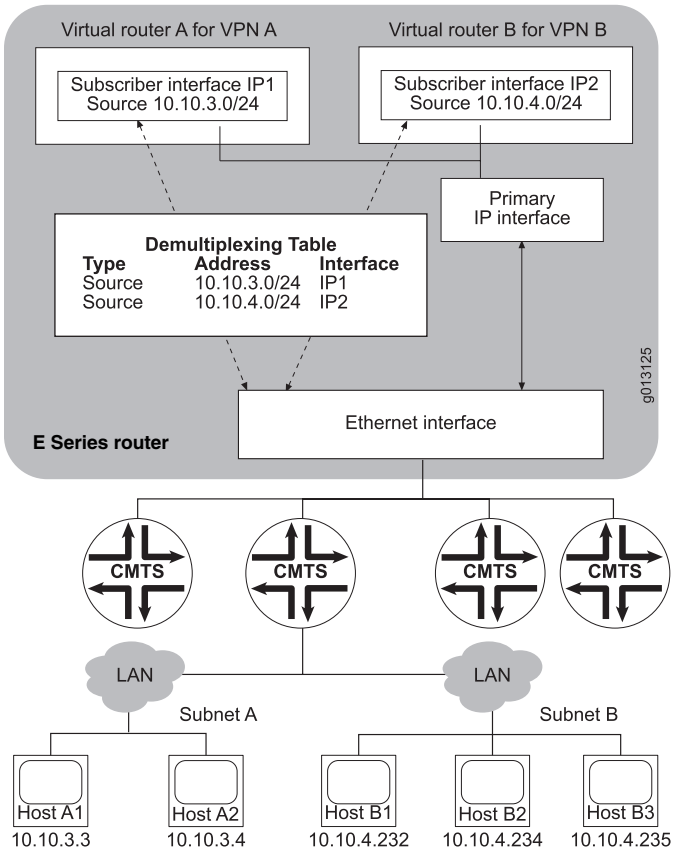
For instructions on configuring the application shown in Figure 4 on page 9, see "Example: Using a Destination Address to Demultiplex Traffic" on page 23.

Differentiating Traffic for VPNs

Similarly, service providers can use subscriber interfaces to differentiate traffic for VPNs. Figure 5 on page 10 shows an example of this application.

Customers on subnet A need to connect to VPN A, and customers on subnet B need to connect to VPN B. The E Series router connects to VPN A through virtual router A and to VPN B though virtual router B. Using two subscriber interfaces on the same primary interface (one on virtual router B and one on virtual router A), the E Series router can separate the traffic from subnets A and B. Because the E Series router is forwarding traffic in this application, the shared IP interface should demultiplex the traffic by using a source address.

Figure 5: Associating Subnets with a VPN Using Subscriber Interfaces



For instructions on configuring the application shown in Figure 5 on page 10, see "Example: Using a Destination Address to Demultiplex Traffic" on page 23.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Example: Configuring Static Subscriber Interfaces on page 23
- Example: Configuring Dynamic Subscriber Interfaces on page 31

Subscriber Interfaces References

For more information about the DHCP local server and DHCP external server, which are used in dynamic creation of subscriber interfaces, consult the following resources:

- DHCP Overview Information
- RFC 2131—Dynamic Host Configuration Protocol (March 1997)

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8

Subscriber Interfaces Platform Considerations

For information about modules that support subscriber interfaces on the ERX7xx models, ERX14xx models, and the ERX310 Broadband Services Router:

- See *ERX Module Guide, Table 1, ERX Module Combinations* for detailed module specifications.
- See *ERX Module Guide, Appendix A, Module Protocol Support* for information about the modules that support subscriber interfaces.

For information about modules that support subscriber interfaces on the E120 and E320 Broadband Services Routers:

- See *E120 and E320 Module Guide, Table 1, Modules and IOAs* for detailed module specifications.
- See *E120 and E320 Module Guide, Appendix A, IOA Protocol Support* for information about the modules that support subscriber interfaces.

Interface Specifiers

The configuration task examples in this chapter use the *slot/port* format to specify an interface. However, the interface specifier format that you use depends on the router that you are using.

For ERX7xx models, ERX14xx models, and ERX310 routers, use the *slot/port* format. For example, the following command specifies a Gigabit Ethernet interface on slot 0, port 1 of an ERX7xx model, ERX14xx model, or ERX310 Broadband Services Router.

```
host1(config)#interface gigabitEthernet 0/1
```

For E120 and E320 Routers, use the *slot/adapter/port* format, which includes an identifier for the bay in which the I/O adapter (IOA) resides. In the software, adapter 0 identifies the right IOA bay (E120 router) and the upper IOA bay (E320 router); adapter 1 identifies the left IOA bay (E120 router) and the lower IOA bay (E320 router). For example, the following command specifies a Gigabit Ethernet interface on slot 5, adapter 0, port 0 of an E320 router.

```
host1(config)#interface gigabitEthernet 5/0/0
```

For more information about supported interface types and specifiers on E Series routers, see Interface Types and Specifiers in *JunosE Command Reference Guide*.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8

CHAPTER 2

Dynamic Subscriber Interfaces Creation Methods

Dynamic Subscriber Interfaces Using Packet Detection Overview

For GRE tunnel interfaces, the event that triggers dynamic creation of subscriber interfaces occurs when the router receives a packet with a source IP address that is not in the demultiplexer table. In this case, the primary IP interface must be in autoconfiguration mode.

Packet detection is the only method of dynamically creating subscriber interfaces on GRE tunnel interfaces; you cannot use DHCP local server or DHCP external server.

Issuing the **ip auto-configure ip-subscriber** command configures the primary IP address to enable dynamic configuration of subscriber interfaces. Unlike DHCP configurations, the router creates the dynamic subscriber interface when it receives the first packet that contains the subscriber's IP address as the source address.

In addition, a dynamic subscriber interface becomes inactive after a period of time in which the router receives no packets that contain the subscriber's IP address as the source address. You can configure the period of time by issuing the **ip inactivity-timer** command.

To configure dynamic creation of subscriber interfaces on GRE tunnel interfaces, see "Example: Configuring Dynamic Subscriber Interfaces over GRE Tunnels" on page 37.

Designating Traffic for the Primary IP Interface

When dynamic creation of subscriber interfaces is enabled on the primary IP interface (by means of the **ip auto-configure ip-subscriber** command), you can use the **ip source-prefix** command to specify the source address of traffic that is destined for the primary IP interface instead of the subscriber interface. If the DHCP server (for DHCP server configurations) or the router (for packet detection configurations) then assigns a subscriber an IP address matching this source prefix, the router does not create a dynamic subscriber interface for that address.

Using Framed Routes

You can use the **ip use-framed-routes ip-subscriber** command to enable a primary IP interface to use framed routes as source IP addresses when creating dynamic subscriber interfaces. The framed routes are applied to the dynamic subscriber interface during configuration so traffic from the subsets can traverse the interface. By applying framed routes in this fashion, you can extend the per-subscriber interface management to any subnetworks behind the dynamic subscriber interface. RADIUS includes the Framed-Route attribute [22] in Access-Accept messages to specify the route in the following format:

Framed-Route = *ipAddress/mask nextHop*

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Dynamic Subscriber Interfaces Using DHCP Events Overview on page 14
- Applications for Subscriber Interfaces on page 8
- Example: Configuring Dynamic Subscriber Interfaces on page 31

Dynamic Subscriber Interfaces Using DHCP Events Overview

The DHCP event that triggers dynamic creation of subscriber interfaces occurs when either a local DHCP server or external DHCP server assigns an IP address to a subscriber that has issued a DHCP request. After the DHCP server assigns the IP address and the router creates the associated dynamic subscriber interface, the subscriber can access required network services.

DHCP Local Server and Address Allocation

You can configure the DHCP local server to operate in either equal-access mode or standalone mode.

In standalone mode, the DHCP local server provides a basic DHCP service. The server receives a client request for an IP address and immediately allocates the subscriber an IP address from one of the local address pools.

In equal-access mode, the DHCP local server works with Juniper Networks Session and Resource Control (SRC) software and the authorization, accounting, and address assignment utility to provide an advanced subscriber configuration and management service. After the subscriber is authenticated through RADIUS, the DHCP server assigns the subscriber an IP address with a long lease time. This assignment of an IP address triggers the creation of dynamic subscriber interfaces.

For more information about the DHCP servers and the SRC software, see the following chapters:

- DHCP Overview Information
- *SRC-PE Getting Started Guide*, *Chapter 1*, *SRC Product Overview*

DHCP External Server and Address Allocation

With DHCP external server, all communication between the subscriber and the DHCP server is monitored by the E Series router. The subscriber requests an address from the DHCP server through the E Series router. After the subscriber receives an IP address, the subscriber can access the Internet and use the value-added services provided by the E Series router and by the SRC software. The edge network must be using a DHCP relay function.

The services provided by integrating the E Series router's DHCP external server application with SRC software are similar to those provided when the DHCP local server is integrated with SRC software. For more information, see *SRC-PE Getting Started Guide*, *Chapter 1*, *SRC Product Overview.*

DHCP Relay Configuration

When you are configuring dynamic subscriber interface support, and you configure DHCP relay in the same virtual router as the dynamic subscriber interfaces, you must use the **set dhcp relay inhibit-access-route-creation** command to ensure that DHCP replay does not install access internal routes. Otherwise, DHCP relay will overwrite the access internal routes that are originally created for the subscriber interface.

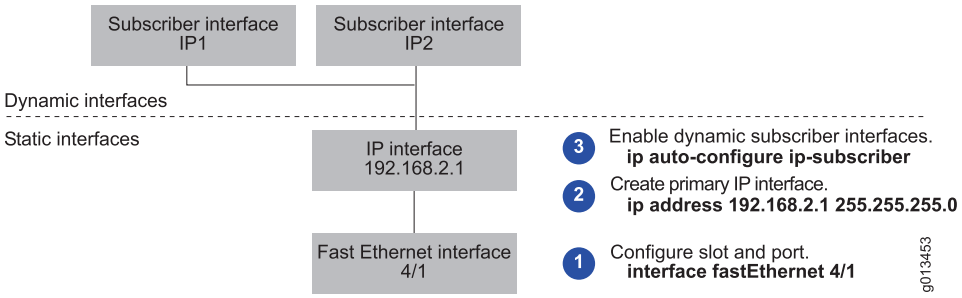
Supported Configurations

E Series routers currently support dynamic creation of subscriber interfaces with DHCP servers in the following configurations:

- IP over Ethernet
- IP over VLAN over Ethernet
- IP over bridged Ethernet over ATM

For example, Figure 6 on page 15 shows the interface stacking in an IP over Ethernet dynamic subscriber interface configuration. The illustration indicates which layers in the stack are static and dynamic, and identifies the CLI commands typically used to create the configuration.

Figure 6: IP over Ethernet Dynamic Subscriber Interface Configuration



As shown in Figure 6 on page 15, issuing the **ip auto-configure ip-subscriber** command configures the primary IP interface to enable dynamic creation of subscriber interfaces. However, the router does not actually create the dynamic subscriber interface until the DHCP server assigns an IP address to the associated subscriber.

To configure each supported configuration, see "Example: Configuring Dynamic Subscriber Interfaces" on page 31.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Applications for Subscriber Interfaces on page 8
- Dynamic Subscriber Interfaces Using Packet Detection Overview on page 13
- Example: Configuring Dynamic Subscriber Interfaces on page 31

Dynamic Creation of Subscriber Interfaces Overview

As an alternative to creating static subscriber interfaces, you can configure E Series routers to create subscriber interfaces dynamically.

When you create a static subscriber interface, as described in "Example: Configuring Static Subscriber Interfaces" on page 23, each layer in the interface stack is created through an existing configuration mechanism such as command-line interface (CLI) or Simple Network Management Protocol (SNMP).

By contrast, the router creates dynamic subscriber interfaces on demand, in response to an external event. Two types of external events can cause dynamic creation of subscriber interfaces: when an Dynamic Host Configuration Protocol (DHCP) event occurs or when the router detects a packet.

The following topics describe the two methods of dynamic creation of subscriber interface columns:

- Dynamic Subscriber Interfaces Using DHCP Events Overview on page 14
- Dynamic Subscriber Interfaces Using Packet Detection Overview on page 13

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Applications for Subscriber Interfaces on page 8
- Example: Configuring Dynamic Subscriber Interfaces on page 31

CHAPTER 3

MAC Address Validation State for Dynamic Subscriber Interfaces

How MAC Address Validation State Inheritance Works

To enable MAC address validation for the static primary IP interface, you must use the existing **ip mac-validate** command with either the **strict** keyword or the **loose** keyword. The **strict** keyword prevents transmission of IP packets that do not reside in the MAC validation table. Use the **strict** keyword to forward packets only when both the IP source address and the MAC source address match one of the IP-MAC address pair entries in the table. When the MAC address in the table does not match the MAC source address, or when IP source address of the incoming packet does not match any of the IP addresses in the validation table, the packet is dropped.

The **loose** keyword forwards packets when both the IP source address and the MAC source address match one of the IP-MAC address pair entries in the MAC validation table. When the IP source address matches one of the IP source addresses in the table, but the MAC address of the incoming packet does not match the MAC address of the entry in the table, the packet is dropped. However, when the IP source address of the incoming packet does not match any of the IP addresses in the table, the packet is forwarded. This is the default setting.

NOTE: When a DHCP discover or a DHCP request packet arrives from a requesting client to the router that functions as the DHCP server or the delegating router on an interface, and if you configured either strict or loose mode of MAC address validation on that interface, the DHCP discover or request packets are processed correctly and are not dropped.

When a dynamic IP subscriber interface is created with the MAC address validation state inherited from the static primary IP interface, an entry for the MAC source address is installed in the MAC validation table when MAC address validation is enabled (either loose or strict) on the static primary IP interface. For each packet received on this interface,

the router compares the packet's MAC source address to the value in the MAC validation table. If these values match, the router forwards the packet; otherwise, the packet is discarded.

In addition, creation of the dynamic IP subscriber interface adds a static MAC address validation entry in the router's Address Resolution Protocol (ARP) table. This occurs regardless of whether you configure MAC address validation on the static primary IP interface with the **ip mac-validate strict** command or the **ip mac-validate loose** command.

Configuration of MAC Address Validation State Inheritance

No special configuration is required to enable inheritance of the MAC address validation state on dynamic IP subscriber interfaces; this occurs automatically provided that MAC address validation is properly enabled on the parent static primary IP interface with the **ip mac-validate** command. If MAC address validation is disabled on the static primary IP interface, the dynamic subscriber interface inherits the disabled state for MAC address validation.

Keep the following guidelines in mind for using dynamic IP subscriber interfaces that inherit the MAC address validation state from their parent static primary IP interface:

- A dynamic subscriber interface inherits the MAC address validation state of its static primary IP interface only when the dynamic subscriber interface is created.
- You cannot change the MAC address validation state inherited by a dynamic subscriber interface from its static primary IP interface.
- Changing the MAC address validation state of a static primary IP interface does not affect the MAC address validation state of dynamic subscriber interfaces already created from this primary IP interface. Any dynamic subscriber interfaces created from this primary IP interface after you change the MAC address validation state inherit the new MAC validation state.
- When you configure a dynamic subscriber interface with one or more framed routes (subnets), we recommend that you use the **ip mac-validate loose** command to configure MAC address validation for the static primary IP interface. Using the **loose** keyword, which is the default, prevents the router from discarding packets with an IP source address from a subnet.
- Because enabling MAC address validation on an IP interface creates a static MAC address validation entry in the router's ARP table, be sure to observe the system limit for the maximum number of dynamic ARP table entries supported per line module. See the Link Layer Maximums tables in *Appendix A, System Maximums*, of the *Release Notes* corresponding to your software release for information about the maximum number of dynamic ARP entries that the router supports. Currently, this limit is set to 32,768 dynamic ARP entries for all E Series modules that support Ethernet interfaces.

Verification of MAC Address Validation State Inheritance

To verify inheritance of the MAC address validation state on a dynamic subscriber interface, you can use the **show ip mac-validate interface** command and the **show arp** command.

The following sample output from the **show ip mac-validate interface** command displays the MAC address validation state (strict) inherited by the dynamic subscriber interface ip74.39.64.3 from its parent static primary IP interface.

```
host1#show ip mac-validate interface ip74.39.64.3
ip74.39.64.3:  Strict

        Address       Hardware Addr
        74.39.64.3    0090.1a40.f4f6
```

Building on this example, the following sample output from the **show arp** command displays a static MAC address validation entry (74.39.64.3) in the ARP table for the dynamic subscriber interface when it is created with the MAC address validation state inherited from its parent static primary IP interface. The asterisk (*) indicates that the ARP entry was added as the result of issuing an **arp validate** command rather than an **arp** command.

```
host1#show arp
        Address          Age        Hardware Addr    Interface
     10.13.10.1        21600        0090.6939.751b    FastEthernet6/0
     74.39.64.3          -          0090.1a40.f4f6    ip74.39.64.3 *
    192.168.1.2        20700        0090.1a40.280d    FastEthernet8/2
```

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8
- Inheritance of MAC Address Validation State for Dynamic Subscriber Interfaces Overview on page 19
- Example: Configuring Static Subscriber Interfaces on page 23
- Example: Configuring Dynamic Subscriber Interfaces on page 31

Inheritance of MAC Address Validation State for Dynamic Subscriber Interfaces Overview

A dynamic IP subscriber interface inherits the MAC address validation state (enabled or disabled) configured for its parent static primary IP interface.

MAC address validation binds a MAC source address for an interface to a given IP source address. When the IP-MAC binding is established, the router forwards ingress packets on the interface when the packet's MAC source address and IP source address match, and drops ingress packets when the packet's MAC source address and IP source address do not match. MAC address validation thereby prevents spoofing on IP-based Ethernet interfaces, and is very useful in subscriber management applications.

When MAC address validation is enabled on an interface, the router checks the entry in the MAC validation table that corresponds to the IP source address of an incoming packet.

The MAC source address of the packet must match the MAC source address of the table entry for the router to forward the packet.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Dynamic Interfaces and Dynamic Subscriber Interfaces Overview on page 4
- Characteristics of Subscriber Interfaces on page 6
- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Applications for Subscriber Interfaces on page 8
- How MAC Address Validation State Inheritance Works on page 17
- Example: Configuring Dynamic Subscriber Interfaces on page 31

PART 2

Configuration

CHAPTER 4

Configuration Tasks for Static Subscriber Interfaces

Example: Configuring Static Subscriber Interfaces

You can configure static subscriber interfaces on ATM, Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, or POS layer 2 interfaces.

The examples in this topic show how to configure static subscriber interfaces on a Fast Ethernet interface, but the steps for configuring static subscriber interfaces over other supported layer 2 interface types are similar.

Example: Using a Destination Address to Demultiplex Traffic

This example shows how you can use static subscriber interfaces to direct traffic toward special local content on the network, based on the traffic's destination address.

Requirements

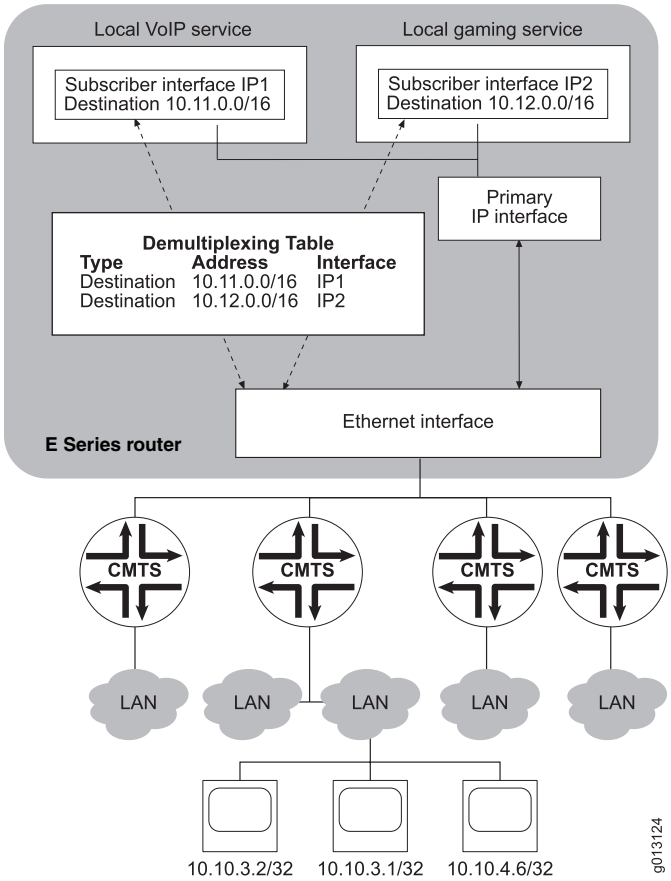
This example uses the following software and hardware components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

The example in Figure 7 on page 24 shows how you can use static subscriber interfaces to direct traffic toward special local content on the network, based on the traffic's destination address. In this application, a local VoIP service is on network 10.11.0.0./16, and a local gaming service is on network 10.12.0.0/16.

Figure 7: Subscriber Interfaces Using a Destination Address to Demultiplex Traffic



Using a Destination Address to Demultiplex Traffic

To configure the static subscriber interfaces shown in Figure 7 on page 24, perform the following steps:

1. Configure a primary IP interface on a supported layer 2 interface.
   a. Create a layer 2 interface.

      host1(config)#interface fastEthernet 3/1

   b. Create a primary IP interface.

      host1(config-if)#ip address 10.1.1.1 255.0.0.0

c. Configure the primary interface to use a destination address to demultiplex traffic for the subscriber interface. (By default, a source address is used to demultiplex traffic.)

```
host1(config-if)#ip demux-type da-prefix
```

Use the **no** version to restore the default situation in which the router uses a source address to demultiplex traffic.

d. Exit Interface Configuration mode.

```
host1(config-if)#exit
```

2. Configure subscriber interface IP1.

a. Create the shared IP interface.

```
host1(config)#interface ip ip1
```

Use the specified name to refer to the shared IP interface; you cannot use the layer 2 interface to refer to the shared IP interface, because the shared interface can be moved.

Use the **no** version to delete the IP interface.

b. Associate the shared IP interface with the layer 2 interface by using one of the following methods:

- Static

```
host1(config-if)#ip share-interface fastEthernet 3/1
```

If you issue this command on a shared IP interface, you cannot issue the **ip share-nexthop** command for the interface.

After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface is operationally up and IP is properly configured. You can create operational shared IP interfaces in the absence of a primary IP interface.

Use the **no** version to remove the association between the layer 2 interface and the shared IP interface. You can delete shared and primary IP interfaces independently.

- Dynamic

```
host1:vr-a:vrf-1(config-if)#ip share-nexthop 10.1.1.2
```

You can use this command to specify that the shared IP interface dynamically tracks a next hop. If the next hop changes, the shared IP interface moves to the new layer 2 interface associated with the IP interface toward the new next hop.

If you issue this command on a shared IP interface, you cannot issue the **ip share-interface** command for the interface. If you issue this command on a shared IP interface, the shared interface cannot dynamically track the next hop for the specified destination if the next-hop IP address is resolvable over MPLS. If you specify a virtual router, the command fails if the VR does not already exist. If you do not specify a VR, the current VR is assumed.

After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface associated with the specified next hop is operationally up and IP is properly configured.

Use the **no** version to halt tracking of the next hop.

c. To fully configure the shared interface, assign an address or make it unnumbered.

```
host1(config-if)#ip unnumbered loopback 0
```

d. Specify the destination addresses for the subscriber interface to use to demultiplex traffic.

```
host1(config-if)#ip destination-prefix 10.11.0.0 255.255.0.0
```

On the ERX1440 Broadband Services Router or the E320 router, you can configure up to 1024 subnets for static subscriber interfaces per primary IP interface when each subnet has a variable network mask that is less than /32. The number of subnets identifying a single route (/32) is still limited by the global maximum of 16,000 hosts per line module.

Use the **no** version to remove the association between the interface and the specified IP destination address and mask.

e. Exit Interface Configuration mode.

```
host1(config-if)#exit
```

3. Repeat Step 2 to configure subscriber interface IP2.

```
host1(config)#interface ip ip2
host1(config-if)#ip share-interface fastEthernet 3/1
host1(config-if)#ip unnumbered loopback 0
host1(config-if)#ip destination-prefix 10.12.0.0 255.255.0.0
```

Example: Using a Source Address to Demultiplex Traffic

This example illustrates how you can use static subscriber interfaces to differentiate traffic for VPN access, based on the traffic's source address.

Requirements

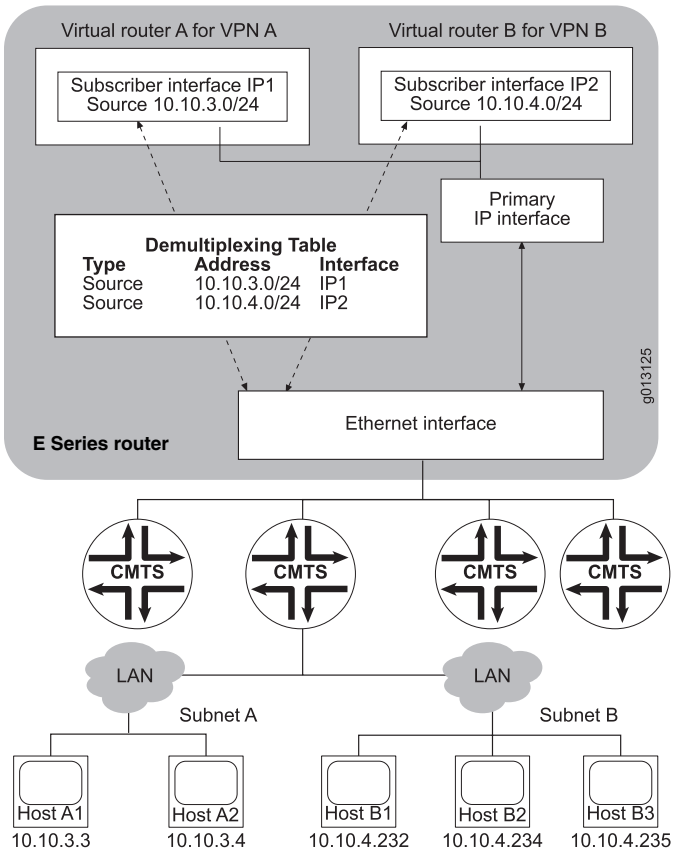
This example uses the following software and hardware components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

Figure 8 on page 27 shows how you can use static subscriber interfaces to differentiate traffic for VPN access, based on the traffic's source address.

Figure 8: Subscriber Interfaces Using a Source Address to Demultiplex Traffic



Using a Source Address to Demultiplex Traffic

To configure the static subscriber interfaces shown in Figure 8 on page 27, perform the following steps:

1. Configure a primary IP interface on a supported layer 2 interface.
   a. Create a layer 2 interface.

      host1(config)#interface fastEthernet 4/1

   b. Create a primary IP interface.

      host1(config-if)#ip address 10.1.1.1 255.255.255.0

   c. Exit Interface Configuration mode.

      host1(config-if)#exit

2. Configure subscriber interface IP1.

a. Create the shared IP interface.

```
host1(config)#virtual-router vra
  Proceed with new virtual-router creation? [confirm] yes
  host1:vra(config)#interface ip ip1
```

Use the specified name to refer to the shared IP interface; you cannot use the layer 2 interface to refer to the shared IP interface, because the shared interface can be moved.

Use the **no** version to delete the IP interface.

b. Associate the shared IP interface with the layer 2 interface by using one of the following methods:

- Static

```
host1:vra(config-if)#ip share-interface fastEthernet 4/1
```

If you issue this command on a shared IP interface, you cannot issue the **ip share-nexthop** command for the interface.

After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface is operationally up and IP is properly configured. You can create operational shared IP interfaces in the absence of a primary IP interface.

Use the **no** version to remove the association between the layer 2 interface and the shared IP interface. You can delete shared and primary IP interfaces independently.

- Dynamic

```
host1:vra(config-if)#ip share-nexthop 10.1.1.2
```

You can use this command to specify that the shared IP interface dynamically tracks a next hop. If the next hop changes, the shared IP interface moves to the new layer 2 interface associated with the IP interface toward the new next hop.

If you issue this command on a shared IP interface, you cannot issue the **ip share-interface** command for the interface. If you issue this command on a shared IP interface, the shared interface cannot dynamically track the next hop for the specified destination if the next-hop IP address is resolvable over MPLS. If you specify a virtual router, the command fails if the VR does not already exist. If you do not specify a VR, the current VR is assumed.

After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface associated with the specified next hop is operationally up and IP is properly configured.

Use the **no** version to halt tracking of the next hop.

c. To fully configure the shared interface, assign an address or make it unnumbered.

```
host1:vra(config-if)#ip unnumbered loopback 0
```

d. Specify the source addresses for the subscriber interface to use to demultiplex traffic, then exit Interface Configuration mode.

```
host1:vra(config-if)#ip source-prefix 10.10.3.0 255.255.255.0
host1:vra(config-if)#exit
```

On the ERX1440 router or the E320 router, you can configure up to 1024 subnets for static subscriber interfaces per primary IP interface when each subnet has a variable network mask that is less than /32. The number of subnets identifying a single route (/32) is still limited by the global maximum of 16,000 hosts per line module.

Use the **no** version to remove the association between the interface and the specified IP source address and mask.

3. Create a static route that sends traffic for destination address 10.10.3.0 to subscriber interface IP1.

```
host1:vra(config)#ip route 10.10.3.0 255.255.255.0 ip ip1
```

4. Repeat Step 2 to configure subscriber interface IP2.

```
host1(config)#virtual-router vrb
  Proceed with new virtual-router creation? [confirm] yes
host1:vrb(config)#interface ip ip2
host1:vrb(config-if)#ip share-interface fastEthernet 4/1
host1:vrb(config-if)#ip unnumbered loopback 0
host1:vrb(config-if)#ip source-prefix 10.10.4.0 255.255.255.0
host1:vrb(config-if)#exit
```

5. Create a static route that sends traffic for destination address 10.10.4.0 to subscriber interface IP2.

```
host1:vrb(config)#ip route 10.10.4.0 255.255.255.0 ip ip2
```

6. Specify that DHCP relay does not install host routes—this avoids a conflict that can causes undesirable ARP behavior.

```
host1(config)#set dhcp relay inhibit-access-route-creation
```

For details about the cause of this conflict and the use of the **set dhcp relay inhibit-access-route-creation** command to avoid the conflict, see Configuring DHCP Relay Proxy.

Related Documentation

- Subscriber Interfaces Overview on page 3
- Characteristics of Subscriber Interfaces on page 6
- How MAC Address Validation State Inheritance Works on page 17
- Example: Configuring Dynamic Subscriber Interfaces on page 31
- Example: Configuring Dynamic Subscriber Interfaces Using Loopback Interfaces on page 39
- interface fastEthernet on page 52
- interface ip on page 53
- ip address on page 57
- ip demux-type da-prefix on page 61

CHAPTER 5

Configuration Tasks for Dynamic Subscriber Interfaces

Example: Configuring Dynamic Subscriber Interfaces

You can configure dynamic subscriber interfaces in the following configurations:

- IP over Ethernet
- IP over VLAN over Ethernet
- IP over bridged Ethernet over ATM
- GRE tunnels

The following topics describe how to create each of these basic configurations. In addition, "Example: Configuring Dynamic Subscriber Interfaces Using Loopback Interfaces" on page 39, provides a detailed sample configuration.

Example: Configuring Dynamic Subscriber Interfaces over Ethernet

This example shows how you can configure a dynamic subscriber interface in an IP over Ethernet configuration by using DHCP events.

Requirements

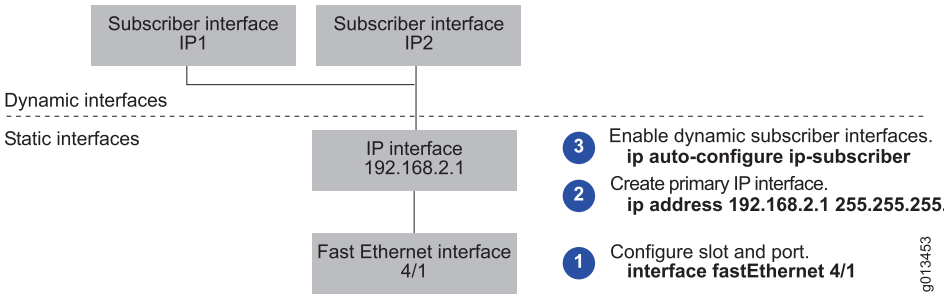
This example uses the following software and hardware components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

Figure 9 on page 32 shows the interface stack built for this configuration.

Figure 9: IP over Ethernet Dynamic Subscriber Interface Configuration



Configuring Dynamic Subscriber Interfaces over Ethernet

To configure a dynamic subscriber interface in an IP over Ethernet configuration by using DHCP events, perform the following steps:

1. Configure the DHCP server.

   For instructions, see Configuring the DHCP Local Server .

2. Specify a Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet port.

   host1(config)#interface fastEthernet 4/1

   Use the **no** version to remove IP from an interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or a subinterface if the one above it still exists.

3. Create the primary IP interface by assigning an IP address and mask to the Ethernet interface (or make it unnumbered).

   host1(config-if)#ip address 192.168.2.1 255.255.255.0

   You must specify the layer 2 encapsulation before you set the IP address. Issuing this command creates the primary IP interface. You must create a primary IP interface on which to enable dynamic creation of subscriber interfaces.

   Use the **no** version to remove the IP address or to disable IP processing.

4. Configure the primary IP interface to enable dynamic creation of subscriber interfaces.

   host1(config-if)#ip auto-configure ip-subscriber

The router creates the required dynamic subscriber interfaces when the IP address is assigned to the associated subscriber. The address might be assigned by an external DHCP server, the DHCP local server, or the packet detect feature.

Use the **include-primary** keyword to specify that the primary interface can be assigned to a subscriber. Use the **exclude-primary** keyword to specify that the primary interface is not used for subscribers. The primary interface is not assigned to a subscriber by default. You can issue this command from Interface Configuration mode, Subinterface Configuration mode, or Profile Configuration mode.

Use the **no** version to disable creation of dynamic subscriber interfaces associated with this primary IP interface. Use the **no** version with the **include-primary** keyword to specify that the primary interface is not assigned to a subscriber.

5. (Optional) Append the virtual router name to the subscriber interface in case of DSI configuration.

   host1(config-if)#ip auto-configure append-virtual-router-name

   You can use this command to allow more than one subscriber to have the same IP address across different virtual routers in the DSI configuration by appending the virtual router name to the interface. You can issue this command from either Interface Configuration mode or Profile Configuration mode.

   Use the **no** version to disable ip auto-configure on the static primary interface if it is already configured. This feature is enabled by default in a non-DSI configuration with the DHCP local server.

6. (Optional) Specify the source address of traffic that is destined for the primary IP interface.

   host1(config-if)#ip source-prefix 192.168.2.1 255.255.255.0

   You can use this command to configure a subscriber interface or a primary IP interface enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified source address. Use the **no** version to remove the association between the interface and the specified IP source address and mask.

Example: Configuring Dynamic Subscriber Interfaces over VLANs

This example shows how you can configure a dynamic subscriber interface in an IP over VLAN over Ethernet configuration by using DHCP events.

Requirements

This example uses the following software and hardware components:

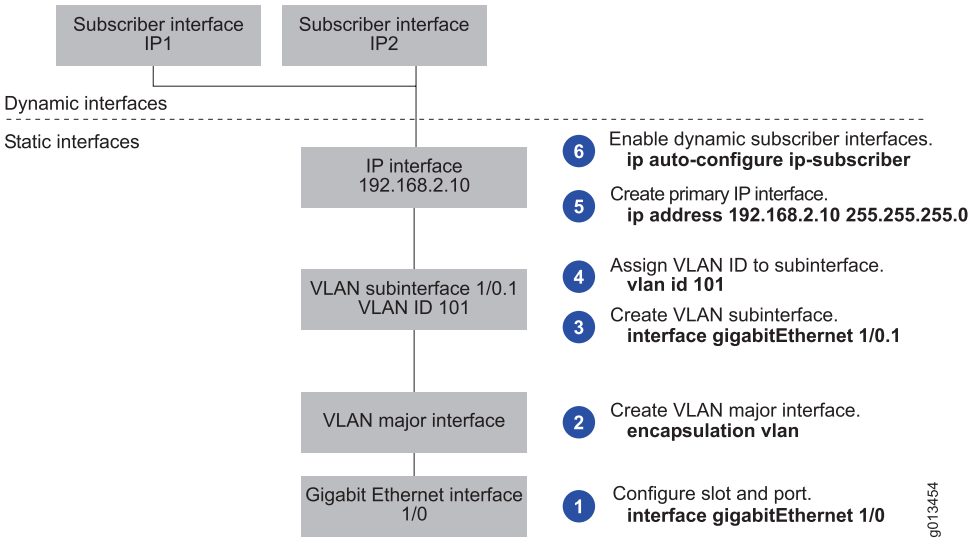
- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)

- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

Figure 10 on page 34 shows the interface stack built for this configuration.

Figure 10: IP over VLAN over Ethernet Dynamic Subscriber Interface Configuration



Configuring Dynamic Subscriber Interfaces over VLANs

To configure a dynamic subscriber interface in an IP over VLAN over Ethernet configuration by using DHCP events, perform the following steps:

1. Configure the DHCP server.

   For instructions, see Configuring the DHCP Local Server .

2. Specify a Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet port.

   host1(config)#interface gigabitEthernet 1/0

   NOTE: **You can configure only the primary port, 0, on the Gigabit Ethernet module. The router automatically uses the redundant port if the primary port fails.**

   Use the **no** version to remove IP from an interface. You must issue the **no** version from the highest level down; you cannot remove an interface or a subinterface if the one above it still exists.

3. Specify VLAN as the encapsulation method on the interface. This command creates the VLAN major interface.

   host1(config-if)#encapsulation vlan

   Use the **no** version to disable VLAN encapsulation on the interface.

4. Create a VLAN subinterface by adding a subinterface number to the interface identification command.

   host1(config-if)#interface gigabitEthernet 1/0.1

5. Assign a unique VLAN ID to the VLAN subinterface.

   host1(config-if)#vlan id 101

   You need to specify a VLAN ID number that is in the range 0–4095 and is unique within the Ethernet interface. Issue the **vlan id** command before you configure any upper-layer interfaces, such as IP.

   There is no **no** version.

6. Create the primary IP interface by assigning an IP address and mask to the VLAN subinterface (or make it unnumbered).

   host1(config-if)#ip address 192.168.2.10 255.255.255.0

   You must specify the layer 2 encapsulation before you set the IP address. Issuing this command creates the primary IP interface. You must create a primary IP interface on which to enable dynamic creation of subscriber interfaces.

   Use the **no** version to remove the IP address or to disable IP processing.

7. (Optional) Append the virtual router name to the subscriber interface in case of DSI configuration.

   host1(config-if)#ip auto-configure append-virtual-router-name

8. (Optional) Specify the source address of traffic that is destined for the primary IP interface.

   host1(config-if)#ip source-prefix 192.168.2.10 255.255.255.0

   You can use this command to configure a subscriber interface or a primary IP interface enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified source address. Use the **no** version to remove the association between the interface and the specified IP source address and mask.

Example: Configuring Dynamic Subscriber Interfaces over Bridged Ethernet

This example shows how you can configure a dynamic subscriber interface in an IP over bridged Ethernet over ATM configuration by using DHCP events.

Requirements

This example uses the following software and hardware components:

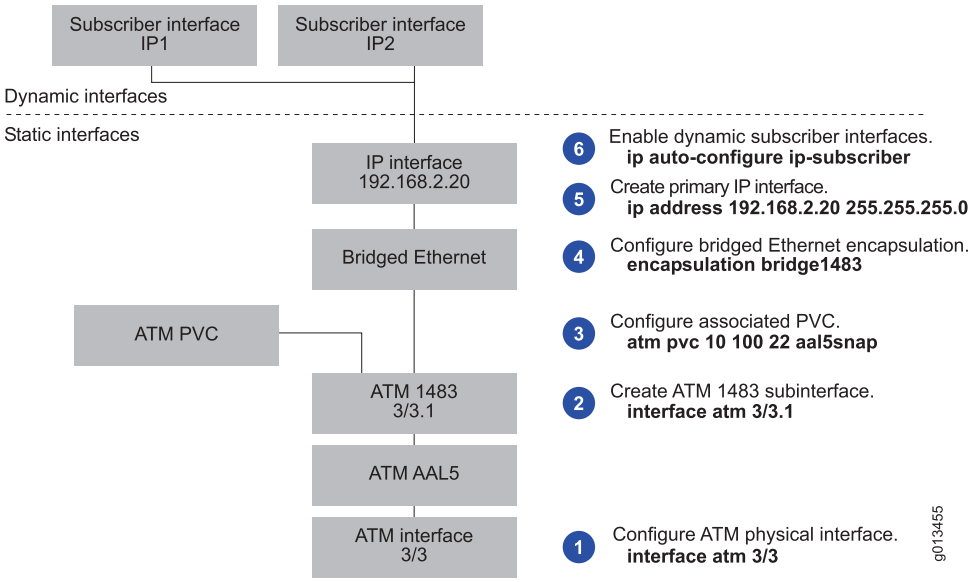
- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)

- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

Figure 11 on page 36 shows the interface stack built for this configuration.

Figure 11: IP over Bridged Ethernet over ATM Dynamic Subscriber Interface Configuration



Configuring Dynamic Subscriber Interfaces over Bridged Ethernet

To configure a dynamic subscriber interface in an IP over bridged Ethernet over ATM configuration by using DHCP events, perform the following steps:

1. Configure the DHCP server.

   For instructions, see Configuring the DHCP Local Server .

2. Create an ATM major interface.

   host1(config)#interface atm 3/3

3. Create an ATM 1483 subinterface.

   host1(config-if)#interface atm 3/3.1

4. Configure an associated PVC for the ATM 1483 subinterface by specifying the VCD, the VPI, the VCI, and the encapsulation type.

   host1(config-subif)#atm pvc 10 100 22 aal5snap

   Specify the VCD, the VPI, the VCI, and the encapsulation type. (For more information about these parameters, see the *Creating a Basic Configuration* section in *JunosE Link Layer Configuration Guide* .)

   Use the **no** version to remove the specified PVC.

5. Specify bridged Ethernet as the encapsulation method on the ATM 1483 subinterface.

   host1(config-subif)#encapsulation bridge1483

Use the **no** version to remove bridged Ethernet as the encapsulation method on the interface.

6. Create the primary IP interface by assigning an IP address and mask to the bridged Ethernet interface (or make it unnumbered).

   host1(config-subif)#ip address 192.168.2.20 255.255.255.0

   You must specify the layer 2 encapsulation before you set the IP address. Issuing this command creates the primary IP interface. You must create a primary IP interface on which to enable dynamic creation of subscriber interfaces.

   Use the **no** version to remove the IP address or to disable IP processing.

7. Configure the primary IP interface to enable dynamic creation of subscriber interfaces.

   host1(config-subif)#ip auto-configure ip-subscriber

8. (Optional) Append the virtual router name to the subscriber interface in case of DSI configuration.

   host1(config-if)#ip auto-configure append-virtual-router-name

9. (Optional) Specify the source address of traffic that is destined for the primary IP interface.

   host1(config-subif)#ip source-prefix 192.168.2.20 255.255.255.0

   You can use this command to configure a subscriber interface or a primary IP interface enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified source address. Use the **no** version to remove the association between the interface and the specified IP source address and mask.

Example: Configuring Dynamic Subscriber Interfaces over GRE Tunnels

This example shows how you can configure a dynamic subscriber interface in a GRE tunnel configuration by using packet detection.

Requirements

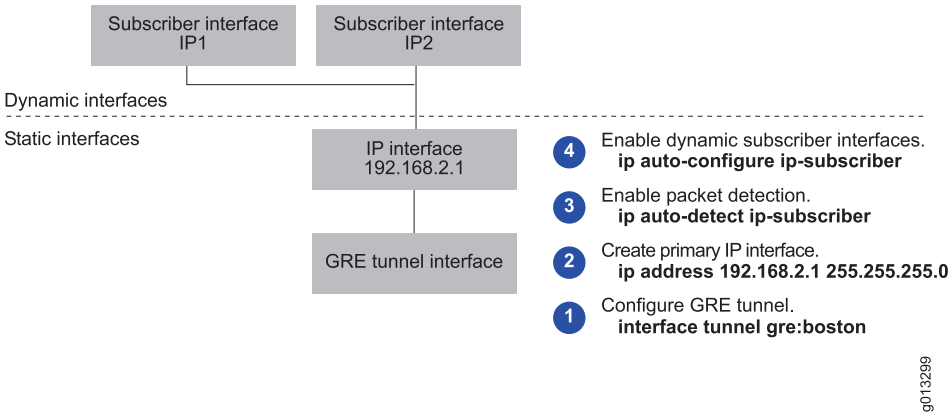
This example uses the following software and hardware components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

Figure 12 on page 38 shows the interface stack built for this configuration.

Figure 12: GRE Tunnel Dynamic Subscriber Interface Configuration



Configuring Dynamic Subscriber Interfaces over GRE Tunnels

To configure a dynamic subscriber interface in a GRE tunnel configuration by using packet detection, perform the following steps:

1. Create a GRE tunnel interface.

   For instructions, see the *Configuration Tasks* section in *JunosE IP Services Configuration Guide* .

2. Create the primary IP interface by assigning an IP address and mask to the bridged Ethernet interface (or make it unnumbered).

   host1(config-subif)#ip address 192.168.2.20 255.255.255.0

   You must specify the layer 2 encapsulation before you set the IP address. Issuing this command creates the primary IP interface. You must create a primary IP interface on which to enable dynamic creation of subscriber interfaces.

   Use the **no** version to remove the IP address or to disable IP processing.

3. Configure the packet detect feature and specify that IP automatically detect packets that do not match any entries in the demultiplexer table.

   host1(config-if)#ip auto-detect ip-subscriber

   When an unmatched packet is detected, an event is generated that determines whether to create a dynamic subscriber interface.

   Use the **no** version to restore the default, in which packet detection is disabled.

4. Configure the primary IP interface to enable dynamic creation of subscriber interfaces.

   host1(config-subif)#ip auto-configure ip-subscriber

5. (Optional) Append the virtual router name to the subscriber interface in case of DSI configuration.

   host1(config-if)#ip auto-configure append-virtual-router-name

6. (Optional) Specify the IP inactivity timer.

   host1(config-subif)#ip inactivity-timer 100

A dynamically created subscriber interface is deleted if it is inactive for a period longer than the inactivity timer value. The timer value can be in the range 1–65335 minutes. A timer value of 0 specifies that dynamically created subscriber interfaces are never deleted by the inactivity timer.

Use the **no** version to restore the default, in which inactivity timer feature is disabled.

7. (Optional) Specify the source address of traffic that is destined for the primary IP interface.

```
host1(config-subif)#ip source-prefix 192.168.2.1 255.255.255.0
```

You can use this command to configure a subscriber interface or a primary IP interface enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified source address. Use the **no** version to remove the association between the interface and the specified IP source address and mask.

Related Documentation

- Dynamic Creation of Subscriber Interfaces Overview on page 16
- Example: Configuring Dynamic Subscriber Interfaces Using Loopback Interfaces on page 39

Example: Configuring Dynamic Subscriber Interfaces Using Loopback Interfaces

This example shows how to configure dynamic subscriber interfaces by using the same loopback interface referenced by multiple unnumbered IP interfaces.

Requirements

This example uses the following software and hardware components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Overview

The procedure in this topic shows how to configure dynamic subscriber interfaces by using the same loopback interface referenced by multiple unnumbered IP interfaces. Instead of assigning a different IP address to each physical interface, this example assigns an IP address to a loopback interface (loopback 0). Each physical interface is then configured as an unnumbered IP interface, referencing the same loopback interface. This example uses a DHCP local server.

This approach has the following benefits:

- A loopback interface provides a stable IP address that can minimize the impact if a physical interface in the network goes down.
- Unnumbered IP interfaces preserve valuable IP address space.

Configuring a Dynamic Subscriber Interface

Step-by-Step Procedure

To configure dynamic subscriber interfaces, perform the following steps:

1. Enable the DHCP local server for standalone mode.

   host1(config)#service dhcp-local standalone

2. Configure DHCP relay to use information in the giaddr in DHCP server-destined packets to identify the primary interface on which dynamic subscriber interfaces are built. See the *Using the Giaddr to Identify the Primary Interface for Dynamic Subscriber Interfaces* section in DHCP Relay and BOOTP Relay Overview for additional information about this feature.

   host1(config)#set dhcp relay giaddr-selects-interface

   Use the **no**version to restore the default in which DHCP relay builds dynamic subscriber interfaces on the IP interface that is used for DHCP server-destined messages.

3. Access DHCP Local Pool Configuration mode for the local address pool.

   host1(config)#ip dhcp-local pool ispWestford

   The DHCP local server uses pool names other than default to maintain configuration information for subscribers to a particular domain.

   Use the **no** version to prevent the DHCP local server from supplying IP addresses from the specified pool.

4. Specify the enduring IP addresses that the DHCP local server can assign from the local address pool.

   host1(config-dhcp-local)#network 10.20.0.0 255.255.192.0

5. Specify the router to forward traffic from the IP addresses to destinations on other subnets.

   host1(config-dhcp-local)#default-router 10.20.32.1

   You can specify the IP address of a primary server, and optionally, specify the IP address of a secondary server.

   Use the **no** version to remove the association between the address pool and the router.

6. Exit DHCP Local Pool Configuration mode.

   host1(config-dhcp-local)#exit

7. Configure a loopback interface.

   host1(config)#interface loopback 0

BEST PRACTICE: We recommend that you configure a 32-bit subnet mask for the loopback interface. For example, if you configure a loopback interface with the IP address and mask as 1.1.1.1/16, the 1.1.0.0/16 route entry is entered on the line module and all traffic destined to the to 1.1.0.0/16 subnet is forwarded to the SRP module by the line module. Although the SRP module responds only to traffic destined to the 1.1.1.1 subnet and discards traffic to all other host IP addresses within that subnet (1.1.1.1/16), if no specific or longer route entry is found or if the SRP module receives too much traffic from subnets other than 1.1.1.1, the CPU utilization on the SRP module reaches the saturation level.

If you use a subnet mask other than a /32 mask for the IP address configured on the loopback interface, traffic from the entire subnet is routed to the loopback interface. Therefore, that subnet cannot be routed through any other interface on the router, unless a more specific route points to another interface.

8. Assign an IP address and mask to the loopback interface.

   host1(config-if)#ip address 10.20.32.1 255.255.255.255

   You must specify the layer 2 encapsulation before you set the IP address. Issuing this command creates the primary IP interface. You must create a primary IP interface on which to enable dynamic creation of subscriber interfaces.

   Use the **no** version to remove the IP address or to disable IP processing.

9. Exit Interface Configuration mode.

   host1(config-if)#exit

10. Specify a Fast Ethernet port.

    host1(config)#interface fastEthernet 3/0

    Use the **no** version to remove IP from an interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or a subinterface if the one above it still exists.

11. Create an unnumbered primary IP interface associated with the loopback interface configured in Steps 6 and 7.

    host1(config-if)#ip unnumbered loopback 0

    This command enables IP processing on an interface without assigning an explicit IP address to the interface. You must specify an interface location, which is the identifier of another interface on which the router has an assigned IP address. This interface cannot be another unnumbered interface.

    Use the **no** version to disable IP processing on the interface.

12. Configure a static primary IP interface to use framed routes as source IP addresses when creating dynamic subscriber interfaces.

    host1(config-if)#ip use-framed-routes ip-subscriber

The router uses the Framed-Route RADIUS attribute [22] sent in Access-Accept messages to apply framed routes to subscriber interfaces associated with the primary interface.

Use the **no** version to disable the use of framed routes when creating dynamic subscriber interfaces associated with this primary IP interface.

13. Configure the primary IP interface to enable dynamic creation of subscriber interfaces. The specified IP interface is considered the primary interface.

    host1(config-if)#ip auto-configure ip-subscriber

    The router creates the required dynamic subscriber interfaces when the IP address is assigned to the associated subscriber. The address might be assigned by an external DHCP server, the DHCP local server, or the packet detect feature.

    Use the **include-primary** keyword to specify that the primary interface can be assigned to a subscriber. Use the **exclude-primary** keyword to specify that the primary interface is not used for subscribers. The primary interface is not assigned to a subscriber by default. You can issue this command from Interface Configuration mode, Subinterface Configuration mode, or Profile Configuration mode.

    Use the **no** version to disable creation of dynamic subscriber interfaces associated with this primary IP interface. Use the **no** version with the **include-primary** keyword to specify that the primary interface is not assigned to a subscriber.

14. (Optional) Append the virtual router name to the subscriber interface in case of DSI configuration.

    host1(config-if)#ip auto-configure append-virtual-router-name

    You can use this command to allow more than one subscriber to have the same IP address across different virtual routers in the DSI configuration by appending the virtual router name to the interface. You can issue this command from either Interface Configuration mode or Profile Configuration mode.

    Use the **no** version to disable ip auto-configure on the static primary interface if it is already configured. This feature is enabled by default in a non-DSI configuration with the DHCP local server.

15. Exit Interface Configuration mode.

    host1(config-if)#exit

16. Repeat Steps 9 through 12 for each Fast Ethernet interface on which you want to configure dynamic subscriber interfaces. For example:

    host1(config)#interface fastEthernet 3/1
    host1(config-if)#ip unnumbered loopback 0
    host1(config-if)#ip auto-configure ip-subscriber
    host1(config-if)#ip auto-configure append-virtual-router-name
    host1(config-if)#exit
    host1(config)#interface fastEthernet 3/2
    host1(config-if)#ip unnumbered loopback 0
    host1(config-if)#ip auto-configure ip-subscriber
    host1(config-if)#ip auto-configure append-virtual-router-name
    host1(config-if)#exit

Related Documentation

- Example: Configuring Dynamic Subscriber Interfaces on page 31
- atm pvc on page 46
- encapsulation bridge1483 on page 49
- encapsulation vlan on page 50
- interface atm on page 51
- interface fastEthernet on page 52
- interface gigabitEthernet on page 54
- interface tenGigabitEthernet on page 55
- interface loopback on page 56
- ip address on page 57
- ip auto-configure append-virtual-router-name on page 58
- ip auto-configure ip-subscriber on page 59
- ip auto-detect ip-subscriber on page 60
- ip dhcp-local pool on page 67
- ip inactivity-timer on page 68
- ip source-prefix on page 65
- ip unnumbered on page 66
- ip use-framed-routes ip-subscriber on page 71
- network on page 72
- service dhcp-local on page 74
- set dhcp relay giaddr-selects-interface on page 75
- vlan id on page 76

CHAPTER 6

Configuration Commands

atm pvc

Syntax To create a PVC on an ATM interface when using the **aal5snap**, **aal5autoconfig**, or **aal5mux ip** encapsulation type:

atm pvc *vcd vpi vci encapsulation* [cbr *cbr* | *peak* [*average burst* [rt]]]
[oam [*seconds* | cc [segment | end-to-end] { source | sink | both }]]
[inArp [*minutes*]]

no atm pvc *vcd*

To create a PVC on an ATM interface when using the **aal5all**, **aal0**, or **ilmi** encapsulation type:

atm pvc *vcd vpi vci encapsulation* [cbr *cbr* | *peak* [*average burst* [rt]]]

no atm pvc *vcd*

To use a profile to apply encapsulation and traffic-shaping parameters to a bulk range of PVCs configured for a dynamic ATM 1483 subinterface:

atm pvc *encapsulation* [cbr *cbr* | *peak* [*average burst* [rt]]] [oam *seconds*]

no atm pvc

Release Information Command introduced before JunosE Release 7.1.0.

Description From Interface Configuration or Subinterface Configuration mode, creates a PVC on an ATM interface. The **no** version removes the specified PVC.

From Profile Configuration mode, applies encapsulation, traffic-shaping, and OAM parameters to the range of PVCs configured on a static ATM AAL5 interface for use by a dynamic ATM 1483 subinterface. The **no** version restores the default service type, UBR, on the VC range.

NOTE: The optional *peak*, *average*, and *burst* parameters configure traffic-shaping parameters for the circuit. The allowable traffic-shaping features and range specifications depend on the line module capabilities.

Options

- *vcd*—Virtual circuit descriptor that is an identifier for the VC in other commands; in the range 1–2147483647
- *vpi*—Virtual path identifier of this PVC. The allowable numeric range depends on the line module capabilities and current configuration. The VPI and VCI cannot both be set to 0; if one is 0, the other cannot be 0.
- *vci*—Virtual circuit identifier of this PVC. The allowable numeric range depends on the line module capabilities and current configuration. The VPI and VCI cannot both be set to 0; if one is 0, the other cannot be 0.

- *encapsulation*—Available options differ for ATM interfaces and dynamic ATM 1483 subinterfaces, as follows:
  - For PVCs created on ATM interfaces:
    - aal5all—Causes the router to pass through all ATM AAL5 traffic without interpreting it; supported for ATM layer 2 services over MPLS
    - aal0—Causes the router to receive raw ATM cells on this circuit and forward the cells without performing AAL5 packet reassembly; supported for ATM layer 2 services over MPLS
    - aal5snap—LLC encapsulated circuit; LLC/SNAP header precedes the protocol datagram
    - aal5mux ip—VC-based multiplexed circuit used for IP only
    - aal5autoconfig—Enables autodetection of the 1483 encapsulation (LLC/SNAP or VC multiplexed)
    - ilmi—Integrated local management interface encapsulation
  - For PVCs created on dynamic ATM 1483 subinterfaces:
    - aal5snap—LLC encapsulated circuit; LLC/SNAP header precedes the protocol datagram
    - aal5mux ip—VC-based multiplexed circuit used for IP only
    - aal5autoconfig—Enables autodetection of the 1483 encapsulation (LLC/SNAP or VC multiplexed)
- *cbr*—Constant bit rate in Kbps
- *peak*—PCR in Kbps
- *average*—Average rate in Kbps; also referred to as SCR
- *burst*—Length in cells of the burst; also referred to as MBS
- rt—Selects VBR-RT as the service type; the default type is VBR-NRT. You can select **rt** only if you set the *peak*, *average*, and *burst* parameters.
- oam—Enables generation of OAM F5 loopback cells on this circuit. This option enables VC integrity features that affect the operational state of the ATM PVC. You can use the **oam** keyword only if you specify the **aal5snap**, **aal5autoconfig**, or **aal5mux ip** encapsulation type.
- *seconds*—Time interval in the range 1–600 seconds between transmissions of OAM F5 end-to-end loopback cells for VC connectivity verification.
- inArp—Enables Inverse ARP. You can use the **inArp** keyword only if you specify the **aal5snap** encapsulation type.
- *minutes*—Inverse ARP refresh rate in minutes; 15 minutes is the default
- cc—Enables CC cells on the PVC; you can enable CC cells only on data circuits, not on control circuits, such as ILMI or signaling circuits
- segment—Opens an OAM CC segment cell flow

- end-to-end—Opens an OAM CC end-to-end cell flow
- sink—Enables this VC as a sink point (cell receiver)
- source—Enables this VC as the source point (cell generator)
- both—Enables this VC as both a sink point and a source point

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

Related Documentation

- Configuring an MPLS Pseudowire with VCC Cell Relay Encapsulation
- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring MPLS LSPs for VPWS

encapsulation bridge1483

Syntax encapsulation bridge1483 [mac-address *macAddress*]

no encapsulation bridge1483

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures bridged Ethernet as the encapsulation method on an interface and optionally assigns a MAC address to the interface. The **no** version removes bridged Ethernet as the encapsulation method on the interface.

Options

- *macAddress*—User-configured MAC address for the interface. The MAC address format is a dotted triple of four-digit hexadecimal numbers; for example, 0090.1a40.4c7c. Multicast MAC address cannot be configured on bridged Ethernet interfaces.

Mode Subinterface Configuration

encapsulation vlan

Syntax [no] encapsulation vlan

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures VLAN as the encapsulation method for the interface. The **no** version removes VLAN encapsulation from the interface.

Mode Interface Configuration, Subinterface Configuration

Related Documentation

- Configuring Ethernet/VLAN Layer 2 Services
- Configuring S-VLAN Tunnels for Layer 2 Services
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces

interface atm

Syntax [no] interface atm *interfaceSpecifier* [multipoint | point-to-point]

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures an ATM interface or subinterface type. The **no** version removes the interface or subinterface.

NOTE: On the OC3-2 GE APS I/O module, you can configure only OC3/STM1 ATM interfaces in ports 0 and 1. Port 2 is reserved for a Gigabit Ethernet interface.

Options

- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers
- multipoint—Specifies an NBMA subinterface
- point-to-point—Specifies an ATM interface or subinterface; default

Mode Global Configuration, Interface Configuration

Related Documentation

- Configuring an MPLS Pseudowire with VCC Cell Relay Encapsulation
- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring MPLS LSPs for VPWS

interface fastEthernet

Syntax [no] interface fastEthernet *interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies a Fast Ethernet interface or subinterface or creates a subinterface over a Fast Ethernet interface. The **no** version removes the interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or subinterface if the one above it still exists.

Options
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Global Configuration

Related Documentation
- Configuring Customer-Facing Interfaces in the VPWS Instance
- Configuring Ethernet/VLAN Layer 2 Services
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces
- Configuring S-VLAN Tunnels for Layer 2 Services

interface ip

Syntax [no] interface ip *interfaceName*

Release Information Command introduced before JunosE Release 7.1.0.

Description Defines a shared IP interface. You can use the specified name to refer to the shared IP interface; you cannot use the layer 2 interface to refer to the shared IP interface, because the shared interface can be moved. The **no** version removes the IP interface.

Options
- *interfaceName*—String of up to 15 characters

Mode Global Configuration

interface gigabitEthernet

Syntax [no] interface gigabitEthernet *interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies or creates a Gigabit Ethernet interface or a subinterface over a Gigabit Ethernet interface. The **no** version removes the interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or subinterface if the one above it still exists.

NOTE: On the GE I/O module, you can configure only the primary port, 0. The router automatically uses the redundant port, 0R, if the primary port fails.

On the GE-2 APS I/O module, you can configure only the primary ports, 0 and 1. The router automatically uses the corresponding redundant port, 0R or 1R, if the primary port fails.

On the OC3-2 GE APS I/O module, you can configure only a Gigabit Ethernet interface in port 2. Ports 0 and 1 are reserved for OC3/STM1 ATM interfaces.

On the ES-2 GE-4 IOA, you can configure all four ports.

Options

- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Global Configuration

Related Documentation

- Configuring the QoS Shaping Mode for Ethernet Interfaces
- Creating a QoS Interface Hierarchy for Bulk-Configured VLAN Subinterfaces with RADIUS
- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode

interface tenGigabitEthernet

Syntax [no] interface tenGigabitEthernet *interfaceSpecifier*

Release Information Command introduced in JunosE Release 7.1.0.

Description Specifies or creates a 10-Gigabit Ethernet interface or a subinterface over a 10-Gigabit Ethernet interface. The **no** version removes the interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or subinterface if the one above it still exists.

Options

- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Global Configuration

interface loopback

Syntax [no] interface loopback *interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Defines a loopback interface, which provides a stable address for protocols (for example, BGP, Telnet, or LDP) to use so that they can avoid any impact if a physical interface goes down. The loopback interface sends packets back to the router or access server for local processing. Any packets routed from the loopback interface, but not destined to the loopback interface, are dropped. The **no** version deletes the loopback interface.

NOTE: Do not confuse loopback with the null 0 interface. Traffic routed to null 0 is discarded on the line module.

You cannot shut down a loopback interface.

BEST PRACTICE: We recommend that you configure a 32-bit subnet mask for the loopback interface. For example, if you configure a loopback interface with the IP address and mask as 1.1.1.1/16, the 1.1.0.0/16 route entry is entered on the line module and if no specific or longer route entry is found, all traffic destined to the 1.1.0.0/16 subnet is forwarded to the SRP module by the line module. Although the SRP module responds only to traffic destined to the 1.1.1.1 subnet and discards traffic to all other host IP addresses within that subnet (1.1.1.1/16), if the SRP module receives too much traffic from subnets other than 1.1.1.1, the CPU utilization on the SRP module reaches the saturation level.

Options

- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Global Configuration

Related Documentation

- Configuring an MPLS Pseudowire with VCC Cell Relay Encapsulation
- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces
- Configuring the Loopback Interface and Router ID for BGP for VPWS
- Configuring the Loopback Interface and Router ID for VPLS

ip address

Syntax ip address *ipAddress ipMask* [secondary]

no ip address [*ipAddress ipMask* [secondary]]

Release Information Command introduced before JunosE Release 7.1.0.

Description Sets a primary or secondary IP address for an interface or subinterface. The **no** version removes an IP address or disables IP processing. You must specify the layer 2 encapsulation before you can set the IP address.

Options

- *ipAddress*—IP address in 32-bit dotted decimal format (for example, 192.56.32.2)
- *ipMask*—mask for associated IP subnet in dotted decimal or prefix length notation
- secondary—Specifies that the configured address is a secondary IP address; if omitted, the configured address is the primary IP address

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

Related Documentation

- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces
- Configuring the Loopback Interface and Router ID for BGP for VPWS
- Configuring the Loopback Interface and Router ID for VPLS
- Configuring MPLS LSPs for VPWS

ip auto-configure append-virtual-router-name

Syntax [no] ip auto-configure append-virtual-router-name

Release Information Command introduced in JunosE Release 12.1.0.

Description Appends the virtual router name to the subscriber interface name in the dynamic subscriber interface (DSI) configuration. This feature is enabled by default in a non-DSI configuration with the DHCP local server. The **no** version restores the default behavior where subscribers with the same IP address are disallowed in the DSI configuration.

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

ip auto-configure ip-subscriber

Syntax [no] ip auto-configure ip-subscriber [include-primary | exclude-primary]

Release Information Command introduced before JunosE Release 7.1.0.
include-primary and **exclude-primary** keywords added in JunosE Release 7.1.0.

Description Configures a primary IP interface to support creation of dynamic subscriber interfaces. The **include-primary** and **exclude-primary** keywords specify whether the primary interface can be assigned to a subscriber. The primary interface is not assigned to a subscriber by default.

The router creates the required dynamic subscriber interfaces when the IP address is assigned to the associated subscriber. The address might be assigned by an external DHCP server, the DHCP local server, or the packet detect feature. The primary interface is not assigned to a subscriber by default.

The **no** version disables creation of dynamic subscriber interfaces on this primary IP interface. Use the **no** version with the **include-primary** keyword to specify that the primary interface is not assigned to a subscriber.

Options

- include-primary—Specifies that the primary interface can be assigned to a subscriber; the **no** version disables the assignment of the primary interface
- exclude-primary—Specifies that the primary interface cannot be assigned to a subscriber; the **no** version enables the assignment of the primary interface

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

ip auto-detect ip-subscriber

Syntax [no] ip auto-detect ip-subscriber

Release Information Command introduced before JunosE Release 7.1.0.

Description Sets the router's packet detect feature, specifying that IP automatically detect packets that do not match any entries in the demultiplexer table. When an unmatched packet is detected, an event is generated that determines whether to create a dynamic subscriber interface or to configure an existing interface. The **no** version disables autodetection.

Mode Interface Configuration, Profile Configuration

ip demux-type da-prefix

Syntax [no] ip demux-type da-prefix

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies that a subscriber interface will demultiplex traffic using destination addresses. The **no** version restores the default situation, in which the subscriber interface demultiplexes traffic using source addresses.

Mode Interface Configuration

ip destination-prefix

Syntax [no] ip destination-prefix *ipAddress ipAddressMask* deny

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures a subscriber interface or a primary IP interface that is enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified destination address. On the ERX1440 Broadband Services Router or the E320 router, you can configure up to 1024 subnets for static subscriber interfaces per primary IP interface when each subnet has a variable network mask that is less than /32. The number of subnets identifying a single route (/32) is still limited by the global maximum of 16,000 hosts per line module. The **no** version removes the association between the interface and the specified destination address.

Options

- *ipAddress*—Destination IP address that the router uses to identify packets for this interface
- *ipAddressMask*—Network mask for associated IP subnet
- deny—Filters packets matching this command

Mode Interface Configuration, Subinterface Configuration

ip share-interface

Syntax ip share-interface *interfaceType interfaceSpecifier*

no ip share-interface

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies the layer 2 interface that an IP interface will share in the current virtual router. The command fails if the layer 2 interface does not yet exist.

If you issue this command on a shared IP interface, you cannot issue the **ip share-nexthop** command for the interface. After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface is operationally up and IP is properly configured. You can create operational shared IP interfaces in the absence of a primary IP interface.

The **no** version removes the association between the layer 2 interface and the shared IP interface. You can delete shared and primary IP interfaces independently

Options

- *interfaceType*—Interface type; see Interface Types and Specifiers
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Interface Configuration

ip share-nexthop

Syntax ip share-nexthop *ipAddress* [virtual-router *vrName*]

no ip share-nexthop

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies that the shared IP interface dynamically tracks a next hop for the specified destination. If the next hop changes, the shared IP interface moves to the new layer 2 interface associated with the IP interface toward the new next hop.

If you issue this command on a shared IP interface, you cannot issue the **ip share-interface** command for the interface. If you issue this command on a shared IP interface, the shared interface cannot dynamically track the next hop for the specified destination if the next-hop IP address is resolvable over MPLS. If you specify a virtual router, the command fails if the VR does not already exist. If you do not specify a VR, the current VR is assumed.

After creating the shared IP interface, you can configure it as you do any other IP interface. The shared interface is operationally up when the layer 2 interface associated with the specified next hop is operationally up and IP is properly configured.

The **no** version halts tracking of the next hop.

Options

- *ipAddress*—IP address of the destination for which the next hop is tracked
- *vrName*—Name of the virtual router for the next hop

Mode Interface Configuration

ip source-prefix

Syntax [no] ip source-prefix *ipAddress ipAddressMask* deny

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures a subscriber interface or a primary IP interface that is enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified IP address and mask. On the ERX1440 router or the E320 router, you can configure up to 1024 subnets for static subscriber interfaces per primary IP interface when each subnet has a variable network mask that is less than /32. The number of subnets identifying a single route (/32) is still limited by the global maximum of 16,000 hosts per line module. The **no** version removes the association between the interface and the specified IP address and mask.

Options

- *ipAddress*—IP address of the physical interface that receives messages for this subscriber
- *ipAddressMask*—Network mask for associated IP subnet
- deny—Filters packets matching this command

Mode Interface Configuration, Subinterface Configuration

ip unnumbered

Syntax [no] ip unnumbered *interfaceType interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Enables IP processing on an interface without assigning an explicit IP address to the interface. You must specify an interface location, which is the identifier of another interface on which the router has an assigned IP address. This interface cannot be another unnumbered interface. The **no** version disables IP processing on the interface.

NOTE: You can specify an unnumbered interface using RADIUS instead of using this command in a profile. For more information about how to specify an unnumbered interface using RADIUS, see *Configuring RADIUS Attributes* in the *JunosE Broadband Access Configuration Guide*.

Options

- *interfaceType*—Interface type; see Interface Types and Specifiers
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

Related Documentation

- Setting Up an Unnumbered Interface
- Configuring Profile Attributes for IP
- Configuring IPv4 Characteristics for a Profile

ip dhcp-local pool

Syntax [no] ip dhcp-local pool { *poolName* | default }

Release Information Command introduced before JunosE Release 7.1.0.

Description Accesses DHCP Local Pool Configuration mode. The DHCP local server uses pool names other than default to maintain configuration information for subscribers to a particular domain. The **no** version prevents the DHCP local server from supplying IP addresses from the specified pool.

Options
- *poolName*—Name of the address pool
- default—Specifies the default address pool

Mode Global Configuration

ip inactivity-timer

Syntax [no] ip inactivity-timer *inactiveTime*

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures an inactivity timer. IP polls the dynamic interface at the configured interval to determine whether the interface was active during the interval. Inactive interfaces are deleted only when the period of inactivity is equal to or greater than the configured value. The **no** version disables the timer.

Options

- *inactiveTime*—Length of time in the range 0–63335 minutes; a value of 0 specifies that dynamically created subscriber interfaces are not deleted

Mode Interface Configuration, Profile Configuration

ip source-prefix

Syntax [no] ip source-prefix *ipAddress ipAddressMask* deny

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures a subscriber interface or a primary IP interface that is enabled for dynamic creation of subscriber interfaces to demultiplex traffic with the specified IP address and mask. On the ERX1440 router or the E320 router, you can configure up to 1024 subnets for static subscriber interfaces per primary IP interface when each subnet has a variable network mask that is less than /32. The number of subnets identifying a single route (/32) is still limited by the global maximum of 16,000 hosts per line module. The **no** version removes the association between the interface and the specified IP address and mask.

Options

- *ipAddress*—IP address of the physical interface that receives messages for this subscriber
- *ipAddressMask*—Network mask for associated IP subnet
- deny—Filters packets matching this command

Mode Interface Configuration, Subinterface Configuration

ip unnumbered

Syntax [no] ip unnumbered *interfaceType interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Enables IP processing on an interface without assigning an explicit IP address to the interface. You must specify an interface location, which is the identifier of another interface on which the router has an assigned IP address. This interface cannot be another unnumbered interface. The **no** version disables IP processing on the interface.

NOTE: You can specify an unnumbered interface using RADIUS instead of using this command in a profile. For more information about how to specify an unnumbered interface using RADIUS, see *Configuring RADIUS Attributes* in the *JunosE Broadband Access Configuration Guide*.

Options

- *interfaceType*—Interface type; see Interface Types and Specifiers
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

Related Documentation

- Setting Up an Unnumbered Interface
- Configuring Profile Attributes for IP
- Configuring IPv4 Characteristics for a Profile

ip use-framed-routes ip-subscriber

Syntax [no] ip use-framed-routes ip-subscriber

Release Information Command introduced in JunosE Release 8.1.0.

Description Configures the router to enable a static primary IP interface to use the RADIUS Framed-Route attribute [22]. The primary IP interface applies the framed routes as source IP addresses when creating and configuring dynamic subscriber interfaces. The **no** version disables the primary IP interface support of the Framed-Route RADIUS attribute.

Mode Interface Configuration

network

Syntax For BGP:

[no] network { *networkNumber* [[mask] *networkMask*] | *ipv6Prefix* | *rtfPrefix* }
[route-map *mapTag*] [weight *weight*] [backdoor]

For DHCP local server:

network *networkAddress* { *networkMask* | *prefix* }

no network [force]

For RIP:

[no] network *networkAddress* [*networkMask*]

Release Information Command introduced before JunosE Release 7.1.0.
rtMemNlri variable added in JunosE Release 9.0.0.
rtMemNlri variable replaced by *rtfPrefix* variable in JunosE Release 9.1.0.

Description For BGP, does one of the following:

- Configures a BGP speaker with an IPv6 or IPv4 prefix originating within its AS that it advertises to its peers if a non-BGP route to the prefix exists in the IP forwarding table. The **no** version removes the prefix.
- Originates a RT-MEM-NLRI route for the prefix that represents the route-target membership NLRI. This route is advertised to all peers that have negotiated the route-target address family. The advertisement is used by the speaker to exhibit interest in or request routes from a specific VPN that is not configured locally. The **no** version removes the prefix.

For DHCP local server, specifies IP addresses that the DHCP local server can provide from an address pool. The **no** version removes the network address and mask.

For RIP, enables RIP on a specific network (not on a range of networks). If you do not associate a network with RIP, the router cannot advertise the network in any RIP update. The **no** version disables RIP on a specific network. If you do not specify a network mask, the router applies the natural mask. Use the **ip rip** commands to configure RIP attributes on the network.

Options

- *networkNumber*—Prefix that BGP will advertise
- *networkMask*—Subnet mask for the network
- *ipv6Prefix*—IPv6 prefix that BGP will advertise
- *rtfPrefix*—Prefix representing the route-target membership NLRI (RT-MEM-NLRI), in the format *asNumber*:*extendedCommunity*/*prefixLength* (for example, 320:320:524/36) where:

  - *asNumber*—AS number for origin of route target information, in the range 1–4294967295
  - *extendedCommunity*—Two-part number in the format *number1:number2* that identifies an extended community of VPNs, in the format *number1* **:** *number2*, where:
    - *number1*—Autonomous system (AS) number, in the range 1–4294967295, or an IP address
    - *number2*—Unique integer, in the range 1–4294967295; 32 bits if *number1* is a 16-bit AS number; 16 bits if *number1* is an IP address or a 32-bit AS number
  - *prefixLength*—Number that specifies the length of the route prefix, in the range 32–96
- *mapTag*—Name of the route map; a string of up to 32 alphanumeric characters; does not currently work with *rtMemNlri*
- *weight*—Number in the range 0–65535; default value is 32768; assigns an absolute weight to the network route that overrides a weight assigned by the **redistribute** command
- backdoor—Lowers the preference of an EBGP route to the specified prefix by setting the administrative distance to the value of an internal BGP route. Use this option to favor an IGP backdoor route over an EBGP route to a specific network. BGP does not advertise the prefix specified with this option.
- *networkAddress*—IP address of the network
- *prefix*—Network prefix
- force—Deletes address pool even if the pool is in use

Mode Address Family Configuration (BGP, RIP), DHCP Local Pool Configuration (for DHCP local server), Router Configuration (BGP, RIP)

service dhcp-local

Syntax [no] service dhcp-local [equal-access | standalone [authenticate]]

Release Information Command introduced before JunosE Release 7.1.0.

Description Enables the DHCP local server. In standalone mode, the **authenticate** keyword enables AAA-based authentication for incoming DHCP clients. The **no** version disables the DHCP local server and does not save the previous settings.

Options

- equal-access—Enables the DHCP local server to work with the SRC (formerly SDX or SSC) or HTTP local server for non-PPP equal access, the default option
- standalone—Configures the router as a DHCP local server
- authenticate—Enables AAA-based authentication of incoming DHCP clients

Mode Global Configuration

set dhcp relay giaddr-selects-interface

Syntax [no] set dhcp relay giaddr-selects-interface

Release Information Command introduced in JunosE Release 8.0.0.

Description Configures DHCP relay to use information in the giaddr in the DHCP ACK packets that are generated by the server and destined for the DHCP client. The DHCP server uses this information to determine the primary interface that is used to optionally build dynamic subscriber interfaces.

The **no** version restores the default that builds dynamic subscriber interfaces on the IP interface on which DHCP client discover packets are received.

Mode Global Configuration

vlan id

Syntax vlan id *idValue* [icr-control-interface] [untagged] [mac-address *macAddress*]

Release Information Command introduced before JunosE Release 7.1.0.
icr-control-interface keyword added in JunosE Release 10.3.0.

Description Specifies a VLAN ID to a VLAN subinterface. Assigns a VLAN ID to a VLAN subinterface on which an ICR partition is to be configured. Issue the **vlan id** command before you configure any upper-layer interfaces, such as IP. There is no **no** version.

Options

- *idValue*—Number unique within the Ethernet interface, in the range 0–4095.
- icr-control-interface—Sets the VLAN subinterface as an ICR control interface on which you want to configure the ICR partition. We recommend that you use this option only if you want the VLAN subinterface to be used to create ICR partitions.
- untagged—Specifies that frames be sent untagged; valid only for VLAN ID 0. Tagged frames can be received, but untagged frames are sent.
- *macAddress*—MAC address of the interface; when you do not specify a unique MAC address, the VLAN uses the MAC address of the Ethernet interface.

Mode Interface Configuration

Related Documentation

- Configuring Ethernet/VLAN Layer 2 Services
- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces

virtual-router

Syntax virtual-router *vrName* | :*vrfName* | *vrName*:*vrfName*

no virtual-router *vrName* [wait-for-completion [*waitSeconds*]]

Release Information Command introduced before JunosE Release 7.1.0.

Description Creates a virtual router or accesses the context of a previously created virtual router or a VRF. The **no** version deletes the virtual router, and the router defaults to the default virtual router. Issuing a **no** version that specifies an existing VRF only displays the error message: " Cannot delete a VRF with this command." You must use the **no ip vrf** command to remove a VRF.

NOTE: In Domain Map Configuration mode, the **virtual-router** command has been replaced by the router-name command and may be removed completely from Domain Map Configuration mode in a future release.

Options

- *vrName*—Name of the virtual router; a string of 1–32 alphanumeric characters
- :*vrfName*—Name of a VRF in the current VR context; a string of 1–32 alphanumeric characters
- *vrName*:*vrfName*—Name of a VRF in the context of a VR other than the current VR
- wait-for-completion—Specifies (in the absence of *waitSeconds*) that the CLI waits for completion of the **no** version operation before it returns a prompt, regardless of how long that takes
- *waitSeconds*—Number of seconds, in the range 1–64000, that the CLI waits before it returns a prompt, regardless of whether the **no** version operation has been completed

Mode Global Configuration, Privileged Exec

PART 3

Administration

CHAPTER 7

Monitoring Tasks

Monitoring Subscriber Interfaces Overview

Purpose The state of the subscriber interface is determined by state of the Ethernet interface and the existence of the primary IP interface, which you can monitor with the show ip interface command. For information about using the **show ip interface** command, see the *Monitoring IP* section in *JunosE IP Services Configuration Guide* .

Action You can use the **show ip demux interface** command to monitor the configuration of subscriber interfaces.

Monitoring Subscriber Interfaces

Purpose Display information about subscriber interfaces.

Action To display subscriber interface information:

```
host1#show ip demux interface fastEthernet 2/0
Prefix/Length      SA/DA  Subscriber-Intf  VR/VRF        Description
10.12.2.2/32       SA     ip subsc1       3             subsc1@test
10.12.2.3/32       SA     ip subsc2       3             subsc2@test
10.12.2.4/32       SA     ip subsc3       3             subsc3@test
10.12.2.5/32       SA     ip subsc4       3             subsc4@test
```

Meaning Table 3 on page 81 lists the **show ip demux interface** command output fields.

Table 3: show ip demux interface Output Fields

Field Name	Field Description
Prefix/Length	Source or destination addresses that the subscriber interface demultiplexes
SA/DA	Demultiplexing method for subscriber interface
SA	Source address

Table 3: show ip demux interface Output Fields *(continued)*

Field Name	Field Description
DA	Destination address
Subscriber-Intf	Name of shared interface on which subscriber interface is configured
VR/VRF	Name of virtual router (VR) or VPN routing and forwarding (VRF) instance on which the subscriber interface is configured
Description	Text description for the IP interface on which subscriber interface is configured (added with the ip description command)

Related Documentation

- show ip demux interface on page 86

Monitoring Active IP Subscribers Created by Subscriber Management

Purpose Display information about active IP subscribers that were created by the JunosE Software's subscriber management feature.

Action To display information about subscribers that were created by subscriber management:

```
host1# show ip-subscriber 2835349506
                                                Virtual
    Id         User Name      Ip Address     Router      Interface
----------   --------------   -----------   -------   -------------
2835349506   user1@isp1.com   192.168.0.1   default   ip192.168.0.1
    Id         Login time
----------   ------------------------
2835349506   WED AUG 23 20:46:24 2006

host1# show ip-subscriber detail
                            Subscriber List
                            ---------------
                                                Virtual
    Id         User Name      Ip Address     Router      Interface
----------   --------------   -----------   -------   -------------
2835349506   user1@isp1.com   192.168.0.1   default   ip192.168.0.1
                                                          Profile
    Id              Login Time            Mac Address      Handle
----------   ------------------------   --------------   --------
2835349506   WED AUG 23 20:46:24 2006   3000.0001.9365   13631489
             Interface   Service
    Id        Profile    Profile        Option 82
----------   ---------   ---------   ----------------
2835349506   myProfile   profile22   FastEthernet 3/1
```

Meaning Table 4 on page 83 lists the **show ip-subscriber** command output fields.

Table 4: show ip-subscriber Output Fields

Field Name	Field Description
Id	ID of the subscriber
User Name	Username used to retrieve information from RADIUS for the subscriber interface
Ip Address	IP address of the subscriber interface
Virtual Router	Name of the virtual router on which the subscriber interface is configured
Interface	Name of subscriber interface; **ip** indicates that subscriber manager created this interface
Login Time	Day, date, and time that the subscriber logged in
Mac Address	MAC address of the subscriber
Profile Handle	AAA profile handle
Interface Profile	Interface profile name used to configure the subscriber interface
Service Profile	IP service profile name used by subscriber management to authorize and configure the subscriber interface with AAA
Option 82	DHCP relay agent information (option 82) circuit identifier that describes the physical interface location associated with the subscriber

Related Documentation

- show ip-subscriber on page 87

CHAPTER 8

Monitoring Commands

show ip demux interface

Syntax show ip demux interface *interfaceType interfaceSpecifier* [*filter*]

Release Information Command introduced before JunosE Release 7.1.0.

Description Displays information about a subscriber interface.

Options

- *interfaceType*—Interface type; see Interface Types and Specifiers
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers
- *filter*—See Filtering show Commands

Mode Privileged Exec

show ip-subscriber

Syntax show ip-subscriber [*subscriberId* | interface *interfaceType interfaceSpecifier* | username *userName* | virtual-router *vrName* | summary] [detail] [*filter*]

Release Information Command introduced in JunosE Release 8.1.0.
filter variable added in JunosE Release 9.1.0.

Description Displays information about the active IP subscribers that are created by subscriber manager.

Options

- *subscriberId*—ID of the IP subscriber
- *interfaceType*—Interface type; see Interface Types and Specifiers
- *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers
- *userName*—Username of a specific active subscriber
- *vrName*—Name of the virtual router to which interfaces of active IP subscribers are bound
- summary—Displays the number of IP subscribers for each virtual router
- detail—Displays detailed information about IP subscribers
- *filter*—See Filtering show Commands

Mode Privileged Exec

PART 4

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