



IPsec VPN Feature Guide for Security Devices



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IPsec VPN Feature Guide for Security Devices
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About the Documentation

- Documentation and Release Notes on page xxv
- Using the Examples in This Manual on page xxv
- Documentation Conventions on page xxvii
- Documentation Feedback on page xxix
- Requesting Technical Support on page xxix

Documentation and Release Notes

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

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

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <https://www.juniper.net/books>.

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

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

Table 1: Notice Icons







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

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

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

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

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

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

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

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- 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 <https://support.juniper.net/support/requesting-support/>.

CHAPTER 1

Overview

- [IPsec VPN Overview on page 31](#)
- [IPsec VPN Configuration Overview on page 54](#)

IPsec VPN Overview

A VPN is a private network that uses a public network to connect two or more remote sites. Instead of using dedicated connections between networks, VPNs use virtual connections routed (tunneled) through public networks. IPsec VPN is a protocol, consists of set of standards used to establish a VPN connection.

- [IPsec VPN Overview on page 31](#)
- [IPsec VPN Topologies on SRX Series Devices on page 37](#)
- [Comparison of Policy-Based VPNs and Route-Based VPNs on page 37](#)
- [Understanding IKE and IPsec Packet Processing on page 38](#)
- [Understanding Phase 1 of IKE Tunnel Negotiation on page 46](#)
- [Understanding Phase 2 of IKE Tunnel Negotiation on page 48](#)
- [Supported IPsec and IKE Standards on page 49](#)
- [Understanding Distributed VPNs in SRX Series Services Gateways on page 51](#)
- [Understanding VPN Support for Inserting Services Processing Cards on page 52](#)
- [Understanding Hub-and-Spoke VPNs on page 53](#)

IPsec VPN Overview

A VPN provides a means by which remote computers communicate securely across a public WAN such as the Internet.

A VPN connection can link two LANs (site-to-site VPN) or a remote dial-up user and a LAN. The traffic that flows between these two points passes through shared resources such as routers, switches, and other network equipment that make up the public WAN. To secure VPN communication while passing through the WAN, the two participants create an IP Security (IPsec) tunnel.



NOTE: The term *tunnel* does not denote tunnel mode (see “[Packet Processing in Tunnel Mode](#)” on page 39). Instead, it refers to the IPsec connection.

IPsec is a suite of related protocols for cryptographically securing communications at the IP Packet Layer. IPsec also provides methods for the manual and automatic negotiation of security associations (SAs) and key distribution, all the attributes for which are gathered in a domain of interpretation (DOI). The IPsec DOI is a document containing definitions for all the security parameters required for the successful negotiation of a VPN tunnel—essentially, all the attributes required for SA and IKE negotiations. See RFC 2407 and RFC 2408 for more information.

This topic includes the following sections:

- [Security Associations on page 32](#)
- [IPsec Key Management on page 33](#)
- [IPsec Security Protocols on page 34](#)
- [IPsec Tunnel Negotiation on page 36](#)

Security Associations

A security association (SA) is a unidirectional agreement between the VPN participants regarding the methods and parameters to use in securing a communication channel. Full bidirectional communication requires at least two SAs, one for each direction. Through the SA, an IPsec tunnel can provide the following security functions:

- Privacy (through encryption)
- Content integrity (through data authentication)
- Sender authentication and—if using certificates—nonrepudiation (through data origin authentication)

The security functions you employ depend on your needs. If you need only to authenticate the IP packet source and content integrity, you can authenticate the packet without applying any encryption. On the other hand, if you are concerned only with preserving privacy, you can encrypt the packet without applying any authentication mechanisms. Optionally, you can both encrypt and authenticate the packet. Most network security designers choose to encrypt, authenticate, and replay-protect their VPN traffic.

An IPsec tunnel consists of a pair of unidirectional SAs—one SA for each direction of the tunnel—that specify the security parameter index (SPI), destination IP address, and security protocol (Authentication Header [AH] or Encapsulating Security Payload [ESP]) employed. An SA groups together the following components for securing communications:

- Security algorithms and keys.
- Protocol mode, either transport or tunnel. Junos OS devices always use tunnel mode. (See [“Packet Processing in Tunnel Mode” on page 39.](#))
- Key-management method, either manual key or AutoKey IKE. (See [“IPsec Key Management” on page 33.](#))
- SA lifetime.

For inbound traffic, Junos OS looks up the SA by using the following triplet:

- Destination IP address.
- Security protocol, either AH or ESP. (See [“IPsec Security Protocols” on page 34.](#))
- Security parameter index (SPI) value.

For outbound VPN traffic, the policy invokes the SA associated with the VPN tunnel.

IPsec Key Management

The distribution and management of keys are critical to using VPNs successfully. Junos OS supports IPsec technology for creating VPN tunnels with three kinds of key creation mechanisms:

- Manual key
- AutoKey IKE with a preshared key or a certificate

You can choose your key creation mechanism—also called authentication method—during Phase 1 and Phase 2 proposal configuration. See [“IPsec Tunnel Negotiation” on page 36.](#)

This topic includes the following sections:

- [Manual Key on page 33](#)
- [AutoKey IKE on page 33](#)
- [Diffie-Hellman Exchange on page 34](#)

Manual Key

With manual keys, administrators at both ends of a tunnel configure all the security parameters. This is a viable technique for small, static networks where the distribution, maintenance, and tracking of keys are not difficult. However, safely distributing manual-key configurations across great distances poses security issues. Aside from passing the keys face-to-face, you cannot be completely sure that the keys have not been compromised while in transit. Also, whenever you want to change the key, you are faced with the same security issues as when you initially distributed it.

AutoKey IKE

When you need to create and manage numerous tunnels, you need a method that does not require you to configure every element manually. IPsec supports the automated generation and negotiation of keys and security associations using the Internet Key Exchange (IKE) protocol. Junos OS refers to such automated tunnel negotiation as AutoKey IKE and supports AutoKey IKE with preshared keys and AutoKey IKE with certificates.

- AutoKey IKE with preshared keys—Using AutoKey IKE with preshared keys to authenticate the participants in an IKE session, each side must configure and securely exchange the preshared key in advance. In this regard, the issue of secure key distribution is the same as that with manual keys. However, once distributed, an autokey, unlike a manual key, can automatically change its keys at predetermined intervals using the IKE protocol. Frequently changing keys greatly improves security, and automatically

doing so greatly reduces key-management responsibilities. However, changing keys increases traffic overhead; therefore, changing keys too often can reduce data transmission efficiency.



NOTE: A preshared key is a key for both encryption and decryption, which both participants must have before initiating communication.

- AutoKey IKE with certificates—When using certificates to authenticate the participants during an AutoKey IKE negotiation, each side generates a public-private key pair and acquires a certificate. As long as the issuing certificate authority (CA) is trusted by both sides, the participants can retrieve the peer's public key and verify the peer's signature. There is no need to keep track of the keys and SAs; IKE does it automatically.

Diffie-Hellman Exchange

A Diffie-Hellman (DH) exchange allows participants to produce a shared secret value. The strength of the technique is that it allows participants to create the secret value over an unsecured medium without passing the secret value through the wire. The size of the prime modulus used in each group's calculation differs as follows:

- DH Group 1—768-bit modulus
- DH Group 2—1024-bit modulus
- DH Group 5—1536-bit modulus
- DH Group 14—2048-bit modulus
- DH Group 15—3072-bit modulus
- DH Group 16—4096-bit modulus
- DH Group 19—256-bit modulus elliptic curve
- DH Group 20—384-bit modulus elliptic curve
- DH Group 21—521-bit modulus elliptic curve
- DH Group 24—2048-bit modulus with 256-bit prime order subgroup

Starting in Junos OS Release 19.1R1, SRX Series devices support DH groups 15, 16, and 21.



NOTE: We do not recommend the use of DH groups 1, 2, and 5.

Because the modulus for each DH group is a different size, the participants must agree to use the same group.

IPsec Security Protocols

IPsec uses two protocols to secure communications at the IP layer:

- Authentication Header (AH)—A security protocol for authenticating the source of an IP packet and verifying the integrity of its content

- Encapsulating Security Payload (ESP)—A security protocol for encrypting the entire IP packet (and authenticating its content)

You can choose your security protocols—also called *authentication and encryption algorithms*—during Phase 2 proposal configuration. See “[IPsec Tunnel Negotiation](#)” on [page 36](#).

For each VPN tunnel, both AH and ESP tunnel sessions are installed on Services Processing Units (SPUs) and the control plane. Tunnel sessions are updated with the negotiated protocol after negotiation is completed. For SRX5400, SRX5600, and SRX5800 devices, tunnel sessions on anchor SPUs are updated with the negotiated protocol while non-anchor SPUs retain ESP and AH tunnel sessions. ESP and AH tunnel sessions are displayed in the outputs for the **show security flow session** and **show security flow cp-session** operational mode commands.

This topic includes the following sections:

- [AH Protocol on page 35](#)
- [ESP Protocol on page 35](#)

AH Protocol

The Authentication Header (AH) protocol provides a means to verify the authenticity and integrity of the content and origin of a packet. You can authenticate the packet by the checksum calculated through a Hash Message Authentication Code (HMAC) using a secret key and either MD5 or SHA hash functions.

- Message Digest 5 (MD5)—An algorithm that produces a 128-bit hash (also called a *digital signature* or *message digest*) from a message of arbitrary length and a 16-byte key. The resulting hash is used, like a fingerprint of the input, to verify content and source authenticity and integrity.
- Secure Hash Algorithm (SHA)—An algorithm that produces a 160-bit hash from a message of arbitrary length and a 20-byte key. It is generally regarded as more secure than MD5 because of the larger hashes it produces. Because the computational processing is done in the ASIC, the performance cost is negligible.



NOTE: For more information on MD5 hashing algorithms, see RFC 1321 and RFC 2403. For more information on SHA hashing algorithms, see RFC 2404. For more information on HMAC, see RFC 2104.

ESP Protocol

The Encapsulating Security Payload (ESP) protocol provides a means to ensure privacy (encryption) and source authentication and content integrity (authentication). ESP in tunnel mode encapsulates the entire IP packet (header and payload) and then appends a new IP header to the now-encrypted packet. This new IP header contains the destination address needed to route the protected data through the network. (See “[Packet Processing in Tunnel Mode](#)” on [page 39](#).)

With ESP, you can both encrypt and authenticate, encrypt only, or authenticate only. For encryption, you can choose one of the following encryption algorithms:

- Data Encryption Standard (DES)—A cryptographic block algorithm with a 56-bit key.
- Triple DES (3DES)—A more powerful version of DES in which the original DES algorithm is applied in three rounds, using a 168-bit key. DES provides significant performance savings but is considered unacceptable for many classified or sensitive material transfers.
- Advanced Encryption Standard (AES)—An encryption standard which offers greater interoperability with other devices. Junos OS supports AES with 128-bit, 192-bit, and 256-bit keys.

For authentication, you can use either MD5 or SHA algorithms.



NOTE: Even though it is possible to select NULL for encryption, it has been demonstrated that IPsec might be vulnerable to attack under such circumstances. Therefore, we suggest that you choose an encryption algorithm for maximum security.

IPsec Tunnel Negotiation

To establish an AutoKey IKE IPsec tunnel, two phases of negotiation are required:

- In Phase 1, the participants establish a secure channel in which to negotiate the IPsec security associations (SAs).
- In Phase 2, the participants negotiate the IPsec SAs for encrypting and authenticating the ensuing exchanges of user data.

For a manual key IPsec tunnel, because all the SA parameters have been previously defined, there is no need to negotiate which SAs to use. In essence, the tunnel has already been established. When traffic matches a policy using that manual key tunnel or when a route involves the tunnel, the Juniper Networks device simply encrypts and authenticates the data, as you determined, and forwards it to the destination gateway.

The remote IKE gateway address can be in any virtual routing (VR) instance. VR is determined during IKE Phase 1 and Phase 2 negotiation. VR does not have to be configured in the IKE proposals. If the IKE gateway interface is moved from one VR to another, the existing IKE Phase 1 and Phase 2 negotiations for the IKE gateway are cleared, and new Phase 1 and Phase 2 negotiations are performed.

**NOTE:**

- On SRX Series devices, when you enable VPN, overlapping of IP addresses across virtual routers is supported with the following limitations:
 - An IKE external interface address cannot overlap with any other virtual router.
 - An internal or trust interface address can overlap across virtual routers.
 - An st0 interface address cannot overlap in route-based VPN in point-to-multipoint tunnel such as NHTB.
 - An st0 interface address can overlap in route-based VPN in point-to-point tunnel.
- The combinations of local IP addresses and remote gateway IP addresses of IPsec VPN tunnels configured across VRs have to be unique.
- When the loopback interface is used as the IKE gateway external interface, the physical interface for IKE negotiation should be in the same VR.

- See Also**
- [Example: Configuring a Policy-Based VPN on page 518](#)
 - [Example: Configuring a Route-Based VPN on page 112](#)

IPsec VPN Topologies on SRX Series Devices

The following are some of the IPsec VPN topologies that Junos operating system (OS) supports:

- Site-to-site VPNs—Connects two sites in an organization together and allows secure communications between the sites.
- Hub-and-spoke VPNs—Connects branch offices to the corporate office in an enterprise network. You can also use this topology to connect spokes together by sending traffic through the hub.
- Remote access VPNs—Allows users working at home or traveling to connect to the corporate office and its resources. This topology is sometimes referred to as an *end-to-site tunnel*.

- See Also**
- [Example: Configuring a Hub-and-Spoke VPN on page 71](#)

Comparison of Policy-Based VPNs and Route-Based VPNs



NOTE: Policy-based VPNs are only supported on SRX5400, SRX5600, and SRX5800 devices. Platform support depends on the Junos OS release in your installation.

[Table 3 on page 38](#) summarizes the differences between policy-based VPNs and route-based VPNs.

Table 3: Comparison Between Policy-Based VPNs and Route-Based VPNs

Policy-Based VPNs	Route-Based VPNs
In policy-based VPNs, a tunnel is treated as an object that, together with source, destination, application, and action, constitutes a tunnel policy that permits VPN traffic.	In route-based VPNs, a policy does not specifically reference a VPN tunnel.
A tunnel policy specifically references a VPN tunnel by name.	A route determines which traffic is sent through the tunnel based on a destination IP address.
The number of policy-based VPN tunnels that you can create is limited by the number of tunnels that the device supports.	The number of route-based VPN tunnels that you create is limited by the number of st0 interfaces (for point-to-point VPNs) or the number of tunnels that the device supports, whichever is lower.
With a policy-based VPN, although you can create numerous tunnel policies referencing the same VPN tunnel, each tunnel policy pair creates an individual IPsec SA with the remote peer. Each SA counts as an individual VPN tunnel.	Because the route, not the policy, determines which traffic goes through the tunnel, multiple policies can be supported with a single SA or VPN.
In a policy-based VPN, the action must be permit and must include a tunnel.	In a route-based VPN, the regulation of traffic is not coupled to the means of its delivery.
The exchange of dynamic routing information is not supported in policy-based VPNs.	Route-based VPNs support the exchange of dynamic routing information through VPN tunnels. You can enable an instance of a dynamic routing protocol, such as OSPF, on an st0 interface that is bound to a VPN tunnel.
If you need more granularity than a route can provide to specify the traffic sent to a tunnel, using a policy-based VPN with security policies is the best choice.	Route-based VPNs uses routes to specify the traffic sent to a tunnel; a policy does not specifically reference a VPN tunnel.
With a policy-based VPN tunnel, you can consider a tunnel as an element in the construction of a policy.	When the security device does a route lookup to find the interface through which it must send traffic to reach an address, it finds a route through a secure tunnel (st0) interface. With a route-based VPN tunnel, you can consider a tunnel as a means for delivering traffic, and can consider the policy as a method for either permitting or denying the delivery of that traffic.

- See Also**
- [Understanding Route-Based IPsec VPNs on page 109](#)
 - [Understanding Policy-Based IPsec VPNs on page 517](#)

Understanding IKE and IPsec Packet Processing

An IPsec VPN tunnel consists of tunnel setup and applied security. During tunnel setup, the peers establish security associations (SAs), which define the parameters for securing traffic between themselves. (See [“IPsec VPN Overview” on page 31](#).) After the tunnel is established, IPsec protects the traffic sent between the two tunnel endpoints by applying

the security parameters defined by the SAs during tunnel setup. Within the Junos OS implementation, IPsec is applied in tunnel mode, which supports the Encapsulating Security Payload (ESP) and Authentication Header (AH) protocols.

This topic includes the following sections:

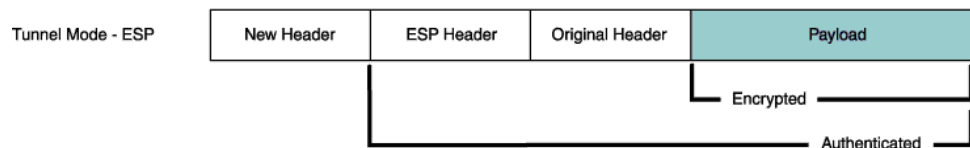
- [Packet Processing in Tunnel Mode on page 39](#)
- [IKE Packet Processing on page 41](#)
- [IPsec Packet Processing on page 44](#)

Packet Processing in Tunnel Mode

IPsec operates in one of two modes—transport or tunnel. When both ends of the tunnel are hosts, you can use either mode. When at least one of the endpoints of a tunnel is a security gateway, such as a Junos OS router or firewall, you must use tunnel mode. Juniper Networks devices always operate in tunnel mode for IPsec tunnels.

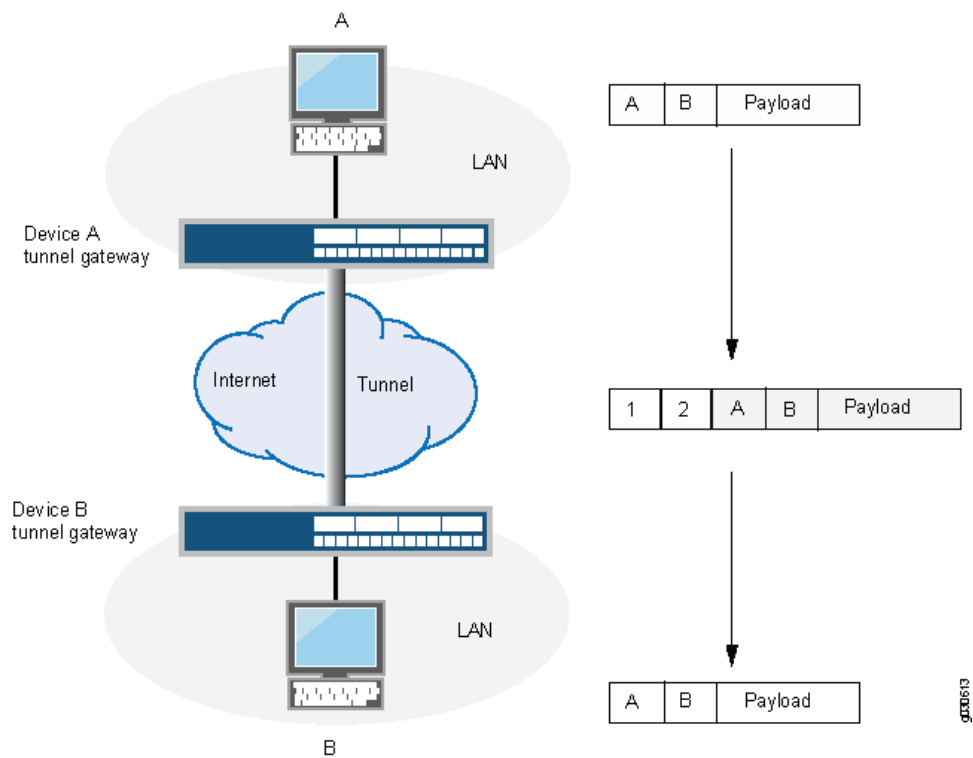
In tunnel mode, the entire original IP packet—payload and header—is encapsulated within another IP payload, and a new header is appended to it, as shown in [Figure 1 on page 39](#). The entire original packet can be encrypted, authenticated, or both. With the Authentication Header (AH) protocol, the AH and new headers are also authenticated. With the Encapsulating Security Payload (ESP) protocol, the ESP header can also be authenticated.

Figure 1: Tunnel Mode



In a site-to-site VPN, the source and destination addresses used in the new header are the IP addresses of the outgoing interface. See [Figure 2 on page 40](#).

Figure 2: Site-to-Site VPN in Tunnel Mode

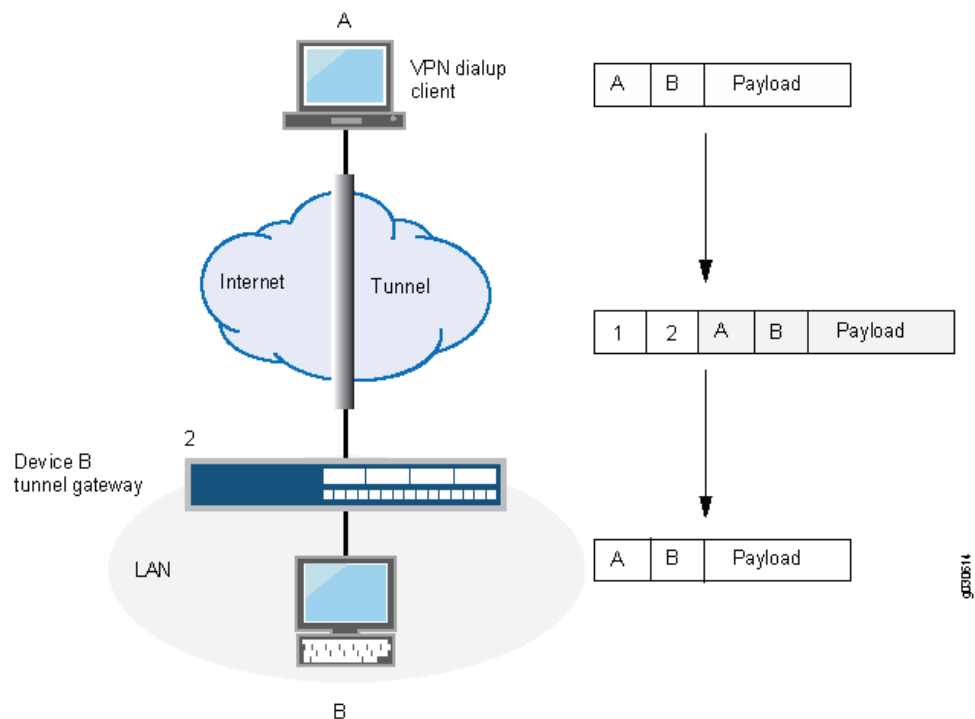


In a dial-up VPN, there is no tunnel gateway on the VPN dial-up client end of the tunnel; the tunnel extends directly to the client itself (see [Figure 3 on page 41](#)). In this case, on packets sent from the dial-up client, both the new header and the encapsulated original header have the same IP address: that of the client's computer.



NOTE: Some VPN clients, such as the dynamic VPN client and Netscreen-Remote, use a virtual inner IP address (also called a “sticky address”). Netscreen-Remote enables you to define the virtual IP address. The dynamic VPN client uses the virtual IP address assigned during the XAuth configuration exchange. In such cases, the virtual inner IP address is the source IP address in the original packet header of traffic originating from the client, and the IP address that the ISP dynamically assigns the dial-up client is the source IP address in the outer header.

Figure 3: Dial-Up VPN in Tunnel Mode

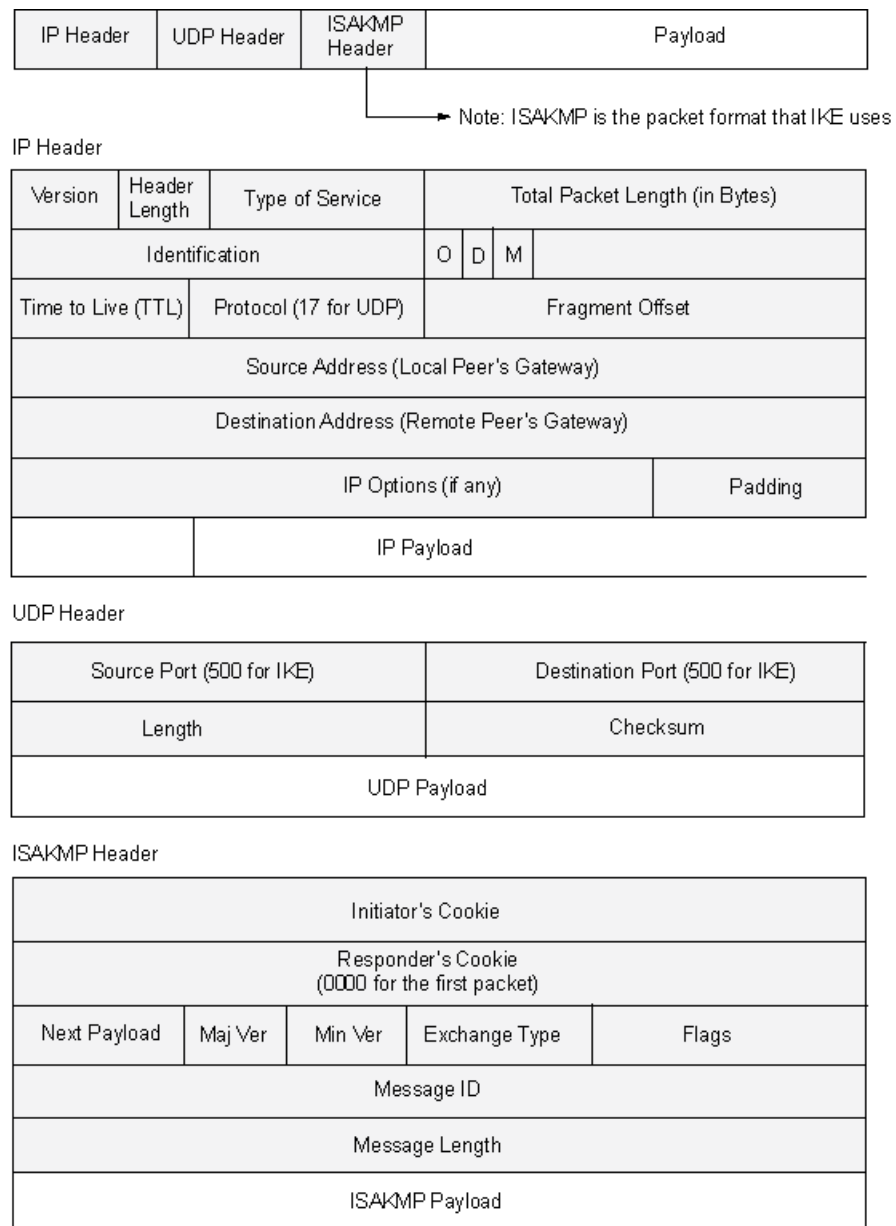


IKE Packet Processing

When a cleartext packet arrives on a Juniper Networks device that requires tunneling, and no active Phase 2 SA exists for that tunnel, Junos OS begins IKE negotiations and drops the packet. The source and destination addresses in the IP packet header are those of the local and remote IKE gateways, respectively. In the IP packet payload, there is a UDP segment encapsulating an ISAKMP (IKE) packet. The format for IKE packets is the same for Phase 1 and Phase 2. See [Figure 4 on page 42](#).

Meanwhile, the source host has sent the dropped packet again. Typically, by the time the second packet arrives, IKE negotiations are complete, and Junos OS protects the packet and all subsequent packets in the session—with IPsec before forwarding it.

Figure 4: IKE Packet for Phases 1 and 2



The Next Payload field contains a number indicating one of the following payload types:

- 0002—SA Negotiation Payload contains a definition for a Phase 1 or Phase 2 SA.
- 0004—Proposal Payload can be a Phase 1 or Phase 2 proposal.
- 0008—Transform Payload gets encapsulated in a proposal payload that gets encapsulated in an SA payload.
- 0010—Key Exchange (KE) Payload contains information necessary for performing a key exchange, such as a DH public value.

- 0020—Identification (IDx) Payload.
 - In Phase 1, IDii indicates the initiator ID, and IDir indicates the responder ID.
 - In Phase 2, IDui indicates the user initiator, and IDur indicates the user responder.

The IDs are IKE ID types such as FQDN, U-FQDN, IP address, and ASN.1_DN.
- 0040—Certificate (CERT) Payload.
- 0080—Certificate Request (CERT_REQ) Payload.
- 0100—Hash (HASH) Payload contains the digest output of a particular hash function.
- 0200—Signature (SIG) Payload contains a digital signature.
- 0400—Nonce (Nx) Payload contains some pseudorandom information necessary for the exchange).
- 0800—Notify Payload.
- 1000—ISAKMP Delete Payload.
- 2000—Vendor ID (VID) Payload can be included anywhere in Phase 1 negotiations. Junos OS uses it to mark support for NAT-T.

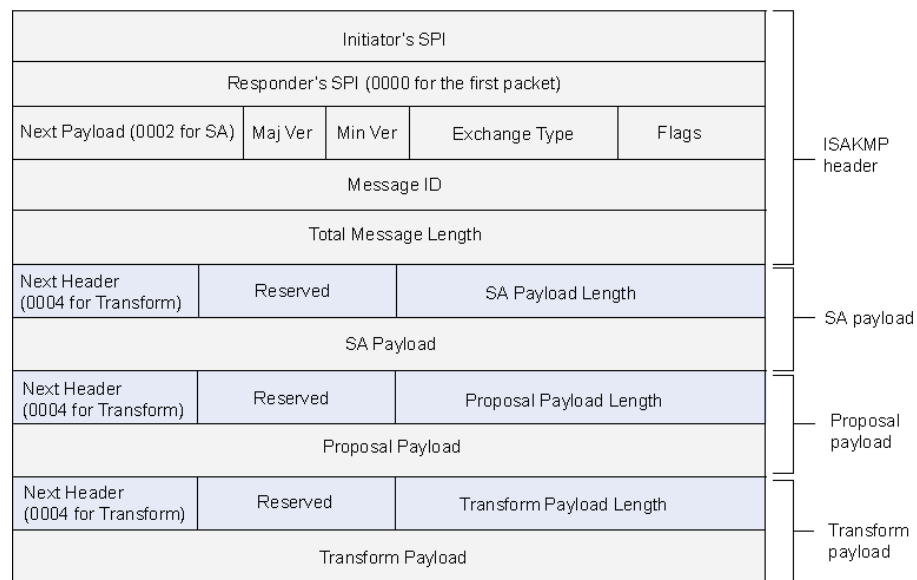
Each ISAKMP payload begins with the same generic header, as shown in [Figure 5 on page 43](#).

Figure 5: Generic ISAKMP Payload Header

Next Header	Reserved	Transform Payload Length (in bytes)
Payload		

9030616

There can be multiple ISAKMP payloads chained together, with each subsequent payload type indicated by the value in the Next Header field. A value of **0000** indicates the last ISAKMP payload. See [Figure 6 on page 44](#) for an example.

Figure 6: ISAKMP Header with Generic ISAKMP Payloads

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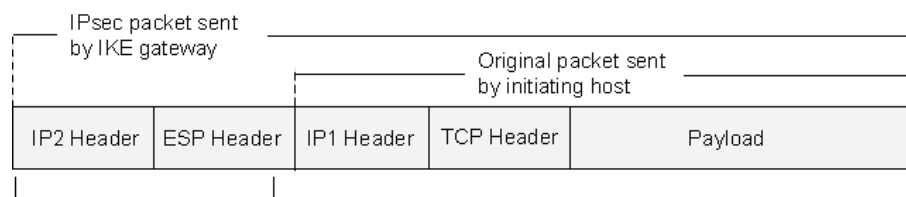
IPsec Packet Processing

After IKE negotiations complete and the two IKE gateways have established Phase 1 and Phase 2 security associations (SAs), all subsequent packets are forwarded using the tunnel. If the Phase 2 SA specifies the Encapsulating Security Protocol (ESP) in tunnel mode, the packet looks like the one shown in [Figure 7 on page 44](#). The device adds two additional headers to the original packet that the initiating host sends.



NOTE: For information about ESP, see [“ESP Protocol” on page 35](#). For information about tunnel mode, see [“Packet Processing in Tunnel Mode” on page 39](#).

As shown in [Figure 7 on page 44](#), the packet that the initiating host constructs includes the payload, the TCP header, and the inner IP header (IP1).

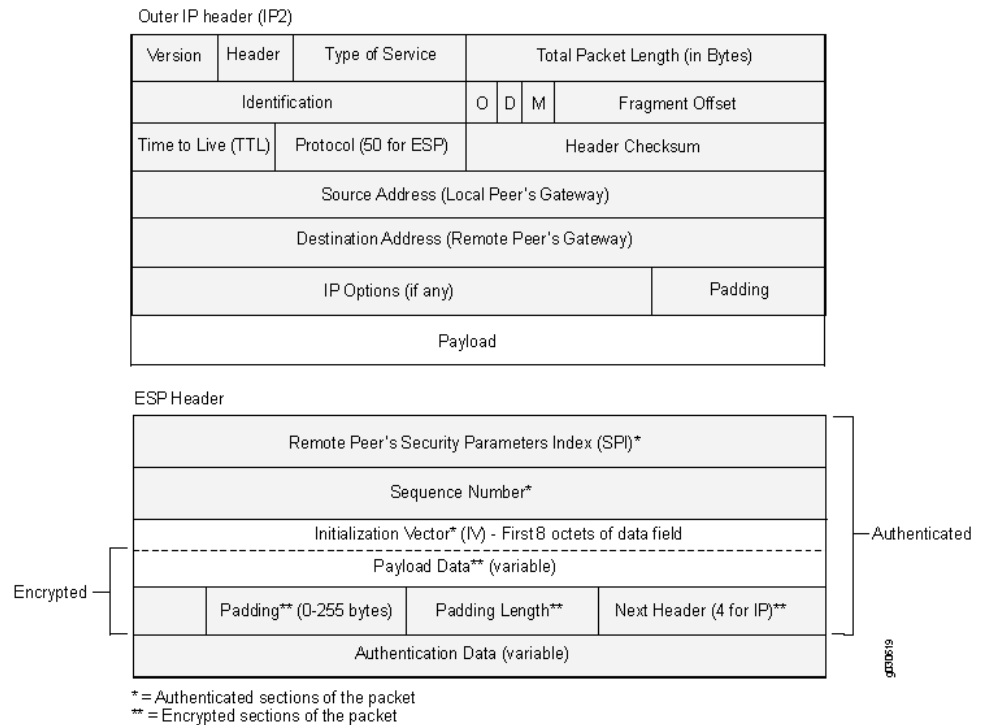
Figure 7: IPsec Packet—ESP in Tunnel Mode

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The local gateway adds these headers to the packet

The router IP header (IP2), which Junos OS adds, contains the IP address of the remote gateway as the destination IP address and the IP address of the local router as the source IP address. Junos OS also adds an ESP header between the outer and inner IP headers. The ESP header contains information that allows the remote peer to properly process the packet when it receives it. This is shown in [Figure 8 on page 45](#).

Figure 8: Outer IP Header (IP2) and ESP Header



The Next Header field indicates the type of data in the payload field. In tunnel mode, this value is 4, indicating an IP packet is contained within the payload. See [Figure 9 on page 46](#).

Figure 9: Inner IP Header (IP1) and TCP Header**Inner IP Header (IP1)**

Version	Header	Type of Service	Total Packet Length (in Bytes)			
Identification			O	D	M	Fragment Offset
Time to Live (TTL)	Protocol (6 for TCP)		Header Checksum			
Source Address (Installing Host)						
Destination Address (Receiving Host)						
IP Options (if any)					Padding	
Payload						

TCP Header

Source Port							Destination Port						
Sequence Number													
Acknowledgement Number													
Header Length	Reserved	U	A	P	R	S	F	Window Size					
		R	C	S	S	I	N						
		G	K	H	T	Y	N						
Checksum							Urgent Pointer						
IP Options (if any)										Padding			
Data													

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- See Also**
- [Example: Configuring a Policy-Based VPN on page 518](#)
 - [Example: Configuring a Route-Based VPN on page 112](#)

Understanding Phase 1 of IKE Tunnel Negotiation

Phase 1 of an AutoKey Internet Key Exchange (IKE) tunnel negotiation consists of the exchange of proposals for how to authenticate and secure the channel. The participants exchange proposals for acceptable security services such as:

- Encryption algorithms—Data Encryption Standard (DES), triple Data Encryption Standard (3DES), and Advanced Encryption Standard (AES). (See [“IPsec VPN Overview” on page 31.](#))
- Authentication algorithms—Message Digest 5 (MD5) and Secure Hash Algorithm (SHA). (See [“IPsec VPN Overview” on page 31.](#))

- Diffie-Hellman (DH) group. (See [“IPsec VPN Overview” on page 31.](#))
- Preshared key or RSA/DSA certificates. (See [“IPsec VPN Overview” on page 31.](#))

A successful Phase 1 negotiation concludes when both ends of the tunnel agree to accept at least one set of the Phase 1 security parameters proposed and then process them. Juniper Networks devices support up to four proposals for Phase 1 negotiations, allowing you to define how restrictive a range of security parameters for key negotiation you will accept. Junos OS provides predefined standard, compatible, and basic Phase 1 proposal sets. You can also define custom Phase 1 proposals.

Phase 1 exchanges can take place in either main mode or aggressive mode. You can choose your mode during IKE policy configuration.

This topic includes the following sections:

- [Main Mode on page 47](#)
- [Aggressive Mode on page 47](#)

Main Mode

In main mode, the initiator and recipient send three two-way exchanges (six messages total) to accomplish the following services:

- First exchange (messages 1 and 2)—Proposes and accepts the encryption and authentication algorithms.
- Second exchange (messages 3 and 4)—Executes a DH exchange, and the initiator and recipient each provide a pseudorandom number.
- Third exchange (messages 5 and 6)—Sends and verifies the identities of the initiator and recipient.

The information transmitted in the third exchange of messages is protected by the encryption algorithm established in the first two exchanges. Thus, the participants' identities are encrypted and therefore not transmitted “in the clear.”

Aggressive Mode

In aggressive mode, the initiator and recipient accomplish the same objectives as with main mode, but in only two exchanges, with a total of three messages:

- First message—The initiator proposes the security association (SA), initiates a DH exchange, and sends a pseudorandom number and its IKE identity.



NOTE: When configuring aggressive mode with multiple proposals for Phase 1 negotiations, use the same DH group in all proposals because the DH group cannot be negotiated. Up to four proposals can be configured.

- Second message—The recipient accepts the SA; authenticates the initiator; and sends a pseudorandom number, its IKE identity, and, if using certificates, the recipient's certificate.

- Third message—The initiator authenticates the recipient, confirms the exchange, and, if using certificates, sends the initiator's certificate.

Because the participants' identities are exchanged in the clear (in the first two messages), aggressive mode does not provide identity protection.



NOTE: Main and aggressive modes applies only to IKEv1 protocol. IKEv2 protocol does not negotiate using main and aggressive modes.

- See Also**
- [Understanding IKE Phase 1 Configuration for Group VPNv1 on page 713](#)
 - [proposal-set \(Security IKE\) on page 1210](#)

Understanding Phase 2 of IKE Tunnel Negotiation

After the participants have established a secure and authenticated channel, they proceed through Phase 2, in which they negotiate security associations (SAs) to secure the data to be transmitted through the IPsec tunnel.

Similar to the process for Phase 1, the participants exchange proposals to determine which security parameters to employ in the SA. A Phase 2 proposal also includes a security protocol—either Encapsulating Security Payload (ESP) or Authentication Header (AH)—and selected encryption and authentication algorithms. The proposal can also specify a Diffie-Hellman (DH) group, if Perfect Forward Secrecy (PFS) is desired.

Regardless of the mode used in Phase 1, Phase 2 always operates in quick mode and involves the exchange of three messages.

Juniper Networks devices support up to four proposals for Phase 2 negotiations, allowing you to define how restrictive a range of tunnel parameters you will accept. Junos OS provides predefined standard, compatible, and basic Phase 2 proposal sets. You can also define custom Phase 2 proposals.

This topic includes the following sections:

- [Proxy IDs on page 48](#)
- [Perfect Forward Secrecy on page 48](#)
- [Replay Protection on page 49](#)

Proxy IDs

In Phase 2, the peers exchange proxy IDs. A proxy ID consists of a local and remote IP address prefix. The proxy ID for both peers must match, which means that the local IP address specified for one peer must be the same as the remote IP address specified for the other peer.

Perfect Forward Secrecy

PFS is a method for deriving Phase 2 keys independent from and unrelated to the preceding keys. Alternatively, the Phase 1 proposal creates the key (the SKEYID_d key)

from which all Phase 2 keys are derived. The SKEYID_d key can generate Phase 2 keys with a minimum of CPU processing. Unfortunately, if an unauthorized party gains access to the SKEYID_d key, all your encryption keys are compromised.

PFS addresses this security risk by forcing a new DH key exchange to occur for each Phase 2 tunnel. Using PFS is thus more secure, although the rekeying procedure in Phase 2 might take slightly longer with PFS enabled.

Replay Protection

A replay attack occurs when an unauthorized person intercepts a series of packets and uses them later either to flood the system, causing a denial of service (DoS), or to gain entry to the trusted network. Junos OS provides a replay protection feature that enables devices to check every IPsec packet to see if it has been received previously. If packets arrive outside a specified sequence range, Junos OS rejects them. Use of this feature does not require negotiation, because packets are always sent with sequence numbers. You simply have the option of checking or not checking the sequence numbers.

- See Also**
- [proposal-set \(Security IPsec\) on page 1213](#)
 - [Understanding IPsec SA Configuration for Group VPNv2 on page 754](#)

Supported IPsec and IKE Standards

On routers equipped with one or more MS-MPCs, MS-MICs, or DPCs, the Canada and U.S. version of Junos OS substantially supports the following RFCs, which define standards for IP Security (IPsec) and Internet Key Exchange (IKE).

- RFC 2085, *HMAC-MD5 IP Authentication with Replay Prevention*
- RFC 2401, *Security Architecture for the Internet Protocol* (obsoleted by RFC 4301)
- RFC 2402, *IP Authentication Header* (obsoleted by RFC 4302)
- RFC 2403, *The Use of HMAC-MD5-96 within ESP and AH*
- RFC 2404, *The Use of HMAC-SHA-1-96 within ESP and AH* (obsoleted by RFC 4305)
- RFC 2405, *The ESP DES-CBC Cipher Algorithm With Explicit IV*
- RFC 2406, *IP Encapsulating Security Payload (ESP)* (obsoleted by RFC 4303 and RFC 4305)
- RFC 2407, *The Internet IP Security Domain of Interpretation for ISAKMP* (obsoleted by RFC 4306)
- RFC 2408, *Internet Security Association and Key Management Protocol (ISAKMP)* (obsoleted by RFC 4306)
- RFC 2409, *The Internet Key Exchange (IKE)* (obsoleted by RFC 4306)
- RFC 2410, *The NULL Encryption Algorithm and Its Use With IPsec*
- RFC 2451, *The ESP CBC-Mode Cipher Algorithms*
- RFC 2460, *Internet Protocol, Version 6 (IPv6)*

- RFC 2560, *X.509 Internet Public Key Infrastructure Online Certificate Status Protocol - OCSP*
- RFC 3193, *Securing L2TP using IPsec*
- RFC 3280, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*
- RFC 3602, *The AES-CBC Cipher Algorithm and Its Use with IPsec*
- RFC 3948, *UDP Encapsulation of IPsec ESP Packets*
- RFC 4106, *The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)*
- RFC 4210, *Internet X.509 Public Key Infrastructure Certificate Management Protocol (CMP)*
- RFC 4211, *Internet X.509 Public Key Infrastructure Certificate Request Message Format (CRMF)*
- RFC 4301, *Security Architecture for the Internet Protocol*
- RFC 4302, *IP Authentication Header*
- RFC 4303, *IP Encapsulating Security Payload (ESP)*
- RFC 4305, *Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)*
- RFC 4306, *Internet Key Exchange (IKEv2) Protocol*
- RFC 4307, *Cryptographic Algorithms for Use in the Internet Key Exchange Version 2 (IKEv2)*
- RFC 4308, *Cryptographic Suites for IPsec*



NOTE: Only Suite VPN-A is supported in Junos OS.

- RFC 4754, *IKE and IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA)*
- RFC 4835, *Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)*
- RFC 5996, *Internet Key Exchange Protocol Version 2 (IKEv2)*

Junos OS partially supports the following RFCs for IPsec and IKE:

- RFC 3526, *More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)*
- RFC 5114, *Additional Diffie-Hellman Groups for Use with IETF Standards*
- RFC 5903, *Elliptic Curve Groups modulo a Prime (ECP Groups) for IKE and IKEv2*

The following RFCs and Internet draft do not define standards, but provide information about IPsec, IKE, and related technologies. The IETF classifies them as “Informational.”

- RFC 2104, *HMAC: Keyed-Hashing for Message Authentication*
- RFC 2412, *The OAKLEY Key Determination Protocol*
- RFC 3706, *A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers*
- Internet draft draft-eastlake-sha2-02.txt, *US Secure Hash Algorithms (SHA and HMAC-SHA)* (expires July 2006)

- See Also**
- *Services Interfaces Overview for Routing Devices*
 - *MX Series Interface Module Reference*
 - *Accessing Standards Documents on the Internet*

Understanding Distributed VPNs in SRX Series Services Gateways

In the SRX5400, SRX5600, and SRX5800 devices, IKE provides tunnel management for IPsec and authenticates end entities. IKE performs a Diffie-Hellman (DH) key exchange to generate an IPsec tunnel between network devices. The IPsec tunnels generated by IKE are used to encrypt, decrypt, and authenticate user traffic between the network devices at the IP layer.

The VPN is created by distributing the IKE and IPsec workload among the multiple Services Processing Units (SPUs) of the platform. For site-to-site tunnels, the least-loaded SPU is chosen as the anchor SPU. If multiple SPUs have the same smallest load, any of them can be chosen as an anchor SPU. Here, load corresponds to the number of site-to-site gateways or manual VPN tunnels anchored on an SPU. For dynamic tunnels, the newly established dynamic tunnels employ a round-robin algorithm to select the SPU.

In IPsec, the workload is distributed by the same algorithm that distributes the IKE. The Phase 2 SA for a given VPN tunnel termination points pair is exclusively owned by a particular SPU, and all IPsec packets belonging to this Phase 2 SA are forwarded to the anchoring SPU of that SA for IPsec processing.

Multiple IPsec sessions (Phase 2 SA) can operate over one or more IKE sessions. The SPU that is selected for anchoring the IPsec session is based on the SPU that is anchoring the underlying IKE session. Therefore, all IPsec sessions that run over a single IKE gateway are serviced by the same SPU and are not load-balanced across several SPUs.

[Table 4 on page 52](#) shows an example of an SRX5000 line device with three SPUs running seven IPsec tunnels over three IKE gateways.

Table 4: Distribution of IKE and IPsec Sessions Across SPUs

SPU	IKE Gateway	IPsec Tunnel
SPU0	IKE-1	IPsec-1
		IPsec-2
		IPsec-3
SPU1	IKE-2	IPsec-4
		IPsec-5
		IPsec-6
SPU2	IKE-3	IPsec-7

The three SPUs have an equal load of one IKE gateway each. If a new IKE gateway is created, SPU0, SPU1, or SPU2 could be selected to anchor the IKE gateway and its IPsec sessions.

Setting up and tearing down existing IPsec tunnels does not affect the underlying IKE session or existing IPsec tunnels.

Use the following **show** command to view the current tunnel count per SPU: **show security ike tunnel-map**.

Use the **summary** option of the command to view the anchor points of each gateway: **show security ike tunnel-map summary**.

See Also

Understanding VPN Support for Inserting Services Processing Cards

SRX5400, SRX5600, and SRX5800 devices have a chassis-based distributed processor architecture. The flow processing power is shared and is based on the number of Services Processing Cards (SPCs). You can scale the processing power of the device by installing new SPCs.

In an SRX5400, SRX5600, or SRX5800 chassis cluster, you can insert new SPCs on the devices without affecting or disrupting the traffic on the existing IKE or IPsec VPN tunnels. When you insert a new SPC in each chassis of the cluster, the existing tunnels are not affected and traffic continues to flow without disruption.

However, existing tunnels cannot use the processing power of the Service Processing Units (SPUs) in the new SPCs. A new SPU can anchor newly established site-to-site and dynamic tunnels. Newly configured tunnels are not, however, guaranteed to be anchored on a new SPU.

Site-to-site tunnels are anchored on different SPUs based on a load-balancing algorithm. The load-balancing algorithm is dependent on number of flow threads each SPU is using. Tunnels belonging to the same local and remote gateway IP addresses are anchored on the same SPU on different flow RT threads used by the SPU. The SPU with the smallest load is chosen as the anchor SPU. Each SPU maintains number of flow RT threads that are hosted in that particular SPU. The number of flow RT threads hosted on each SPU vary based on the type of SPU.

Tunnel load factor = Number of tunnels anchored on the SPU / Total number of flow RT threads used by the SPU.

Dynamic tunnels are anchored on different SPUs based on a round-robin algorithm. Newly configured dynamic tunnels are not guaranteed to be anchored on the new SPC.

Starting in Junos OS Release 18.2R2 and 18.4R1, all the existing IPsec VPN features that are currently supported on SRX5K-SPC3 (SPC3) only will be supported on SRX5400, SRX5600, and SRX5800 devices when SRX5K-SPC-4-15-320 (SPC2) and SPC3 cards are installed and operating on the device in a chassis cluster mode or in a standalone mode.

When both SPC2 and SPC3 cards are installed, you can verify the tunnel mapping on different SPUs using the **show security ipsec tunnel-distribution** command.

Use the command **show security ike tunnel-map** to view the tunnel mapping on different SPUs with only SPC2 card inserted. The command **show security ike tunnel-map** is not valid in an environment where SPC2 and SPC3 cards are installed.

See Also • [show security ike tunnel-map on page 1382](#)

Understanding Hub-and-Spoke VPNs

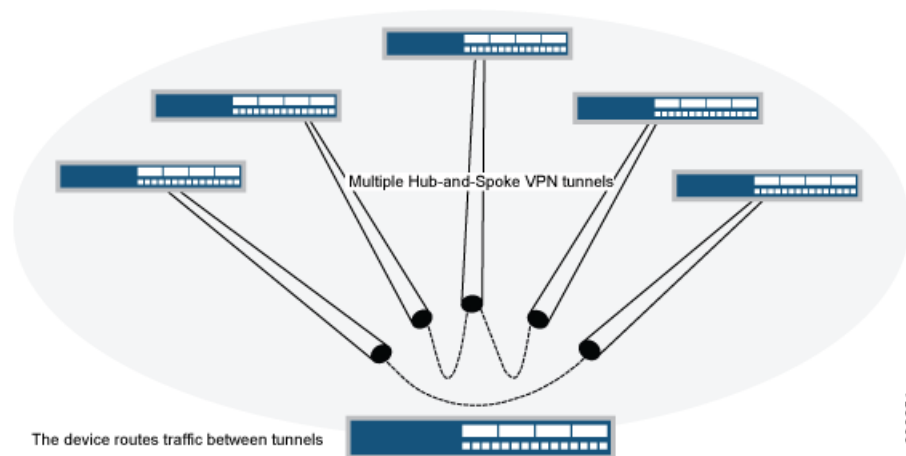
If you create two VPN tunnels that terminate at a device, you can set up a pair of routes so that the device directs traffic exiting one tunnel to the other tunnel. You also need to create a policy to permit the traffic to pass from one tunnel to the other. Such an arrangement is known as *hub-and-spoke VPN*. (See [Figure 10 on page 54](#).)

You can also configure multiple VPNs and route traffic between any two tunnels.



NOTE: SRX Series devices support only the route-based hub-and-spoke feature.

Figure 10: Multiple Tunnels in a Hub-and-Spoke VPN Configuration



See Also • [Example: Configuring a Hub-and-Spoke VPN on page 71](#)

Release History Table

Release	Description
19.1R1	Starting in Junos OS Release 19.1R1, SRX Series devices support DH groups 15, 16, and 21.

Related Documentation

- [Route-Based IPsec VPNs on page 109](#)
- [Policy-Based IPsec VPNs on page 517](#)

IPsec VPN Configuration Overview

A VPN connection can link two LANs (site-to-site VPN) or a remote dial-up user and a LAN. The traffic that flows between these two points passes through shared resources such as routers, switches, and other network equipment that make up the public WAN. An IPsec tunnel is created between two participant devices to secure VPN communication.

- [IPsec VPN with Autokey IKE Configuration Overview on page 55](#)
- [IPsec VPN with Manual Keys Configuration Overview on page 56](#)
- [Recommended Configuration Options for Site-to-Site VPN with Static IP Addresses on page 57](#)
- [Recommended Configuration Options for Site-to-Site or Dialup VPNs with Dynamic IP Addresses on page 57](#)
- [Understanding IPsec VPNs with Dynamic Endpoints on page 58](#)
- [Understanding IKE Identity Configuration on page 60](#)
- [Configuring Remote IKE IDs for Site-to-Site VPNs on page 62](#)
- [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62](#)

- [Example: Configuring IPsec Authentication for an OSPF Interface on an SRX Series Device on page 64](#)
- [Configuring IPsec VPN Using the VPN Wizard on page 69](#)
- [Understanding Suite B and PRIME Cryptographic Suites on page 69](#)
- [Example: Configuring a Hub-and-Spoke VPN on page 71](#)

IPsec VPN with Autokey IKE Configuration Overview

IPsec VPN negotiation occurs in two phases. In Phase 1, participants establish a secure channel in which to negotiate the IPsec security association (SA). In Phase 2, participants negotiate the IPsec SA for authenticating traffic that will flow through the tunnel.

This overview describes the basic steps to configure a route-based or policy-based IPsec VPN using autokey IKE (preshared keys or certificates).

To configure a route-based or policy-based IPsec VPN using autokey IKE:

1. Configure interfaces, security zones, and address book information.
(For route-based VPNs) Configure a secure tunnel st0.x interface. Configure routing on the device.
2. Configure Phase 1 of the IPsec VPN tunnel.
 - a. (Optional) Configure a custom IKE Phase 1 proposal. This step is optional, as you can use a predefined IKE Phase 1 proposal set (Standard, Compatible, or Basic).
 - b. Configure an IKE policy that references either your custom IKE Phase 1 proposal or a predefined IKE Phase 1 proposal set. Specify autokey IKE preshared key or certificate information. Specify the mode (main or aggressive) for the Phase 1 exchanges.
 - c. Configure an IKE gateway that references the IKE policy. Specify the IKE IDs for the local and remote devices. If the IP address of the remote gateway is not known, specify how the remote gateway is to be identified.
3. Configure Phase 2 of the IPsec VPN tunnel.
 - a. (Optional) Configure a custom IPsec Phase 2 proposal. This step is optional, as you can use a predefined IPsec Phase 2 proposal set (Standard, Compatible, or Basic).
 - b. Configure an IPsec policy that references either your custom IPsec Phase 2 proposal or a predefined IPsec Phase 2 proposal set. Specify perfect forward secrecy (PFS) keys.
 - c. Configure an IPsec VPN tunnel that references both the IKE gateway and the IPsec policy. Specify the proxy IDs to be used in Phase 2 negotiations.

(For route-based VPNs) Bind the secure tunnel interface st0.x to the IPsec VPN tunnel.

4. Configure a security policy to permit traffic from the source zone to the destination zone.

(For policy-based VPNs) Specify the security policy action **tunnel ipsec-vpn** with the name of the IPsec VPN tunnel that you configured.

5. Update your global VPN settings.

- See Also**
- [Understanding Route-Based IPsec VPNs on page 109](#)
 - [Understanding Policy-Based IPsec VPNs on page 517](#)

IPsec VPN with Manual Keys Configuration Overview

This overview describes the basic steps to configure a route-based or policy-based IPsec VPN using manual keys.

To configure a route-based or policy-based IPsec VPN using manual keys:

1. Configure interfaces, security zones, and address book information.
(For route-based VPNs) Configure routing. Configure a secure tunnel st0.x interface.
2. Configure an IPsec VPN tunnel by specifying the following parameters:
 - Authentication algorithm and key
 - Encryption algorithm and key
 - Outgoing interface
 - IP address of the peer
 - IPsec protocol for the security association
 - Security parameter index
(For route-based VPNs) Bind the secure tunnel interface st0.x to the IPsec VPN tunnel.
3. Configure security policy to permit traffic from the source zone to the destination zone.
(For policy-based VPNs) Specify the security policy action **tunnel ipsec-vpn** with the name of the IPsec VPN tunnel that you configured.

- See Also**
- [Understanding Route-Based IPsec VPNs on page 109](#)
 - [Understanding Policy-Based IPsec VPNs on page 517](#)
 - [Example: Configuring an IPv6 IPsec Manual VPN on page 681](#)

Recommended Configuration Options for Site-to-Site VPN with Static IP Addresses

Table 5 on page 57 lists the configuration options for a generic site-to-site VPN between two security devices with static IP addresses. The VPN can be either route-based or policy-based.

Table 5: Recommended Configuration for Site-to-Site VPN with Static IP Addresses

Configuration Option	Comment
<i>IKE configuration options:</i>	
Autokey IKE with certificates	Manual key is not recommended.
Main mode	Used when peers have static IP addresses.
RSA or DSA certificates	RSA or DSA certificates can be used on the local device. Specify the type of certificate (PKCS7 or X.509) on the peer.
Diffie-Hellman (DH) group 14	DH group 14 provides more security than DH groups 1, 2, or 5.
Advanced Encryption Standard (AES) encryption	AES is cryptographically stronger than Data Encryption Standard (DES) and Triple DES (3DES) when key lengths are equal. Approved encryption algorithm for Federal Information Processing Standards (FIPS) and Common Criteria EAL4 standards.
Secure Hash Algorithm 256 (SHA-256) authentication	SHA-256 provides more cryptographic security than SHA-1 or Message Digest 5 (MD5) .
<i>IPsec configuration options:</i>	
Perfect Forward Secrecy (PFS) DH group 14	PFS DH group 14 provides increased security because the peers perform a second DH exchange to produce the key used for IPsec encryption and decryption.
Encapsulating Security Payload (ESP) protocol	ESP provides both confidentiality through encryption and encapsulation of the original IP packet and integrity through authentication.
AES encryption	AES is cryptographically stronger than DES and 3DES when key lengths are equal. Approved encryption algorithm for FIPS and Common Criteria EAL4 standards.
SHA-256 authentication	SHA-256 provides more cryptographic security than SHA-1 or MD5.
Anti-replay protection	Enabled by default. Disabling this feature might resolve compatibility issues with third-party peers.

See Also • [IPsec VPN Overview on page 31](#)

Recommended Configuration Options for Site-to-Site or Dialup VPNs with Dynamic IP Addresses

Table 6 on page 58 lists the configuration options for a generic site-to-site or dialup VPN, where the peer devices have dynamic IP addresses.

Table 6: Recommended Configuration for Site-to-Site or Dialup VPNs with Dynamic IP Addresses

Configuration Option	Comment
<i>IKE configuration options:</i>	
Autokey IKE with certificates	Manual key is not recommended.
Main mode	Used with certificates.
2048-bit certificates	RSA or DSA certificates can be used. Specify the certificate to be used on the local device. Specify the type of certificate (PKCS7 or X.509) on the peer.
Diffie-Hellman (DH) group 14	DH group 14 provides more security than DH groups 1, 2, or 5.
Advanced Encryption Standard (AES) encryption	AES is cryptographically stronger than Data Encryption Standard (DES) and Triple DES (3DES) when key lengths are equal. Approved encryption algorithm for Federal Information Processing Standards (FIPS) and Common Criteria EAL4 standards.
Secure Hash Algorithm 256 (SHA-256) authentication	SHA-256 provides more cryptographic security than SHA-1 or Message Digest 5 (MD5).
<i>IPsec configuration options:</i>	
Perfect Forward Secrecy (PFS) DH group 14	PFS DH group 14 provides increased security because the peers perform a second DH exchange to produce the key used for IPsec encryption and decryption.
Encapsulating Security Payload (ESP) protocol	ESP provides both confidentiality through encryption and encapsulation of the original IP packet and integrity through authentication.
AES encryption	AES is cryptographically stronger than DES and 3DES when key lengths are equal. Approved encryption algorithm for FIPS and Common Criteria EAL4 standards.
SHA-256 authentication	SHA-256 provides more cryptographic security than SHA-1 or MD5.
Anti-replay protection	Enabled by default. Disabling this might resolve compatibility issues with third-party peers.

See Also • [IPsec VPN Overview on page 31](#)

Understanding IPsec VPNs with Dynamic Endpoints

- [Overview on page 59](#)
- [IKE Identity on page 59](#)
- [Aggressive Mode for IKEv1 Policy on page 59](#)
- [IKE Policies and External Interfaces on page 59](#)
- [NAT on page 60](#)
- [Group and Shared IKE IDs on page 60](#)

Overview

An IPsec VPN peer can have an IP address that is not known to the peer with which it is establishing the VPN connection. For example, a peer can have an IP address dynamically assigned by means of Dynamic Host Configuration Protocol (DHCP). This could be the case with a remote access client in a branch or home office or a mobile device that moves between different physical locations. Or, the peer can be located behind a NAT device that translates the peer's original source IP address into a different address. A VPN peer with an unknown IP address is referred to as a *dynamic endpoint* and a VPN established with a dynamic endpoint is referred to as a *dynamic endpoint VPN*.

On SRX Series devices, IKEv1 or IKEv2 is supported with dynamic endpoint VPNs. Dynamic endpoint VPNs on SRX Series devices support IPv4 traffic on secure tunnels. Starting with Junos OS Release 15.1X49-D80, dynamic endpoint VPNs on SRX Series devices support IPv6 traffic on secure tunnels.



NOTE: IPv6 traffic is not supported for AutoVPN networks.

The following sections describe items to note when configuring a VPN with a dynamic endpoint.

IKE Identity

On the dynamic endpoint, an IKE identity must be configured for the device to identify itself to its peer. The local identity of the dynamic endpoint is verified on the peer. By default, the SRX Series device expects the IKE identity to be one of the following:

- When certificates are used, a distinguished name (DN) can be used to identify users or an organization.
- A hostname or fully qualified domain name (FQDN) that identifies the endpoint.
- A user fully qualified domain name (UFQDN), also known as *user-at-hostname*. This is a string that follows the e-mail address format.

Aggressive Mode for IKEv1 Policy

When IKEv1 is used with dynamic endpoint VPNs, the IKE policy must be configured for aggressive mode. IKEv2 does not use aggressive mode, so you can configure either main or aggressive mode when using IKEv2 with dynamic endpoint VPNs.

IKE Policies and External Interfaces

Starting with Junos OS Release 12.3X48-D40, Junos OS Release 15.1X49-D70, and Junos OS Release 17.3R1, all dynamic endpoint gateways configured on SRX Series devices that use the same external interface can use different IKE policies, but the IKE policies must use the same IKE proposal. This applies to IKEv1 and IKEv2.

NAT

If the dynamic endpoint is behind a NAT device, NAT-T must be configured on the SRX Series device. NAT keepalives might be required to maintain the NAT translation during the connection between the VPN peers. By default, NAT-T is enabled on SRX Series devices and NAT keepalives are sent at 20-second intervals.

Group and Shared IKE IDs

You can configure an individual VPN tunnel for each dynamic endpoint. For IPv4 dynamic endpoint VPNs, you can use the group IKE ID or shared IKE ID features to allow a number of dynamic endpoints to share an IKE gateway configuration.

The group IKE ID allows you to define a common part of a full IKE ID for all dynamic endpoints, such as "example.net." A user-specific part, such as the username "Bob," concatenated with the common part forms a full IKE ID (Bob.example.net) that uniquely identifies each user connection.

The shared IKE ID allows dynamic endpoints to share a single IKE ID and preshared key.

See Also • [Example: Configuring NAT-T with Dynamic Endpoint VPN on page 629](#)

Understanding IKE Identity Configuration

The IKE identification (IKE ID) is used for validation of VPN peer devices during IKE negotiation. The IKE ID received by the SRX Series device from a remote peer can be an IPv4 or IPv6 address, a hostname, a fully qualified domain name (FQDN), a user FQDN (UFQDN), or a distinguished name (DN). The IKE ID sent by the remote peer needs to match what is expected by the SRX Series device. Otherwise, IKE ID validation fails and the VPN is not established.

- [IKE ID Types on page 60](#)
- [Remote IKE IDs and Site-to-Site VPNs on page 61](#)
- [Remote IKE IDs and Dynamic Endpoint VPNs on page 61](#)
- [Local IKE ID of the SRX Series Device on page 61](#)

IKE ID Types

The SRX Series devices support the following types of IKE identities for remote peers:

- An IPv4 or IPv6 address is commonly used with site-to-site VPNs, where the remote peer has a static IP address.
- A hostname is a string that identifies the remote peer system. This can be an FQDN that resolves to an IP address. It can also be a partial FQDN that is used in conjunction with an IKE user type to identify a specific remote user.



NOTE: When a hostname is configured instead of an IP address, the committed configuration and subsequent tunnel establishment is based on the currently-resolved IP address. If the remote peer's IP address changes, the configuration is no longer valid.

- A UFQDN is a string that follows the same format as an e-mail address, such as `user@example.com`.
- A DN is a name used with digital certificates to uniquely identify a user. For example, a DN can be "CN=user, DC=example, DC=com." Optionally, you can use the **container** keyword to specify that the order of the fields in a DN and their values exactly match the configured DN, or use the **wildcard** keyword to specify that the values of fields in a DN must match but the order of the fields does not matter.
- An IKE user type can be used with AutoVPN and remote access VPNs when there are multiple remote peers connecting to the same VPN gateway on the SRX Series device. Configure **ike-user-type group-ike-id** to specify a group IKE ID or **ike-user-type shared-ike-id** to specify a shared IKE ID.

Remote IKE IDs and Site-to-Site VPNs

For site-to-site VPNs, the remote peer's IKE ID can be the IP address of the egress network interface card, a loopback address, a hostname, or a manually configured IKE ID, depending on the configuration of the peer device.

By default, SRX Series devices expect the remote peer's IKE ID to be the IP address configured with the **set security ike gateway gateway-name address** configuration. If the remote peer's IKE ID is a different value, you need to configure the **remote-identity** statement at the **[edit security ike gateway gateway-name]** hierarchy level.

For example, an IKE gateway on the SRX Series devices is configured with the **set security ike gateway remote-gateway address 203.0.113.1** command. However, the IKE ID sent by the remote peer is **host.example.net**. There is a mismatch between what the SRX Series device expects for the remote peer's IKE ID (203.0.113.1) and the actual IKE ID (**host.example.net**) sent by the peer. In this case, IKE ID validation fails. Use the **set security ike gateway remote-gateway remote-identity hostname host.example.net** to match the IKE ID received from the remote peer.

Remote IKE IDs and Dynamic Endpoint VPNs

For dynamic endpoint VPNs, the remote peer's expected IKE ID is configured with the options at the **[edit security ike gateway gateway-name dynamic]** hierarchy level. For AutoVPN, **hostname** combined with **ike-user-type group-ike-id** can be used where there are multiple peers that have a common domain name. If certificates are used for verifying the peer, a DN can be configured.

Local IKE ID of the SRX Series Device

By default, the SRX Series device uses the IP address of its external interface to the remote peer as its IKE ID. This IKE ID can be overridden by configuring the **local-identity**

statement at the `[edit security ike gateway gateway-name]` hierarchy level. If you need to configure the **local-identity** statement on an SRX Series device, make sure that the configured IKE ID matches the IKE ID expected by the remote peer.

See Also • [Understanding Spoke Authentication in AutoVPN Deployments on page 229](#)

Configuring Remote IKE IDs for Site-to-Site VPNs

By default, SRX Series devices validate the IKE ID received from the peer with the IP address configured for the IKE gateway. In certain network setups, the IKE ID received from the peer (which can be an IPv4 or IPv6 address, fully qualified domain name [FQDN], distinguished name, or e-mail address) does not match the IKE gateway configured on the SRX Series device. This can lead to a Phase 1 validation failure.

To modify the configuration of the SRX Series device or the peer device for the IKE ID that is used:

- On the SRX Series device, configure the **remote-identity** statement at the `[edit security ike gateway gateway-name]` hierarchy level to match the IKE ID that is received from the peer. Values can be an IPv4 or IPv6 address, FQDN, distinguished name, or e-mail address.



NOTE: If you do not configure **remote-identity**, the device uses the IPv4 or IPv6 address that corresponds to the remote peer by default.

- On the peer device, ensure that the IKE ID is the same as the **remote-identity** configured on the SRX Series device. If the peer device is an SRX Series device, configure the **local-identity** statement at the `[edit security ike gateway gateway-name]` hierarchy level. Values can be an IPv4 or IPv6 address, FQDN, distinguished name, or e-mail address.

See Also • [Understanding NAT-T on page 567](#)

- [Example: Configuring a Route-Based VPN with Only the Responder Behind a NAT Device on page 568](#)
- [Example: Configuring a Policy-Based VPN with Both an Initiator and a Responder Behind a NAT Device on page 599](#)

Understanding OSPF and OSPFv3 Authentication on SRX Series Devices

OSPFv3 does not have a built-in authentication method and relies on the IP Security (IPsec) suite to provide this functionality. IPsec provides authentication of origin, data integrity, confidentiality, replay protection, and nonrepudiation of source. You can use IPsec to secure specific OSPFv3 interfaces and virtual links and to provide encryption for OSPF packets.

OSPFv3 uses the IP authentication header (AH) and the IP Encapsulating Security Payload (ESP) portions of the IPsec protocol to authenticate routing information between peers. AH can provide connectionless integrity and data origin authentication. It also provides protection against replays. AH authenticates as much of the IP header as possible, as well as the upper-level protocol data. However, some IP header fields might change in transit. Because the value of these fields might not be predictable by the sender, they cannot be protected by AH. ESP can provide encryption and limited traffic flow confidentiality or connectionless integrity, data origin authentication, and an anti-replay service.

IPsec is based on security associations (SAs). An SA is a set of IPsec specifications that are negotiated between devices that are establishing an IPsec relationship. This simplex connection provides security services to the packets carried by the SA. These specifications include preferences for the type of authentication, encryption, and IPsec protocol to be used when establishing the IPsec connection. An SA is used to encrypt and authenticate a particular flow in one direction. Therefore, in normal bidirectional traffic, the flows are secured by a pair of SAs. An SA to be used with OSPFv3 must be configured manually and use transport mode. Static values must be configured on both ends of the SA.

To configure IPsec for OSPF or OSPFv3, first define a manual SA with the **security-association sa-name** option at the **[edit security ipsec]** hierarchy level. This feature only supports bidirectional manual key SAs in transport mode. Manual SAs require no negotiation between the peers. All values, including the keys, are static and specified in the configuration. Manual SAs statically define the security parameter index (SPI) values, algorithms, and keys to be used and require matching configurations on both endpoints (OSPF or OSPFv3 peers). As a result, each peer must have the same configured options for communication to take place.

The actual choice of encryption and authentication algorithms is left to your IPsec administrator; however, we have the following recommendations:

- Use ESP with null encryption to provide authentication to protocol headers but not to the IPv6 header, extension headers, and options. With null encryption, you are choosing not to provide encryption on protocol headers. This can be useful for troubleshooting and debugging purposes. For more information about null encryption, see RFC 2410, *The NULL Encryption Algorithm and Its Use with IPsec*.
- Use ESP with DES or 3DES for full confidentiality.
- Use AH to provide authentication to protocol headers, immutable fields in IPv6 headers, and extension headers and options.

The configured SA is applied to the OSPF or OSPFv3 configurations as follows:

- For an OSPF or OSPFv3 interface, include the **ipsec-sa name** statement at the **[edit protocols ospf area area-id interface interface-name]** or **[edit protocols ospf3 area area-id interface interface-name]** hierarchy level. Only one IPsec SA name can be specified for an OSPF or OSPFv3 interface; however, different OSPF/OSPFv3 interfaces can specify the same IPsec SA.
- For an OSPF or OSPFv3 virtual link, include the **ipsec-sa name** statement at the **[edit protocols ospf area area-id virtual-link neighbor-id router-id transit-area area-id]** or **[edit**

protocols ospf3 area *area-id* virtual-link neighbor-id *router-id* transit-area *area-id*] hierarchy level. You must configure the same IPsec SA for all virtual links with the same remote endpoint address.

The following restrictions apply to IPsec authentication for OSPF or OSPFv3 on SRX Series devices:

- Manual VPN configurations that are configured at the [**edit security ipsec vpn *vpn-name* manual**] hierarchy level cannot be applied to OSPF or OSPFv3 interfaces or virtual links to provide IPsec authentication and confidentiality.
- You cannot configure IPsec for OSPF or OSPFv3 authentication if there is an existing IPsec VPN configured on the device with the same local and remote addresses.
- IPsec for OSPF or OSPFv3 authentication is not supported over secure tunnel st0 interfaces.
- Rekeying of manual keys is not supported.
- Dynamic Internet Key Exchange (IKE) SAs are not supported.
- Only IPsec transport mode is supported. In transport mode, only the payload (the data you transfer) of the IP packet is encrypted, authenticated, or both. Tunnel mode is not supported.
- Because only bidirectional manual SAs are supported, all OSPFv3 peers must be configured with the same IPsec SA. You configure a manual bidirectional SA at the [**edit security ipsec**] hierarchy level.
- You must configure the same IPsec SA for all virtual links with the same remote endpoint address.

See Also • [IPsec VPN Overview on page 31](#)

Example: Configuring IPsec Authentication for an OSPF Interface on an SRX Series Device

This example shows how to configure and apply a manual security association (SA) to an OSPF interface.

- [Requirements on page 64](#)
- [Overview on page 65](#)
- [Configuration on page 65](#)
- [Verification on page 68](#)

Requirements

Before you begin:

- Configure the device interfaces.
- Configure the router identifiers for the devices in your OSPF network.
- Control OSPF designated router election.

- Configure a single-area OSPF network.
- Configure a multiarea OSPF network.

Overview

You can use IPsec authentication for both OSPF and OSPFv3. You configure the manual SA separately and apply it to the applicable OSPF configuration. [Table 7 on page 65](#) lists the parameters and values configured for the manual SA in this example.

Table 7: Manual SA for IPsec OSPF Interface Authentication

Parameter	Value
SA name	sa1
Mode	transport
Direction	bidirectional
Protocol	AH
SPI	256
Authentication algorithm	hmac-md5-96
Key	(ASCII) 123456789012abc
Encryption algorithm	des
Key	(ASCII) cba210987654321

Configuration

- [Configuring a Manual SA on page 65](#)
- [Enabling IPsec Authentication for an OSPF Interface on page 67](#)

Configuring a Manual SA

CLI Quick Configuration

To quickly configure a manual SA to be used for IPsec authentication on an OSPF interface, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
[edit]
set security ipsec security-association sa1
set security ipsec security-association sa1 mode transport
set security ipsec security-association sa1 manual direction bidirectional
set security ipsec security-association sa1 manual direction bidirectional protocol ah
set security ipsec security-association sa1 manual direction bidirectional spi 256
set security ipsec security-association sa1 manual direction bidirectional authentication
algorithm hmac-md5-96 key ascii-text 123456789012abc
```

```
set security ipsec security-association sa1 manual direction bidirectional encryption
algorithm des key ascii-text cba210987654321
```

**Step-by-Step
Procedure**

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a manual SA:

1. Specify a name for the SA.

```
[edit]
user@host# edit security ipsec security-association sa1
```

2. Specify the mode of the manual SA.

```
[edit security ipsec security-association sa1]
user@host# set mode transport
```

3. Configure the direction of the manual SA.

```
[edit security ipsec security-association sa1]
user@host# set manual direction bidirectional
```

4. Configure the IPsec protocol to use.

```
[edit security ipsec security-association sa1]
user@host# set manual direction bidirectional protocol ah
```

5. Configure the value of the SPI.

```
[edit security ipsec security-association sa1]
user@host# set manual direction bidirectional spi 256
```

6. Configure the authentication algorithm and key.

```
[edit security ipsec security-association sa1]
user@host# set manual direction bidirectional authentication algorithm
hmac-md5-96 key ascii-text 123456789012abc
```

7. Configure the encryption algorithm and key.

```
[edit security ipsec security-association sa1]
user@host# set manual direction bidirectional encryption algorithm des key ascii-text
cba210987654321
```

Results Confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.



NOTE: After you configure the password, you do not see the password itself. The output displays the encrypted form of the password you configured.

```
[edit]
user@host# show security ipsec
security-association sa1 {
  mode transport;
  manual {
    direction bidirectional {
      protocol ah;
      spi 256;
      authentication {
        algorithm hmac-md5-96;
        key ascii-text "$9$AP5Hp1RcylMLxSygoZUHK1REhKMVwY2oJx7jHq.zF69A00R";
        ## SECRET-DATA
      }
    }
    encryption {
      algorithm des;
      key ascii-text "$9$AP5Hp1RcylMLxSygoZUHK1REhKMVwY2oJx7jHq.zF69A00R";
      ## SECRET-DATA
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Enabling IPsec Authentication for an OSPF Interface

CLI Quick Configuration To quickly apply a manual SA used for IPsec authentication to an OSPF interface, copy the following command, paste it into a text file, change any details necessary to match your network configuration, copy and paste the command into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
[edit]
set protocols ospf area 0.0.0.0 interface so-0/2/0 ipsec-sa sa1
```

Step-by-Step Procedure To enable IPsec authentication for an OSPF interface:

1. Create an OSPF area.



NOTE: To specify OSPFv3, include the **ospf3** statement at the **[edit protocols]** hierarchy level.

```
[edit]
user@host# edit protocols ospf area 0.0.0.0
```

2. Specify the interface.

```
[edit protocols ospf area 0.0.0.0]
user@host# edit interface so-0/2/0
```

3. Apply the IPsec manual SA.

```
[edit protocols ospf area 0.0.0.0 interface so-0/2/0.0]
user@host# set ipsec-sa sa1
```

Results Confirm your configuration by entering the **show ospf interface detail** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

To confirm your OSPFv3 configuration, enter the **show protocols ospf3** command.

```
[edit]
user@host# show protocols ospf
area 0.0.0.0 {
    interface so-0/2/0.0 {
        ipsec-sa sa1;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying the IPsec Security Association Settings on page 68](#)
- [Verifying the IPsec Security Association on the OSPF Interface on page 69](#)

Verifying the IPsec Security Association Settings

Purpose Verify the configured IPsec security association settings. Verify the following information:

- The Security association field displays the name of the configured security association.
- The SPI field displays the value you configured.
- The Mode field displays transport mode.
- The Type field displays manual as the type of security association.

Action From operational mode, enter the **show ospf interface detail** command.

Verifying the IPsec Security Association on the OSPF Interface

Purpose Verify that the IPsec security association that you configured has been applied to the OSPF interface. Confirm that the IPsec SA name field displays the name of the configured IPsec security association.

Action From operational mode, enter the **show ospf interface detail** command for OSPF, and enter the **show ospf3 interface detail** command for OSPFv3.

See Also • [Understanding IPsec SA Configuration for Group VPNv1 on page 714](#)

Configuring IPsec VPN Using the VPN Wizard

The VPN Wizard enables you to perform basic IPsec VPN configuration, including both Phase 1 and Phase 2. For more advanced configuration, use the J-Web interface or the CLI. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

To configure IPsec VPN using the VPN Wizard:

1. Select **Configure>Device Setup>VPN** in the J-Web interface.
2. Click the Launch VPN Wizard button.
3. Follow the wizard prompts.

The upper left area of the wizard page shows where you are in the configuration process. The lower left area of the page shows field-sensitive help. When you click a link under the Resources heading, the document opens in your browser. If the document opens in a new tab, be sure to close only the tab (not the browser window) when you close the document.

See Also • [IPsec VPN Overview on page 31](#)
 • [Understanding Phase 1 of IKE Tunnel Negotiation on page 46](#)
 • [Understanding Phase 2 of IKE Tunnel Negotiation on page 48](#)

Understanding Suite B and PRIME Cryptographic Suites

Suite B is a set of cryptographic algorithms designated by the U.S. National Security Agency to allow commercial products to protect traffic that is classified at secret or top secret levels. Suite B protocols are defined in RFC 6379, *Suite B Cryptographic Suites for IPsec*. The Suite B cryptographic suites provide Encapsulating Security Payload (ESP) integrity and confidentiality and should be used when ESP integrity protection and encryption are both required. Protocol Requirements for IP Modular Encryption (PRIME), an IPsec profile defined for public sector networks in the United Kingdom, is based on

the Suite B cryptographic suite, but uses AES-GCM rather than AES-CBC for IKEv2 negotiations.

The following cryptographic suites are supported:

- Suite-B-GCM-128
 - ESP: Advanced Encryption Standard (AES) encryption with 128-bit keys and 16-octet integrity check value (ICV) in Galois Counter Mode (GCM).
 - IKE: AES encryption with 128-bit keys in cipher block chaining (CBC) mode, integrity using SHA-256 authentication, key establishment using Diffie-Hellman (DH) group 19, and authentication using Elliptic Curve Digital Signature Algorithm (ECDSA) 256-bit elliptic curve signatures.
- Suite-B-GCM-256
 - ESP: AES encryption with 256-bit keys and 16-octet ICV in GCM for ESP.
 - IKE: AES encryption with 256-bit keys in CBC mode, integrity using SHA-384 authentication, key establishment using DH group 20, and authentication using ECDSA 384-bit elliptic curve signatures.
- PRIME-128
 - ESP: AES encryption with 128-bit keys and 16-octet ICV in GCM.
 - IKE: AES encryption with 128-bit keys in GCM, key establishment using DH group 19, and authentication using ECDSA 256-bit elliptic curve signatures.
- PRIME-256
 - ESP: AES encryption with 256-bit keys and 16-octet ICV in GCM for ESP.
 - IKE: AES encryption with 256-bit keys in GCM, key establishment using DH group 20, and authentication using ECDSA 384-bit elliptic curve signatures.

Suite-B cryptographic suites support IKEv1 and IKEv2. PRIME cryptographic suites only support IKEv2.



NOTE: Suite B and PRIME are not fully supported on SRX3400 and SRX3600 devices and on SRX5400, SRX5600, and SRX5800 devices that do not have the SPC2 (SRX5K-SPC-4-14-320). (Platform support depends on the Junos OS release in your installation.) You can configure IKE with Suite B options on these devices, but AES-GCM options are not supported. If you configure IKE with Suite B options on these devices, VPN establishment is slower because the devices do not have the hardware processors that can accelerate Suite B algorithm processing.



NOTE: Suite B and PRIME are not supported with the Group VPNv2 feature.

CLI options support Suite B and PRIME compliance in IKE and IPsec proposal configuration:

- For IKE proposals configured at the `[edit security ike proposal proposal-name]` hierarchy level:
 - **authentication-algorithm** options include `sha-256` and `sha-384`.
 - **authentication-method** options include `ecdsa-signatures-256` and `ecdsa-signatures-384`.
 - **dh-group** options include `group19` and `group20`.
 - **encryption-algorithm** options for PRIME include `aes-128-gcm` and `aes-256-gcm`.



NOTE: When `aes-128-gcm` or `aes-256-gcm` encryption algorithms are configured in the IPsec proposal, it is not mandatory to configure AES-GCM encryption algorithm in the corresponding IKE proposal.

- For IPsec proposals configured at the `[edit security ipsec proposal proposal-name]` hierarchy level, **encryption-algorithm** options include `aes-128-gcm`, `aes-192-gcm`, and `aes-256-gcm`.
- For IPsec policies configured at the `[edit security ipsec policy policy-name]` hierarchy level, the **perfect-forward-secrecy keys** options include `group19` and `group20`.
- For convenience, predefined proposals that provide compliance with Suite B (`suiteb-gcm-128` and `suiteb-gcm-256`) and PRIME (`prime-128` and `prime-256`) are available at the `[edit security ike policy policy-name]` and `[edit security ipsec policy policy-name]` hierarchy levels.



NOTE: VPN monitoring and cryptographic configuration options `ecdsa-signatures-384` (for IKE authentication) and DH group 20 consume considerable CPU resources. If VPN monitoring and the `ecdsa-signatures-384` and `group20` options are used on an SRX Series device with a large number of tunnels configured, the SRX Series device must have the SPC2 installed.

See Also • [IPsec VPN Overview on page 31](#)

Example: Configuring a Hub-and-Spoke VPN

This example shows how to configure a hub-and-spoke IPsec VPN for an enterprise-class deployment.

- [Requirements on page 72](#)
- [Overview on page 72](#)
- [Configuration on page 78](#)
- [Verification on page 101](#)

Requirements

This example uses the following hardware:

- SRX240 device
- SRX5800 device
- SSG140 device

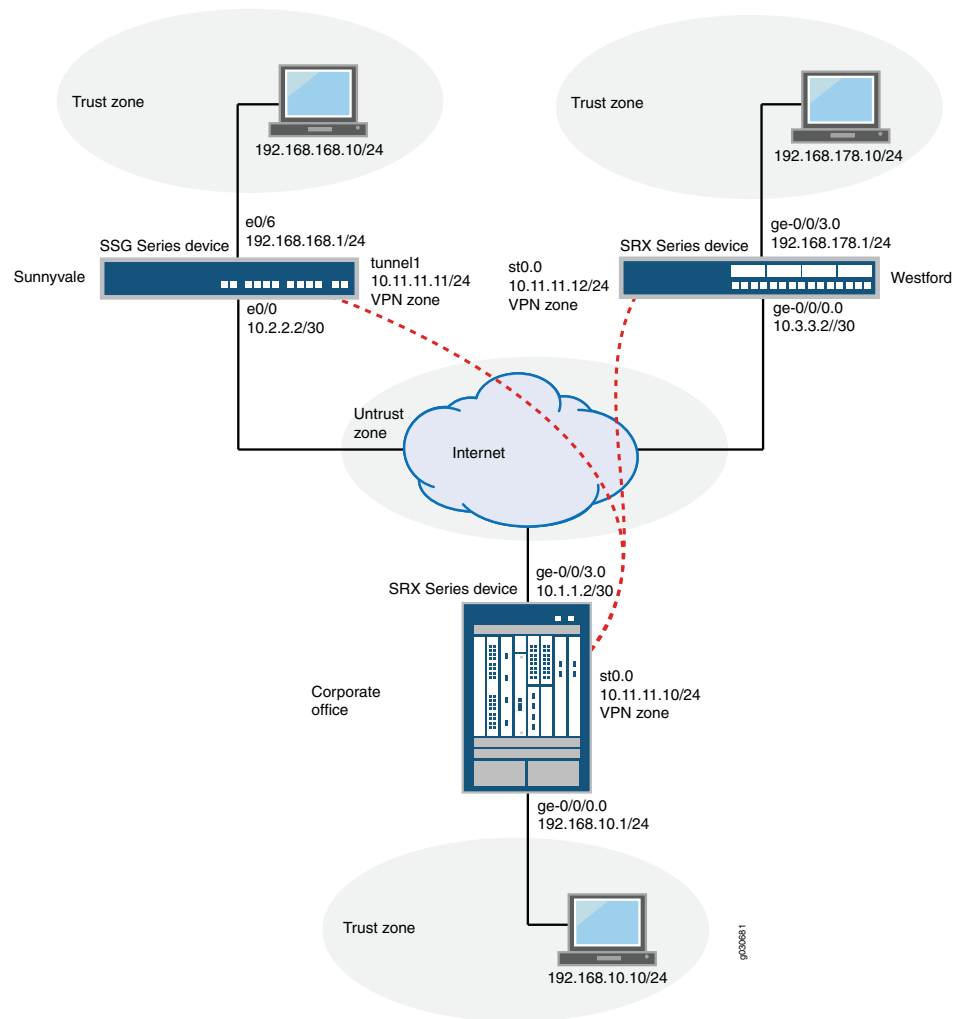
Before you begin, read [“IPsec VPN Overview” on page 31](#).

Overview

This example describes how to configure a hub-and-spoke VPN typically found in branch deployments. The hub is the corporate office, and there are two spokes—a branch office in Sunnyvale, California, and a branch office in Westford, Massachusetts. Users in the branch offices will use the VPN to securely transfer data with the corporate office.

[Figure 11 on page 73](#) shows an example of a hub-and-spoke VPN topology. In this topology, an SRX5800 device is located at the corporate office. An SRX Series device is located at the Westford branch, and an SSG140 device is located at the Sunnyvale branch.

Figure 11: Hub-and-Spoke VPN Topology



In this example, you configure the corporate office hub, the Westford spoke, and the Sunnyvale spoke. First you configure interfaces, IPv4 static and default routes, security zones, and address books. Then you configure IKE Phase 1 and IPsec Phase 2 parameters, and bind the st0.0 interface to the IPsec VPN. On the hub, you configure st0.0 for multipoint and add a static NHTB table entry for the Sunnyvale spoke. Finally, you configure security policy and TCP-MSS parameters. See [Table 8 on page 73](#) through [Table 12 on page 78](#) for specific configuration parameters used in this example.

Table 8: Interface, Security Zone, and Address Book Information

Hub or Spoke	Feature	Name	Configuration Parameters
Hub	Interfaces	ge-0/0/0.0	192.168.10.1/24
		ge-0/0/3.0	10.1.1.2/30

Table 8: Interface, Security Zone, and Address Book Information (continued)

Hub or Spoke	Feature	Name	Configuration Parameters
Spoke	Interfaces	st0	10.11.11.10/24
		ge-0/0/0.0	10.3.3.2/30
		ge-0/0/3.0	192.168.178.1/24
Hub	Security zones	st0	10.11.11.12/24
		trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/0.0 interface is bound to this zone.
		untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/3.0 interface is bound to this zone.
Spoke	Security zones	vpn	The st0.0 interface is bound to this zone.
		trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/3.0 interface is bound to this zone.
		untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/0.0 interface is bound to this zone.
Hub	Address book entries	vpn	The st0.0 interface is bound to this zone.
		local-net	<ul style="list-style-type: none"> This address is for the trust zone's address book. The address for this address book entry is 192.168.10.0/24.
		sunnyvale-net	<ul style="list-style-type: none"> This address book is for the vpn zone's address book. The address for this address book entry is 192.168.168.0/24.
Hub	Address book entries	westford-net	<ul style="list-style-type: none"> This address is for the vpn zone's address book. The address for this address book entry is 192.168.178.0/24.

Table 8: Interface, Security Zone, and Address Book Information (continued)

Hub or Spoke	Feature	Name	Configuration Parameters
Spoke	Address book entries	local-net	<ul style="list-style-type: none"> This address is for the trust zone's address book. The address for this address book entry is 192.168.168.178.0/24.
		corp-net	<ul style="list-style-type: none"> This address is for the vpn zone's address book. The address for this address book entry is 192.168.10.0/24.
		sunnyvale-net	<ul style="list-style-type: none"> This address is for the vpn zone's address book. The address for this address book entry is 192.168.168.0/24.

Table 9: IKE Phase 1 Configuration Parameters

Hub or Spoke	Feature	Name	Configuration Parameters
Hub	Proposal	ike-phase1-proposal	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: aes-128-cbc
	Policy	ike-phase1-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-phase1-proposal IKE Phase 1 policy authentication method: pre-shared-key ascii-text
	Gateway	gw-westford	<ul style="list-style-type: none"> IKE policy reference: ike-phase1-policy External interface: ge-0/0/3.0 Gateway address: 10.3.3.2
		gw-sunnyvale	<ul style="list-style-type: none"> IKE policy reference: ike-phase1-policy External interface: ge-0/0/3.0 Gateway address: 10.2.2.2

Table 9: IKE Phase 1 Configuration Parameters (continued)

Hub or Spoke	Feature	Name	Configuration Parameters
Spoke	Proposal	ike-phase1-proposal	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: aes-128-cbc
	Policy	ike-phase1-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-phase1-proposal IKE Phase 1 policy authentication method: pre-shared-key ascii-text
	Gateway	gw-corporate	<ul style="list-style-type: none"> IKE policy reference: ike-phase1-policy External interface: ge-0/0/0.0 Gateway address: 10.1.1.2

Table 10: IPsec Phase 2 Configuration Parameters

Hub or Spoke	Feature	Name	Configuration Parameters
Hub	Proposal	ipsec-phase2-proposal	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: aes-128-cbc
	Policy	ipsec-phase2-policy	<ul style="list-style-type: none"> Proposal reference: ipsec-phase2-proposal PFS: Diffie-Hellman group2
	VPN	vpn-sunnyvale	<ul style="list-style-type: none"> IKE gateway reference: gw-sunnyvale IPsec policy reference: ipsec-phase2-policy Bind to interface: st0.0
		vpn-westford	<ul style="list-style-type: none"> IKE gateway reference: gw-westford IPsec policy reference: ipsec-phase2-policy Bind to interface: st0.0
Spoke	Proposal	ipsec-phase2-proposal	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: aes-128-cbc
	Policy	ipsec-phase2-policy	<ul style="list-style-type: none"> Proposal reference: ipsec-phase2-proposal PFS: Diffie-Hellman group2

Table 10: IPsec Phase 2 Configuration Parameters (continued)

Hub or Spoke	Feature	Name	Configuration Parameters
	VPN	vpn-corporate	<ul style="list-style-type: none"> • IKE gateway reference: gw-corporate • IPsec policy reference: ipsec-phase2-policy • Bind to interface: st0.0

Table 11: Security Policy Configuration Parameters

Hub or Spoke	Purpose	Name	Configuration Parameters
Hub	The security policy permits traffic from the trust zone to the vpn zone.	local-to-spokes	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address local-net • destination-address sunnyvale-net • destination-address westford-net • application any
	The security policy permits traffic from the vpn zone to the trust zone.	spokes-to-local	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address sunnyvale-net • source-address westford-net • destination-address local-net • application any
	The security policy permits intrazone traffic.	spoke-to-spoke	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address any • destination-address any • application any
Spoke	The security policy permits traffic from the trust zone to the vpn zone.	to-corp	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address local-net • destination-address corp-net • destination-address sunnyvale-net • application any
	The security policy permits traffic from the vpn zone to the trust zone.	from-corp	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address corp-net • source-address sunnyvale-net • destination-address local-net • application any

Table 11: Security Policy Configuration Parameters (continued)

Hub or Spoke	Purpose	Name	Configuration Parameters
	The security policy permits traffic from the untrust zone to the trust zone.	permit-any	<p>Match criteria:</p> <ul style="list-style-type: none"> • source-address any • source-destination any • application any • Permit action: source-nat interface <p>By specifying source-nat interface, the SRX Series device translates the source IP address and port for outgoing traffic, using the IP address of the egress interface as the source IP address and a random high-number port for the source port.</p>

Table 12: TCP-MSS Configuration Parameters

Purpose	Configuration Parameters
<p>TCC-MSS is negotiated as part of the TCP three-way handshake and limits the maximum size of a TCP segment to better fit the MTU limits on a network. For VPN traffic, the IPsec encapsulation overhead, along with the IP and frame overhead, can cause the resulting ESP packet to exceed the MTU of the physical interface, which causes fragmentation. Fragmentation results in increased use of bandwidth and device resources.</p> <p>NOTE: The value of 1350 is a recommended starting point for most Ethernet-based networks with an MTU of 1500 or greater. You might need to experiment with different TCP-MSS values to obtain optimal performance. For example, you might need to change the value if any device in the path has a lower MTU, or if there is any additional overhead such as PPP or Frame Relay.</p>	MSS value: 1350

Configuration

- [Configuring Basic Network, Security Zone, and Address Book Information for the Hub on page 79](#)
- [Configuring IKE for the Hub on page 82](#)
- [Configuring IPsec for the Hub on page 85](#)
- [Configuring Security Policies for the Hub on page 88](#)
- [Configuring TCP-MSS for the Hub on page 90](#)
- [Configuring Basic Network, Security Zone, and Address Book Information for the Westford Spoke on page 90](#)
- [Configuring IKE for the Westford Spoke on page 94](#)
- [Configuring IPsec for the Westford Spoke on page 96](#)
- [Configuring Security Policies for the Westford Spoke on page 98](#)
- [Configuring TCP-MSS for the Westford Spoke on page 100](#)
- [Configuring the Sunnyvale Spoke on page 101](#)

Configuring Basic Network, Security Zone, and Address Book Information for the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
set interfaces st0 unit 0 family inet address 10.11.10.1/24
set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
set routing-options static route 192.168.168.0/24 next-hop 10.11.11.11
set routing-options static route 192.168.178.0/24 next-hop 10.11.11.12
set security zones security-zone untrust interfaces ge-0/0/3.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone vpn interfaces st0.0
set security address-book book1 address local-net 192.168.10.0/24
set security address-book book1 attach zone trust
set security address-book book2 address sunnyvale-net 192.168.168.0/24
set security address-book book2 address westford-net 192.168.178.0/24
set security address-book book2 attach zone vpn
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure basic network, security zone, and address book information for the hub:

1. Configure Ethernet interface information.

```
[edit]
user@hub# set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
user@hub# set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
user@hub# set interfaces st0 unit 0 family inet address 10.11.10.1/24
```

2. Configure static route information.

```
[edit]
user@hub# set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
user@hub# set routing-options static route 192.168.168.0/24 next-hop 10.11.11.11
user@hub# set routing-options static route 192.168.178.0/24 next-hop 10.11.11.12
```

3. Configure the untrust security zone.

```
[edit ]
user@hub# set security zones security-zone untrust
```

4. Assign an interface to the untrust security zone.

```
[edit security zones security-zone untrust]
user@hub# set interfaces ge-0/0/3.0
```

5. Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@hub# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@hub# edit security zones security-zone trust
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@hub# set interfaces ge-0/0/0.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@hub# set host-inbound-traffic system-services all
```

9. Create an address book and attach a zone to it.

```
[edit security address-book book1]
user@hub# set address local-net 10.10.10.0/24
user@hub# set attach zone trust
```

10. Configure the vpn security zone.

```
[edit]
user@hub# edit security zones security-zone vpn
```

11. Assign an interface to the vpn security zone.

```
[edit security zones security-zone vpn]
user@hub# set interfaces st0.0
```

12. Create another address book and attach a zone to it.

```
[edit security address-book book2]
user@hub# set address sunnyvale-net 192.168.168.0/24
user@hub# set address westford-net 192.168.178.0/24
```

```
user@hub# set attach zone vpn
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security address-book** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@hub# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 192.168.10.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.1.1.2/30
    }
  }
}
st0 {
  unit 0 {
    family inet {
      address 10.11.11.10/24
    }
  }
}
```

```
[edit]
user@hub# show routing-options
static {
  route 0.0.0.0/0 next-hop 10.1.1.1;
  route 192.168.168.0/24 next-hop 10.11.11.11;
  route 192.168.178.0/24 next-hop 10.11.11.12;
}
```

```
[edit]
user@hub# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      ike;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
```

```

security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
security-zone vpn {
  host-inbound-traffic {
  }
  interfaces {
    st0.0;
  }
}
[edit]
user@hub# show security address-book
book1 {
  address local-net 10.10.10.0/24;
  attach {
    zone trust;
  }
}
book2 {
  address sunnyvale-net 192.168.168.0/24;
  address westford-net 192.168.178.0/24;
  attach {
    zone vpn;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Hub

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-phase1-proposal authentication-method pre-shared-keys
set security ike proposal ike-phase1-proposal dh-group group2
set security ike proposal ike-phase1-proposal authentication-algorithm sha1
set security ike proposal ike-phase1-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-phase1-policy mode main
set security ike policy ike-phase1-policy proposals ike-phase1-proposal
set security ike policy ike-phase1-policy pre-shared-key ascii-text "$ABC123"
set security ike gateway gw-westford external-interface ge-0/0/3.0
set security ike gateway gw-westford ike-policy ike-phase1-policy
set security ike gateway gw-westford address 10.3.3.2
set security ike gateway gw-sunnyvale external-interface ge-0/0/3.0

```

```
set security ike gateway gw-sunnyvale ike-policy ike-phase1-policy
set security ike gateway gw-sunnyvale address 10.2.2.2
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE for the hub:

1. Create the IKE Phase 1 proposal.

```
[edit security ike]
user@hub# set proposal ike-phase1-proposal
```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike-phase1-proposal]
user@hub# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike-phase1-proposal]
user@hub# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike-phase1-proposal]
user@hub# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike-phase1-proposal]
user@hub# set encryption-algorithm aes-128-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]
user@hub# set policy ike-phase1-policy
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike-phase1-policy]
user@hub# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-phase1-policy]
user@hub# set proposals ike-phase1-proposal
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike-phase1-policy]
user@hub# set pre-shared-key ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]
user@hub# set gateway gw-westford external-interface ge-0/0/3.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike]
user@hub# set gateway gw-westford ike-policy ike-phase1-policy
```

12. Define the IKE Phase 1 gateway address.

```
[edit security ike]
user@hub# set gateway gw-westford address 10.3.3.2
```

13. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]
user@hub# set gateway gw-sunnyvale external-interface ge-0/0/3.0
```

14. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway]
user@hub# set gateway gw-sunnyvale ike-policy ike-phase1-policy
```

15. Define the IKE Phase 1 gateway address.

```
[edit security ike gateway]
user@hub# set gateway gw-sunnyvale address 10.2.2.2
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@hub# show security ike
```



```

proposal ike-phase1-proposal {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-phase1-policy {
  mode main;
  proposals ike-phase1-proposal;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway gw-sunnyvale {
  ike-policy ike-phase1-policy;
  address 10.2.2.2;
  external-interface ge-0/0/3.0;
}
gateway gw-westford {
  ike-policy ike-phase1-policy;
  address 10.3.3.2;
  external-interface ge-0/0/3.0;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ipsec proposal ipsec-phase2-proposal protocol esp
set security ipsec proposal ipsec-phase2-proposal authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec-phase2-proposal encryption-algorithm aes-128-cbc
set security ipsec policy ipsec-phase2-policy proposals ipsec-phase2-proposal
set security ipsec policy ipsec-phase2-policy perfect-forward-secrecy keys group2
set security ipsec vpn vpn-westford ike gateway gw-westford
set security ipsec vpn vpn-westford ike ipsec-policy ipsec-phase2-policy
set security ipsec vpn vpn-westford bind-interface st0.0
set security ipsec vpn vpn-sunnyvale ike gateway gw-sunnyvale
set security ipsec vpn vpn-sunnyvale ike ipsec-policy ipsec-phase2-policy
set security ipsec vpn vpn-sunnyvale bind-interface st0.0
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet next-hop-tunnel 10.11.11.11 ipsec-vpn vpn-sunnyvale

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec for the hub:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@hub# set security ipsec proposal ipsec-phase2-proposal
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@hub# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@hub# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@hub# set encryption-algorithm aes-128-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@hub# set policy ipsec-phase2-policy
```

6. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec-phase2-policy]
user@hub# set proposals ipsec-phase2-proposal
```

7. Specify IPsec Phase 2 PFS to use Diffie-Hellman group 2.

```
[edit security ipsec policy ipsec-phase2-policy]
user@host# set perfect-forward-secrecy keys group2
```

8. Specify the IKE gateways.

```
[edit security ipsec]
user@hub# set vpn vpn-westford ike gateway gw-westford
user@hub# set vpn vpn-sunnyvale ike gateway gw-sunnyvale
```

9. Specify the IPsec Phase 2 policies.

```
[edit security ipsec]
user@hub# set vpn vpn-westford ike ipsec-policy ipsec-phase2-policy
user@hub# set vpn vpn-sunnyvale ike ipsec-policy ipsec-phase2-policy
```

10. Specify the interface to bind.

```
[edit security ipsec]
user@hub# set vpn vpn-westford bind-interface st0.0
user@hub# set vpn vpn-sunnyvale bind-interface st0.0
```

11. Configure the st0 interface as multipoint.

```
[edit]
user@hub# set interfaces st0 unit 0 multipoint
```

12. Add static NHTB table entries for the Sunnyvale and Westford offices.

```
[edit]
user@hub# set interfaces st0 unit 0 family inet next-hop-tunnel 10.11.11.11 ipsec-vpn
vpn-sunnyvale
user@hub# set interfaces st0 unit 0 family inet next-hop-tunnel 10.11.11.12 ipsec-vpn
vpn-westford
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@hub# show security ipsec
proposal ipsec-phase2-proposal {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-128-cbc;
}
policy ipsec-phase2-policy {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec-phase2-proposal;
}
vpn vpn-sunnyvale {
  bind-interface st0.0;
  ike {
    gateway gw-sunnyvale;
    ipsec-policy ipsec-phase2-policy;
  }
}
vpn vpn-westford {
  bind-interface st0.0;
  ike {
    gateway gw-westford;
    ipsec-policy ipsec-phase2-policy;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies for the Hub

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone vpn policy local-to-spokes match
  source-address local-net
set security policies from-zone trust to-zone vpn policy local-to-spokes match
  destination-address sunnyvale-net
set security policies from-zone trust to-zone vpn policy local-to-spokes match
  destination-address westford-net
set security policies from-zone trust to-zone vpn policy local-to-spokes match application
  any
set security policies from-zone trust to-zone vpn policy local-to-spokes then permit
set security policies from-zone vpn to-zone trust policy spokes-to-local match
  source-address sunnyvale-net
set security policies from-zone vpn to-zone trust policy spokes-to-local match
  source-address westford-net
set security policies from-zone vpn to-zone trust policy spokes-to-local match
  destination-address local-net
set security policies from-zone vpn to-zone trust policy spokes-to-local match application
  any
set security policies from-zone vpn to-zone trust policy spokes-to-local then permit
set security policies from-zone vpn to-zone vpn policy spoke-to-spoke match
  source-address any
set security policies from-zone vpn to-zone vpn policy spoke-to-spoke match
  destination-address any
set security policies from-zone vpn to-zone vpn policy spoke-to-spoke match application
  any
set security policies from-zone vpn to-zone vpn policy spoke-to-spoke then permit
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies for the hub:

1. Create the security policy to permit traffic from the trust zone to the vpn zone.

```
[edit security policies from-zone trust to-zone vpn]
user@hub# set policy local-to-spokes match source-address local-net
user@hub# set policy local-to-spokes match destination-address sunnyvale-net
user@hub# set policy local-to-spokes match destination-address westford-net
user@hub# set policy local-to-spokes match application any
user@hub# set policy local-to-spokes then permit
```

2. Create the security policy to permit traffic from the vpn zone to the trust zone.

```
[edit security policies from-zone vpn to-zone trust]
user@hub# set policy spokes-to-local match source-address sunnyvale-net
user@hub# set policy spokes-to-local match source-address westford-net
user@hub# set policy spokes-to-local match destination-address local-net
user@hub# set policy spokes-to-local match application any
user@hub# set policy spokes-to-local then permit
```

3. Create the security policy to permit intrazone traffic.

```
[edit security policies from-zone vpn to-zone vpn]
user@hub# set policy spoke-to-spoke match source-address any
user@hub# set policy spoke-to-spoke match destination-address any
user@hub# set policy spoke-to-spoke match application any
user@hub# set policy spoke-to-spoke then permit
```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@hub# show security policies
from-zone trust to-zone vpn {
  policy local-to-spokes {
    match {
      source-address local-net;
      destination-address [ sunnyvale-net westford-net ];
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone vpn to-zone trust {
  policy spokes-to-local {
    match {
      source-address [ sunnyvale-net westford-net ];
      destination-address local-net;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone vpn to-zone vpn {
  policy spoke-to-spoke {
    match {
      source-address any;
      destination-address any;
      application any;
    }
  }
}
```

```

    }
    then {
        permit;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS for the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure To configure TCP-MSS information for the hub:

1. Configure TCP-MSS information.

```

[edit]
user@hub# set security flow tcp-mss ipsec-vpn mss 1350

```

Results From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@hub# show security flow
tcp-mss {
    ipsec-vpn {
        mss 1350;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Basic Network, Security Zone, and Address Book Information for the Westford Spoke

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 10.3.3.2/30
```

```

set interfaces ge-0/0/3 unit 0 family inet address 192.168.178.1/24
set interfaces st0 unit 0 family inet address 10.11.11.12/24
set routing-options static route 0.0.0.0/0 next-hop 10.3.3.1
set routing-options static route 10.10.10.0/24 next-hop 10.11.11.10
set routing-options static route 192.168.168.0/24 next-hop 10.11.11.10
set security zones security-zone untrust interfaces ge-0/0/0.0
set security zones security-zone trust interfaces ge-0/0/3.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone vpn interfaces st0.0
set security address-book book1 address local-net 192.168.178.0/24
set security address-book book1 attach zone trust
set security address-book book2 address corp-net 10.10.10.0/24
set security address-book book2 address sunnyvale-net 192.168.168.0/24
set security address-book book2 attach zone vpn

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure basic network, security zone, and address book information for the Westford spoke:

1. Configure Ethernet interface information.

```

[edit]
user@spoke# set interfaces ge-0/0/0 unit 0 family inet address 10.3.3.2/30
user@spoke# set interfaces ge-0/0/3 unit 0 family inet address 192.168.178.1/24
user@spoke# set interfaces st0 unit 0 family inet address 10.11.11.12/24

```

2. Configure static route information.

```

[edit]
user@spoke# set routing-options static route 0.0.0.0/0 next-hop 10.3.3.1
user@spoke# set routing-options static route 10.10.10.0/24 next-hop 10.11.11.10
user@spoke# set routing-options static route 192.168.168.0/24 next-hop 10.11.11.10

```

3. Configure the untrust security zone.

```

[edit]
user@spoke# set security zones security-zone untrust

```

4. Assign an interface to the security zone.

```

[edit security zones security-zone untrust]
user@spoke# set interfaces ge-0/0/0.0

```

5. Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@spoke# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@spoke# edit security zones security-zone trust
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@spoke# set interfaces ge-0/0/3.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@spoke# set host-inbound-traffic system-services all
```

9. Configure the vpn security zone.

```
[edit]
user@spoke# edit security zones security-zone vpn
```

10. Assign an interface to the vpn security zone.

```
[edit security zones security-zone vpn]
user@spoke# set interfaces st0.0
```

11. Create an address book and attach a zone to it.

```
[edit security address-book book1]
user@spoke# set address local-net 192.168.178.0/24
user@spoke# set attach zone trust
```

12. Create another address book and attach a zone to it.

```
[edit security address-book book2]
user@spoke# set address corp-net 10.10.10.0/24
user@spoke# set address sunnyvale-net 192.168.168.0/24
user@spoke# set attach zone vpn
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security address-book** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.


```
[edit]
user@spoke# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 10.3.3.2/30;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 192.168.178.1/24;
    }
  }
}
st0 {
  unit 0 {
    family inet {
      address 10.11.11.10/24;
    }
  }
}
```

```
[edit]
user@spoke# show routing-options
static {
  route 0.0.0.0/0 next-hop 10.3.3.1;
  route 192.168.168.0/24 next-hop 10.11.11.10;
  route 10.10.10.0/24 next-hop 10.11.11.10;
}
```

```
[edit]
user@spoke# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      ike;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
```

```

security-zone vpn {
  interfaces {
    st0.0;
  }
}
[edit]
user@spoke# show security address-book
book1 {
  address corp-net 10.10.10.0/24;
  attach {
    zone trust;
  }
}
book2 {
  address local-net 192.168.178.0/24;
  address sunnyvale-net 192.168.168.0/24;
  attach {
    zone vpn;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Westford Spoke

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-phase1-proposal authentication-method pre-shared-keys
set security ike proposal ike-phase1-proposal dh-group group2
set security ike proposal ike-phase1-proposal authentication-algorithm sha1
set security ike proposal ike-phase1-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-phase1-policy mode main
set security ike policy ike-phase1-policy proposals ike-phase1-proposal
set security ike policy ike-phase1-policy pre-shared-key ascii-text "$ABC123"
set security ike gateway gw-corporate external-interface ge-0/0/0.0
set security ike gateway gw-corporate ike-policy ike-phase1-policy
set security ike gateway gw-corporate address 10.1.1.2

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE for the Westford spoke:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@spoke# set proposal ike-phase1-proposal

```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike-phase1-proposal]  
user@spoke# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike-phase1-proposal]  
user@spoke# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike-phase1-proposal]  
user@spoke# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike-phase1-proposal]  
user@spoke# set encryption-algorithm aes-128-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]  
user@spoke# set policy ike-phase1-policy
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike-phase1-policy]  
user@spoke# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-phase1-policy]  
user@spoke# set proposals ike-phase1-proposal
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike-phase1-policy]  
user@spoke# set pre-shared-key ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]  
user@spoke# set gateway gw-corporate external-interface ge-0/0/0.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike]
user@spoke# set gateway gw-corporate ike-policy ike-phase1-policy
```

12. Define the IKE Phase 1 gateway address.

```
[edit security ike]
user@spoke# set gateway gw-corporate address 10.1.1.2
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@spoke# show security ike
proposal ike-phase1-proposal {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-phase1-policy {
  mode main;
  proposals ike-phase1-proposal;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway gw-corporate {
  ike-policy ike-phase1-policy;
  address 10.1.1.2;
  external-interface ge-0/0/0.0;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Westford Spoke

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec-phase2-proposal protocol esp
set security ipsec proposal ipsec-phase2-proposal authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec-phase2-proposal encryption-algorithm aes-128-cbc
set security ipsec policy ipsec-phase2-policy proposals ipsec-phase2-proposal
set security ipsec policy ipsec-phase2-policy perfect-forward-secrecy keys group2
set security ipsec vpn vpn-corporate ike gateway gw-corporate
set security ipsec vpn vpn-corporate ike ipsec-policy ipsec-phase2-policy
set security ipsec vpn vpn-corporate bind-interface st0.0
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec for the Westford spoke:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@spoke# set security ipsec proposal ipsec-phase2-proposal
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@spoke# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@spoke# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@spoke# set encryption-algorithm aes-128-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@spoke# set policy ipsec-phase2-policy
```

6. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec-phase2-policy]
user@spoke# set proposals ipsec-phase2-proposal
```

7. Specify IPsec Phase 2 PFS to use Diffie-Hellman group 2.

```
[edit security ipsec policy ipsec-phase2-policy]
user@host# set perfect-forward-secrecy keys group2
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@spoke# set vpn vpn-corporate ike gateway gw-corporate
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@spoke# set vpn vpn-corporate ike ipsec-policy ipsec-phase2-policy
```

10. Specify the interface to bind.

```
[edit security ipsec]
user@spoke# set vpn vpn-corporate bind-interface st0.0
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@spoke# show security ipsec
proposal ipsec-phase2-proposal {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-128-cbc;
}
policy ipsec-phase2-policy {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec-phase2-proposal;
}
vpn vpn-corporate {
  bind-interface st0.0;
  ike {
    gateway gw-corporate;
    ipsec-policy ipsec-phase2-policy;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies for the Westford Spoke

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone vpn policy to-corporate match source-address local-net
set security policies from-zone trust to-zone vpn policy to-corporate match destination-address corp-net
set security policies from-zone trust to-zone vpn policy to-corporate match destination-address sunnyvale-net
```

```

set security policies from-zone trust to-zone vpn policy to-corporate application any
set security policies from-zone trust to-zone vpn policy to-corporate then permit
set security policies from-zone vpn to-zone trust policy from-corporate match
  source-address corp-net
set security policies from-zone vpn to-zone trust policy from-corporate match
  source-address sunnyvale-net
set security policies from-zone vpn to-zone trust policy from-corporate match
  destination-address local-net
set security policies from-zone vpn to-zone trust policy from-corporate application any
set security policies from-zone vpn to-zone trust policy from-corporate then permit

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies for the Westford spoke:

1. Create the security policy to permit traffic from the trust zone to the vpn zone.

```

[edit security policies from-zone trust to-zone vpn]
user@spoke# set policy to-corp match source-address local-net
user@spoke# set policy to-corp match destination-address corp-net
user@spoke# set policy to-corp match destination-address sunnyvale-net
user@spoke# set policy to-corp match application any
user@spoke# set policy to-corp then permit

```

2. Create the security policy to permit traffic from the vpn zone to the trust zone.

```

[edit security policies from-zone vpn to-zone trust]
user@spoke# set policy spokes-to-local match source-address corp-net
user@spoke# set policy spokes-to-local match source-address sunnyvale-net
user@spoke# set policy spokes-to-local match destination-address local-net
user@spoke# set policy spokes-to-local match application any
user@spoke# set policy spokes-to-local then permit

```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@spoke# show security policies
from-zone trust to-zone vpn {
  policy to-corp {
    match {
      source-address local-net;
      destination-address [ sunnyvale-net westford-net ];
      application any;
    }
    then {
      permit;
    }
  }
}

```

```

    }
  }
}
from-zone vpn to-zone trust {
  policy spokes-to-local {
    match {
      source-address [ sunnyvale-net westford-net ];
      destination-address local-net;
      application any;
    }
    then {
      permit;
    }
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS for the Westford Spoke

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure To configure TCP-MSS for the Westford spoke:

1. Configure TCP-MSS information.

```

[edit]
user@spoke# set security flow tcp-mss ipsec-vpn mss 1350

```

Results From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@spoke# show security flow
tcp-mss {
  ipsec-vpn {
    mss 1350;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Sunnyvale Spoke

CLI Quick Configuration This example uses an SSG Series device for the Sunnyvale spoke. For reference, the configuration for the SSG Series device is provided. For information about configuring SSG Series devices, see the *Concepts and Examples ScreenOS Reference Guide*, which is located at <https://www.juniper.net/documentation>.

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set zone name "VPN"
set interface ethernet0/6 zone "Trust"
set interface "tunnel.1" zone "VPN"
set interface ethernet0/6 ip 192.168.168.1/24
set interface ethernet0/6 route
set interface ethernet0/0 ip 10.2.2.2/30
set interface ethernet0/0 route
set interface tunnel.1 ip 10.11.11.1/24
set flow tcp-mss 1350
set address "Trust" "sunnyvale-net" 192.168.168.0 255.255.255.0
set address "VPN" "corp-net" 10.10.10.0 255.255.255.0
set address "VPN" "westford-net" 192.168.178.0 255.255.255.0
set ike gateway "corp-ike" address 10.1.1.2 Main outgoing-interface ethernet0/0 preshare
  "395psksecr3t" sec-level standard
set vpn corp-vpn monitor optimized rekey
set vpn "corp-vpn" bind interface tunnel.1
set vpn "corp-vpn" gateway "corp-ike" replay tunnel idletime 0 sec-level standard
set policy id 1 from "Trust" to "Untrust" "ANY" "ANY" "ANY" nat src permit
set policy id 2 from "Trust" to "VPN" "sunnyvale-net" "corp-net" "ANY" permit
set policy id 2
exit
set dst-address "westford-net"
exit
set policy id 3 from "VPN" to "Trust" "corp-net" "sunnyvale-net" "ANY" permit
set policy id 3
set src-address "westford-net"
exit
set route 10.10.10.0/24 interface tunnel.1
set route 192.168.178.0/24 interface tunnel.1
set route 0.0.0.0/0 interface ethernet0/0 gateway 10.2.2.1
```

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Phase 1 Status on page 102](#)
- [Verifying the IPsec Phase 2 Status on page 103](#)
- [Verifying Next-Hop Tunnel Bindings on page 105](#)
- [Verifying Static Routes for Remote Peer Local LANs on page 106](#)

- [Reviewing Statistics and Errors for an IPsec Security Association on page 106](#)
- [Testing Traffic Flow Across the VPN on page 107](#)

Verifying the IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you need to send traffic from a host in the 192.168.10/24 network to a host in the 192.168.168/24 and 192.168.178/24 networks to bring the tunnels up. For route-based VPNs, you can send traffic initiated from the SRX Series device through the tunnel. We recommend that when testing IPsec tunnels, you send test traffic from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate a ping from 192.168.10.10 to 192.168.168.10.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@hub> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
6	10.3.3.2	UP	94906ae2263bbd8e	1c35e4c3fc54d6d3	Main
7	10.2.2.2	UP	7e7a1c0367dfe73c	f284221c656a5fbc	Main

```
user@hub> show security ike security-associations index 6 detail
```

```
IKE peer 10.3.3.2, Index 6,
Role: Responder, State: UP
Initiator cookie: 94906ae2263bbd8e,, Responder cookie: 1c35e4c3fc54d6d3
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 10.1.1.2:500, Remote: 10.3.3.2:500
Lifetime: Expires in 3571 seconds
Algorithms:
Authentication      : sha1
Encryption          : aes-cbc (128 bits)
Pseudo random function: hmac-sha1
Traffic statistics:
Input bytes   :          1128
Output bytes  :          988
Input packets :           6
Output packets:           5
Flags: Caller notification sent
IPsec security associations: 1 created, 0 deleted
Phase 2 negotiations in progress: 1
Negotiation type: Quick mode, Role: Responder, Message ID: 1350777248
Local: 10.1.1.2:500, Remote: 10.3.3.2:500
Local identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Flags: Caller notification sent, Waiting for done
```

Meaning The `show security ike security-associations` command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the `show security ike security-associations index detail` command to get more information about the SA.
- Remote Address—Verify that the remote IP address is correct.
- State
 - UP—The Phase 1 SA has been established.
 - DOWN—There was a problem establishing the Phase 1 SA.
- Mode—Verify that the correct mode is being used.

Verify that the following information is correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The `show security ike security-associations index 1 detail` command lists additional information about the security association with an index number of 1:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Initiator and responder role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying the IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@hub> show security ipsec security-associations
```

```
total configured sa: 4
ID      Gateway      Port  Algorithm      SPI      Life:sec/kb  Mon vsys
<16384 10.2.2.2      500   ESP:aes-128/sha1  b2fc36f8 3364/ unlim   -   0
>16384 10.2.2.2      500   ESP:aes-128/sha1  5d73929e 3364/ unlim   -   0
ID      Gateway      Port  Algorithm      SPI      Life:sec/kb  Mon vsys
<16385 10.3.3.2      500   ESP:3des/sha1    70f789c6 28756/unlim  -   0
>16385 10.3.3.2      500   ESP:3des/sha1    80f4126d 28756/unlim  -   0
```

```
user@hub> show security ipsec security-associations index 16385 detail
```

```
Virtual-system: Root
Local Gateway: 10.1.1.2, Remote Gateway: 10.3.3.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/24)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
DF-bit: clear
Direction: inbound, SPI: 1895270854, AUX-SPI: 0
Hard lifetime: Expires in 28729 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 28136 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)

Anti-replay service: enabled, Replay window size: 32

Direction: outbound, SPI: 2163479149, AUX-SPI: 0
Hard lifetime: Expires in 28729 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 28136 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)

Anti-replay service: enabled, Replay window size: 32
```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 16385. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500, which indicates that no NAT-traversal is implemented. (NAT-traversal uses port 4500 or another random high-number port.)
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 28756/ unlim value indicates that the Phase 2 lifetime expires in 28756 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.

- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index 16385 detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a Phase 2 failure. If no IPsec SA is listed, confirm that Phase 2 proposals, including the proxy ID settings, are correct for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Another common reason for Phase 2 failure is not specifying the ST interface binding. If IPsec cannot complete, check the kmd log or set trace options.

Verifying Next-Hop Tunnel Bindings

Purpose After Phase 2 is complete for all peers, verify the next-hop tunnel bindings.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@hub> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag
10.11.11.11	st0.0	sunnyvale-vpn	Static
10.11.11.12	st0.0	westford-vpn	Auto

Meaning The next-hop gateways are the IP addresses for the st0 interfaces of all remote spoke peers. The next hop should be associated with the correct IPsec VPN name. If no NHTB entry exists, there is no way for the hub device to differentiate which IPsec VPN is associated with which next hop.

The Flag field has one of the following values:

- Static— NHTB was manually configured in the st0.0 interface configurations, which is required if the peer is not an SRX Series device.
- Auto— NHTB was not configured, but the entry was automatically populated into the NHTB table during Phase 2 negotiations between two SRX Series devices

There is no NHTB table for any of the spoke sites in this example. From the spoke perspective, the st0 interface is still a point-to-point link with only one IPsec VPN binding.

Verifying Static Routes for Remote Peer Local LANs

Purpose Verify that the static route references the spoke peer's st0 IP address.

Action From operational mode, enter the **show route** command.

```
user@hub> show route 192.168.168.10
inet.0: 9 destinations, 9 routes (9 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.168.0/24    *[Static/5] 00:08:33
                  > to 10.11.11.11 via st0.0

user@hub> show route 192.168.178.10
inet.0: 9 destinations, 9 routes (9 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.178.0/24    *[Static/5] 00:04:04
                  > to 10.11.11.12 via st0.0
```

The next hop is the remote peer's st0 IP address, and both routes point to st0.0 as the outgoing interface.

Reviewing Statistics and Errors for an IPsec Security Association

Purpose Review ESP and authentication header counters and errors for an IPsec security association.

Action From operational mode, enter the **show security ipsec statistics index** command.

```
user@hub> show security ipsec statistics index 16385
ESP Statistics:
  Encrypted bytes:      920
  Decrypted bytes:     6208
  Encrypted packets:    5
  Decrypted packets:   87
AH Statistics:
  Input bytes:          0
  Output bytes:         0
  Input packets:        0
  Output packets:       0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
```

You can also use the **show security ipsec statistics** command to review statistics and errors for all SAs.

To clear all IPsec statistics, use the **clear security ipsec statistics** command.

Meaning If you see packet loss issues across a VPN, you can run the **show security ipsec statistics** or **show security ipsec statistics detail** command several times to confirm that the encrypted and decrypted packet counters are incrementing. You should also check whether the other error counters are incrementing.

Testing Traffic Flow Across the VPN

Purpose Verify the traffic flow across the VPN.

Action You can use the **ping** command from the SRX Series device to test traffic flow to a remote host PC. Make sure that you specify the source interface so that the route lookup is correct and the appropriate security zones are referenced during policy lookup.

From operational mode, enter the **ping** command.

```
user@hub> ping 192.168.168.10 interface ge-0/0/0 count 5

PING 192.168.168.10 (192.168.168.10): 56 data bytes
64 bytes from 192.168.168.10: icmp_seq=0 ttl=127 time=8.287 ms
64 bytes from 192.168.168.10: icmp_seq=1 ttl=127 time=4.119 ms
64 bytes from 192.168.168.10: icmp_seq=2 ttl=127 time=5.399 ms
64 bytes from 192.168.168.10: icmp_seq=3 ttl=127 time=4.361 ms
64 bytes from 192.168.168.10: icmp_seq=4 ttl=127 time=5.137 ms

--- 192.168.168.10 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 4.119/5.461/8.287/1.490 ms
```

You can also use the **ping** command from the SSG Series device.

```
user@hub> ping 192.168.10.10 from ethernet0/6

Type escape sequence to abort
Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 1 seconds from
ethernet0/6
!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=4/4/5 ms
```

```
ssg-> ping 192.168.178.10 from ethernet0/6

Type escape sequence to abort
Sending 5, 100-byte ICMP Echos to 192.168.178.10, timeout is 1 seconds from
ethernet0/6
!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=8/8/10 ms
```

Meaning If the **ping** command fails from the SRX Series or SSG Series device, there might be a problem with the routing, security policies, end host, or encryption and decryption of ESP packets.

See Also • [Understanding Hub-and-Spoke VPNs on page 53](#)

- [Example: Configuring a Route-Based VPN on page 112](#)
- [Example: Configuring a Policy-Based VPN on page 518](#)

Release History Table

Release	Description
15.1X49-D80	Starting with Junos OS Release 15.1X49-D80, dynamic endpoint VPNs on SRX Series devices support IPv6 traffic on secure tunnels.
12.3X48-D40	Starting with Junos OS Release 12.3X48-D40, Junos OS Release 15.1X49-D70, and Junos OS Release 17.3R1, all dynamic endpoint gateways configured on SRX Series devices that use the same external interface can use different IKE policies, but the IKE policies must use the same IKE proposal.

**Related
Documentation**

- [VPNs for IKEv2 on page 131](#)

CHAPTER 2

Configuring Route-Based IPsec VPNs

- [Route-Based IPsec VPNs on page 109](#)
- [VPNs for IKEv2 on page 131](#)
- [Secure Tunnel Interface in a Virtual Router on page 198](#)
- [Traffic Selectors in Route-Based VPNs on page 204](#)
- [AutoVPN on Hub-and-Spoke Devices on page 225](#)
- [Auto Discovery VPNs on page 439](#)

Route-Based IPsec VPNs

A route-based VPN is a configuration in which an IPsec VPN tunnel created between two end points is referenced by a route that determines which traffic is sent through the tunnel based on a destination IP address.

- [Understanding Route-Based IPsec VPNs on page 109](#)
- [Example: Configuring a Route-Based VPN on page 112](#)

Understanding Route-Based IPsec VPNs

With route-based VPNs, you can configure dozens of security policies to regulate traffic flowing through a single VPN tunnel between two sites, and there is just one set of IKE and IPsec SAs at work. Unlike policy-based VPNs, for route-based VPNs, a policy refers to a destination address, not a VPN tunnel. When Junos OS looks up a route to find the interface to use to send traffic to the packet's destination address, it finds a route through a secure tunnel interface (st0.x). The tunnel interface is bound to a specific VPN tunnel, and the traffic is routed to the tunnel if the policy action is permit.



NOTE: A secure tunnel (st0) interface supports only one IPv4 address and one IPv6 address at the same time. This applies to all route-based VPNs. The `disable` option is not supported on st0 interfaces.

Examples of where route-based VPNs can be used:

- There are overlapping subnets or IP addresses between the two LANs.
- A hub-and-spoke VPN topology is used in the network, and spoke-to-spoke traffic is required.
- Primary and backup VPNs are required.
- A dynamic routing protocol (for example, OSPF, RIP, or BGP) is running across the VPN.



NOTE: Configuring RIP demand circuits over point-to-multipoint VPN interfaces is not supported.

We recommend that you use route-based VPN when you want to configure VPN between multiple remote sites. Route-based VPN allows for routing between the spokes between multiple remote sites; it is easier to configure, monitor, and troubleshoot.

Understanding CoS Support on st0 Interfaces

Starting with Junos OS Release 15.1X49-D60 and Junos OS Release 17.3R1, class of service (CoS) features such as classifier, policer, queuing, scheduling, shaping, rewriting markers, and virtual channels can now be configured on the secure tunnel interface (st0) for point-to-point VPNs.

The st0 tunnel interface is an internal interface that can be used by route-based VPNs to route cleartext traffics to an IPsec VPN tunnel. The following CoS features are supported on the st0 interface on all available SRX Series devices and vSRX2.0:

- Classifiers
- Policers
- Queuing, scheduling, and shaping
- Rewrite markers
- Virtual channels



NOTE: Starting with Junos OS Release 15.1X49-D70 and Junos OS Release 17.3R1, support for queuing, scheduling, shaping, and virtual channels is added to the st0 interface for SRX5400, SRX5600, and SRX5800 devices. Support for all the listed CoS features is added for the st0 interface for SRX1500, SRX4100, and SRX4200 devices. Starting with Junos OS Release 17.4R1, support for listed CoS features is added for the st0 interface for SRX4600 devices.

Limitations of CoS support on VPN st0 interfaces

The following limitations apply to CoS support on VPN st0 interfaces:

- The maximum number for software queues is 2048. If the number of st0 interfaces exceeds 2048, not enough software queues can be created for all the st0 interfaces.
- Only route-based VPNs can apply CoS features on st0 interfaces. [Table 13 on page 111](#) describes the st0 CoS feature support for different types of VPNs.

Table 13: CoS Feature Support for VPN

Classifier Features	Site-to-Site VPN (P2P)	AutoVPN (P2P)	Site-to-Site/Auto VPN /AD-VPN (P2MP)
Classifiers, policers, and rewriting markers	Supported	Supported	Supported
Queueing, scheduling, and shaping based on st0 logical interfaces	Supported	Not supported	Not supported
Queueing, scheduling, and shaping based on virtual channels	Supported	Supported	Supported

- On SRX300, SRX320, SRX340, SRX345, and SRX550HM devices, one st0 logical interface can bind to multiple VPN tunnels. The eight queues for the st0 logical interface cannot reroute the traffic to different tunnels, so pre-tunneling is not supported.



NOTE: The virtual channel feature can be used as a workaround on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

- When defining a CoS shaping rate on an st0 tunnel interface, consider the following restrictions:
 - The shaping rate on the tunnel interface must be less than that of the physical egress interface.
 - The shaping rate only measures the packet size that includes the inner Layer 3 cleartext packet with an ESP/AH header and an outer IP header encapsulation. The outer Layer 2 encapsulation added by the physical interface is not factored into the shaping rate measurement.
 - The CoS behavior works as expected when the physical interface carries the shaped GRE or IP-IP tunnel traffic only. If the physical interface carries other traffic, thereby lowering the available bandwidth for tunnel interface traffic, the CoS features do not work as expected.
- On SRX550M, SRX5400, SRX5600, and SRX5800 devices, bandwidth limit and burst size limit values in a policer configuration are a per-SPU, not per-system limitation. This is the same policer behavior as on the physical interface.

- See Also**
- [Class of Service Feature Guide for Security Devices](#)
 - [IPsec VPN Overview on page 31](#)
 - [Example: Configuring a Hub-and-Spoke VPN on page 71](#)
 - [Example: Configuring a Policy-Based VPN on page 518](#)

Example: Configuring a Route-Based VPN

This example shows how to configure a route-based IPsec VPN to allow data to be securely transferred between a branch office and the corporate office.

- [Requirements on page 112](#)
- [Overview on page 112](#)
- [Configuration on page 115](#)
- [Verification on page 126](#)

Requirements

This example uses the following hardware:

- SRX240 device
- SSG140 device

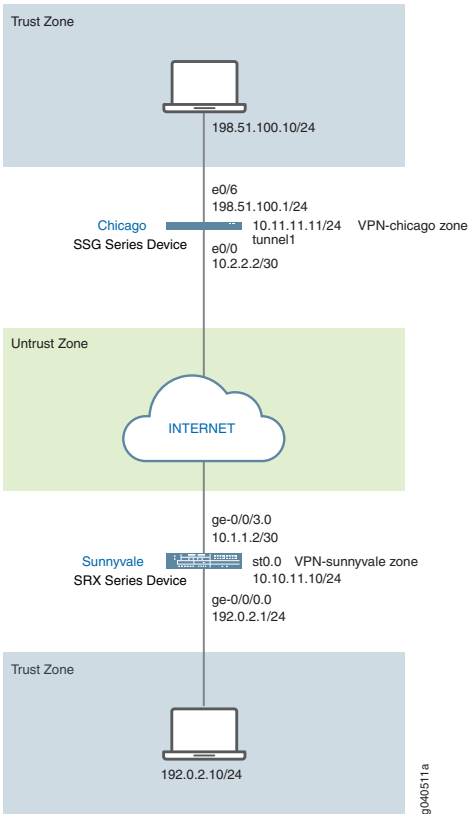
Before you begin, read [“IPsec VPN Overview” on page 31](#).

Overview

In this example, you configure a route-based VPN for a branch office in Chicago, because you want to conserve tunnel resources but still get granular restrictions on VPN traffic. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

[Figure 12 on page 113](#) shows an example of a route-based VPN topology. In this topology, the SRX Series device is located in Sunnyvale, and an SSG Series device (or a third-party device) is located in Chicago.

Figure 12: Route-Based VPN Topology



In this example, you configure interfaces, an IPv4 default route, security zones, and address books. Then you configure IKE, IPsec, security policy, and TCP-MSS parameters. See [Table 14 on page 113](#) through [Table 18 on page 115](#) for specific configuration parameters used in this example.

Table 14: Interface, Static Route, Security Zone, and Address Book Information

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/0.0	192.0.2.1/24
	ge-0/0/3.0	10.1.1.2/30
	st0.0 (tunnel interface)	10.10.11.10/24
Static routes	0.0.0.0/0 (default route)	The next hop is 10.1.1.2.
Security zones	trust	<ul style="list-style-type: none">All system services are allowed.The ge-0/0/0.0 interface is bound to this zone.

Table 14: Interface, Static Route, Security Zone, and Address Book Information (continued)

Feature	Name	Configuration Parameters
	untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/3.0 interface is bound to this zone.
	vpn	The st0.0 interface is bound to this zone.

Table 15: IKE Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ike-proposal	<ul style="list-style-type: none"> Authentication method: rsa-signatures Diffie-Hellman group: group14 Authentication algorithm: sha256 Encryption algorithm: aes-256-cbc
Policy	ike-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-policy IKE policy authentication method: rsa-signatures
Gateway	gw-chicago	<ul style="list-style-type: none"> IKE policy reference: ike-policy External interface: ge-0/0/3.0 Gateway address: 10.2.2.2

Table 16: IPsec Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha-256 Encryption algorithm: aes-256-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop PFS: Diffie-Hellman group2
VPN	ipsec_vpn1	<ul style="list-style-type: none"> IKE gateway reference: gw-chicago IPsec policy reference: ipsec_pol Bind to interface: st0.0

Table 17: Security Policy Configuration Parameters

Purpose	Name	Configuration Parameters
The security policy permits traffic from the trust zone to the vpn zone.	vpn	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address sunnyvale destination-address chicago application any Action: permit
The security policy permits traffic from the vpn zone to the trust zone.	vpn	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address chicago destination-address sunnyvale application any Action: permit

Table 18: TCP-MSS Configuration Parameters

Purpose	Configuration Parameters
<p>TCP-MSS is negotiated as part of the TCP three-way handshake and limits the maximum size of a TCP segment to better fit the MTU limits on a network. For VPN traffic, the IPsec encapsulation overhead, along with the IP and frame overhead, can cause the resulting ESP packet to exceed the MTU of the physical interface, which causes fragmentation. Fragmentation increases bandwidth and device resources.</p> <p>NOTE: We recommend a value of 1350 as the starting point for most Ethernet-based networks with an MTU of 1500 or greater. You might need to experiment with different TCP-MSS values to obtain optimal performance. For example, you might need to change the value if any device in the path has a lower MTU, or if there is any additional overhead such as PPP or Frame Relay.</p>	MSS value: 1350

Configuration

- [Configuring Basic Network and Security Zone Information on page 115](#)
- [Configuring IKE on page 118](#)
- [Configuring IPsec on page 121](#)
- [Configuring Security Policies on page 123](#)
- [Configuring TCP-MSS on page 124](#)
- [Configuring the SSG Series Device on page 125](#)

Configuring Basic Network and Security Zone Information

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 family inet address 192.0.2.1/24
set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
set interfaces st0 unit 0 family inet address 10.10.11.10/24
set routing-options static route 0.0.0.0/0 next-hop 10.10.11.10
set security zones security-zone untrust interfaces ge-0/0/3.0
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone vpn-chicago interfaces st0.0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interface, static route, security zone, and address book information:

1. Configure Ethernet interface information.

```

[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 192.0.2.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
user@host# set interfaces st0 unit 0 family inet address 10.10.11.10/24

```

2. Configure static route information.

```

[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 10.1.1.2

```

3. Configure the untrust security zone.

```

[edit ]
user@host# edit security zones security-zone untrust

```

4. Assign an interface to the security zone.

```

[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/3.0

```

5. Specify allowed system services for the security zone.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike

```

6. Configure the trust security zone.

```

[edit]
user@host# edit security zones security-zone trust

```


7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/0.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

9. Configure the vpn security zone.

```
[edit]
user@host# edit security zones security-zone vpn
```

10. Assign an interface to the security zone.

```
[edit security zones security-zone vpn-chicago]
user@host# set interfaces st0.0
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security address-book** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 192.0.2.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.1.1.2/30;
    }
  }
}
st0 {
  unit 0 {
    family inet {
      address 10.10.11.10/24;
    }
  }
}
```

```
[edit]
user@host# show routing-options
static {
    route 0.0.0.0/0 next-hop 10.1.1.2;
}
```

```
[edit]
user@host# show security zones
security-zone Host {
    host-inbound-traffic {
        system-services {
            all;
        }
    }
    interfaces {
        ge-0/0/0.0;
    }
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            ike;
        }
    }
    interfaces {
        ge-0/0/3.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
    }
    interfaces {
        ge-0/0/0.0;
    }
}
security-zone vpn {
    interfaces {
        st0.0;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-proposal authentication-method pre-shared-keys
set security ike proposal ike-proposal dh-group group14
set security ike proposal ike-proposal authentication-algorithm sha-256
set security ike proposal ike-proposal encryption-algorithm aes-256-cbc
set security ike policy ike-policy mode main
set security ike policy ike-policy proposals ike-proposal
set security ike policy ike-policy pre-shared-key ascii-text $ABC123
set security ike gateway gw-chicago external-interface ge-0/0/3.0
set security ike gateway gw-chicago ike policy ike-policy
set security ike gateway gw-chicago address 10.2.2.2
set security ike gateway gw-chicago version v2-only

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE proposal.

```

[edit security ike]
user@host# set proposal ike-proposal

```

2. Define the IKE proposal authentication method.

```

[edit security ike proposal ike-proposal]
user@host# set authentication-method pre-shared-keys

```

3. Define the IKE proposal Diffie-Hellman group.

```

[edit security ike proposal ike-proposal]
user@host# set dh-group group14

```

4. Define the IKE proposal authentication algorithm.

```

[edit security ike proposal ike-proposal]
user@host# set authentication-algorithm sha-256

```

5. Define the IKE proposal encryption algorithm.

```

[edit security ike proposal ike-proposal]
user@host# set encryption-algorithm aes-256-cbc

```

6. Create an IKE policy.

```

[edit security ike]
user@host# set policy ike-policy

```

7. Set the IKE policy mode.

```
[edit security ike policy ike-policy]
user@host# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-policy]
user@host# set proposals ike-proposal
```

9. Define the IKE policy authentication method.

```
[edit security ike policy ike-policy]
user@host# set pre-shared-key ascii-text $ABC123
```

10. Create an IKE gateway and define its external interface.

```
[edit security ike]
user@host# set gateway gw-chicago external-interface ge-0/0/3.0
```

11. Define the IKE policy reference.

```
[edit security ike gateway gw-chicago]
user@host# set ike policy ike-policy
```

12. Define the IKE gateway address.

```
[edit security ike gateway gw-chicago]
user@host# set address 10.2.2.2
```

13. Define the IKE gateway version.

```
[edit security ike gateway gw-chicago]
user@host# set version v2-only
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method pre-shared-keys;
  dh-group group14;
  authentication-algorithm sha-256;
```

```

    encryption-algorithm aes-256-cbc;
  }
  policy ike-policy {
    mode main;
    proposals ike-proposal;
    pre-shared-key ascii-text "$ABC123";
  }
  gateway gw-chicago {
    ike policy ike-policy;
    address 10.2.2.2;
    external-interface ge-0/0/3.0;
    version v2-only;
  }

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ipsec traceoptions flag all
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha-256
set security ipsec proposal ipsec_prop encryption-algorithm aes256-cbc
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn ipsec_vpn1 ike ipsec-policy ipsec_pol
set security ipsec vpn ipsec_vpn1 bind-interface st0.1
set security ipsec vpn ipsec_vpn1 ike ipsec-policy ipsec_pol
set security ipsec vpn ipsec_vpn1 ike gateway IKE_GW1
set security ipsec vpn ipsec_vpn1 bind-interface st0.0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Enable IPsec trace options.

```

[edit]
user@host# set security ipsec traceoptions flag all

```

2. Create an IPsec proposal.

```

[edit]
user@host# set security ipsec proposal ipsec_prop

```

3. Specify the IPsec proposal protocol.

```
[edit security ipsec proposal ipsec_prop]  
user@host# set protocol esp
```

4. Specify the IPsec proposal authentication algorithm.

```
[edit security ipsec proposal ipsec_prop]  
user@host# set authentication-algorithm hmac-sha-256
```

5. Specify the IPsec proposal encryption algorithm.

```
[edit security ipsec proposal ipsec_prop]  
user@host# set encryption-algorithm aes256-cbc
```

6. Create the IPsec policy.

```
[edit security ipsec]  
user@host# set policy ipsec_pol
```

7. Specify the IPsec proposal reference.

```
[edit security ipsec policy ipsec_pol]  
user@host# set proposals ipsec_prop
```

8. Specify the IKE gateway.

```
[edit security ipsec]  
user@host# set vpn ipsec_vpn1 ike gateway IKE_GW1
```

9. Specify the IPsec policy.

```
[edit security ipsec]  
user@host# set vpn ipsec_vpn1 ike ipsec-policy ipsec_pol
```

10. Specify the interface to bind.

```
[edit security ipsec]  
user@host# set vpn ipsec_vpn1 bind-interface st0.1
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ipsec
traceoptions {
    flag all;
}
proposal ipsec_prop {
    protocol esp;
    authentication-algorithm hmac-sha-256;
    encryption-algorithm aes256-cbc;
}
proposal ipsec_prop;
policy ipsec_pol {
    proposals ipsec_prop;
}
vpn ipsec_vpn1 {
    bind-interface st0.1;
    ike {
        gateway IKE_GW1;
        ipsec-policy ipsec_pol;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone vpn policy vpn match source-address
  sunnyvale
set security policies from-zone trust to-zone vpn policy vpn match destination-address
  chicago
set security policies from-zone trust to-zone vpn policy vpn match application any
set security policies from-zone trust to-zone vpn policy vpn then permit
set security policies from-zone vpn to-zone trust policy vpn match source-address chicago
set security policies from-zone vpn to-zone trust policy vpn match destination-address
  sunnyvale
set security policies from-zone vpn to-zone trust policy vpn match application any
set security policies from-zone vpn to-zone trust policy vpn then permit
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the vpn zone.

```
[edit security policies from-zone trust to-zone vpn]
```

```

user@host# set policy vpn match source-address sunnyvale
user@host# set policy vpn match destination-address chicago
user@host# set policy vpn match application any
user@host# set policy vpn then permit

```

2. Create the security policy to permit traffic from the vpn zone to the trust zone.

```

[edit security policies from-zone vpn to-zone trust]
user@host# set policy vpn match source-address chicago
user@host# set policy vpn match destination-address sunnyvale
user@host# set policy vpn match application any
user@host# set policy vpn then permit

```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security policies
from-zone trust to-zone vpn {
  policy vpn {
    match {
      source-address sunnyvale;
      destination-address chicago;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone vpn to-zone trust {
  policy vpn {
    match {
      source-address chicago;
      destination-address sunnyvale;
      application any;
    }
    then {
      permit;
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS

CLI Quick Configuration To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your

network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure TCP-MSS information:

1. Configure TCP-MSS information.

```
[edit]
user@host# set security flow tcp-mss ipsec-vpn mss 1350
```

Results

From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security flow
tcp-mss {
  ipsec-vpn {
    mss 1350;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the SSG Series Device

CLI Quick Configuration

For reference, the configuration for the SSG Series device is provided. For information about configuring SSG Series devices, see the *Concepts and Examples ScreenOS Reference Guide*, which is located at <http://www.juniper.net/techpubs>.

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set zone name vpn
set interface ethernet0/6 zone Trust
set interface ethernet0/0 zone Untrust
set interface tunnel.1 zone vpn
set interface ethernet0/6 ip 198.51.100.1/24
set interface ethernet0/6 route
set interface ethernet0/0 ip 10.2.2.2/30
set interface ethernet0/0 route
```

```

set interface tunnel.1 ip 10.11.11.1/24
set flow tcp-mss 1350
set address Trust "10.1.1.2-net" 10.1.1.2.252.0.0
set address vpn "10.1.1-net" 10.1.1.2.252.0.0
set ike gateway corp-ike address 198.51.100.2 Main outgoing-interface ethernet0/0
  preshare $ABC123 sec-level standard
set vpn corp-vpn gateway corp-ike replay tunnel idletime 0 sec-level standard
set vpn corp-vpn monitor optimized rekey
set vpn corp-vpn bind interface tunnel.1
set policy from Trust to Untrust "ANY" "ANY" "ANY" nat src permit
set policy from Trust to vpn "10.1.1.1-net" "10.1.1-net" "ANY" permit
set policy from vpn to Trust "10.1.1-net" "10.1.1.2-net" "ANY" permit
set route 0.0.0.0/0 interface ethernet0/0 gateway 10.2.2.2

```

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Status on page 126](#)
- [Verifying the IPsec Status on page 128](#)
- [Reviewing Statistics and Errors for an IPsec Security Association on page 129](#)
- [Testing Traffic Flow Across the VPN on page 130](#)

Verifying the IKE Status

Purpose Verify the IKE status.

Action



NOTE: Before starting the verification process, you need to send traffic from a host in the 192.0.2.10/24 network to a host in the 198.51.100.10/24 network. For route-based VPNs, traffic can be initiated by the SRX Series device through the tunnel. We recommend that when testing IPsec tunnels, test traffic be sent from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate a ping from 192.0.2.10 to 198.51.100.10.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
1	10.2.2.2	UP	744a594d957dd513	1e1307db82f58387	Main

```
user@host> show security ike security-associations index 1 detail
```

```

IKE peer 10.2.2.2, Index 1,
  Role: Responder, State: UP

```

```

Initiator cookie: 744a594d957dd513, Responder cookie: 1e1307db82f58387
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 198.51.100.2:500, Remote: 10.2.2.2:500
Lifetime: Expires in 28570 seconds
Algorithms:
  Authentication      : sha1
  Encryption          : aes-cbc (128 bits)
  Pseudo random function: hmac-sha1
Traffic statistics:
  Input bytes      :      852
  Output bytes     :      940
  Input packets    :         5
  Output packets   :         5
Flags: Caller notification sent
IPsec security associations: 1 created, 0 deleted
Phase 2 negotiations in progress: 0

```

Meaning The **show security ike security-associations** command lists all active IKE SAs. If no SAs are listed, there was a problem with IKE establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote Address—Verify that the remote IP address is correct.
- State
 - UP—The IKE SA has been established.
 - DOWN—There was a problem establishing the IKE SA.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Proposal parameters (must match on both peers)

The **show security ike security-associations index 1 detail** command lists additional information about the security association with an index number of 1:

- Authentication and encryption algorithms used
- lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of negotiations in progress

Verifying the IPsec Status

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

total configured sa: 2							
ID	Gateway	Port	Algorithm	SPI	Life:sec/kb	Mon	vsys
<16384	10.2.2.2	500	ESP:aes-128/sha1	76d64d1d	3363/ unlim	-	0
>16384	10.2.2.2	500	ESP:aes-128/sha1	a1024ee2	3363/ unlim	-	0

```
user@host> show security ipsec security-associations index 16384 detail
```

```
Virtual-system: Root
Local Gateway: 198.51.100.2, Remote Gateway: 10.2.2.2
Local Identity: ipv4_subnet(any:0,[0..7]=192.0.2.0/24)
Remote Identity: ipv4_subnet(any:0,[0..7]=192.0.2.168/24)
DF-bit: clear

Direction: inbound, SPI: 1993755933, AUX-SPI: 0
Hard lifetime: Expires in 3352 seconds
Lifsize Remaining: Unlimited
Soft lifetime: Expires in 2775 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)

Anti-replay service: enabled, Replay window size: 32

Direction: outbound, SPI: 2701283042, AUX-SPI: 0
Hard lifetime: Expires in 3352 seconds
Lifsize Remaining: Unlimited
Soft lifetime: Expires in 2775 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc
(128 bits)
Anti-replay service: enabled, Replay window size: 32
```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 16384. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500, which indicates that no NAT-traversal is implemented. (NAT-traversal uses port 4500 or another random high-number port.)
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3363/ unlim value indicates that the lifetime expires in 3363 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Lifetime can differ from lifetime, as IPsec is not dependent on IKE after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index 16384 detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a IPsec failure. If no IPsec SA is listed, confirm that IPsec proposals, including the proxy ID settings, are correct for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Another common reason for IPsec failure is not specifying the ST interface binding. If IPsec cannot complete, check the kmd log or set trace options.

Reviewing Statistics and Errors for an IPsec Security Association

Purpose Review ESP and authentication header counters and errors for an IPsec security association.

Action From operational mode, enter the **show security ipsec statistics index index_number** command, using the index number of the VPN for which you want to see statistics.

```
user@host> show security ipsec statistics index 16384
```

```
ESP Statistics:
  Encrypted bytes:      920
  Decrypted bytes:     6208
  Encrypted packets:    5
  Decrypted packets:   87
AH Statistics:
  Input bytes:          0
  Output bytes:         0
```

```

Input packets:          0
Output packets:         0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0

```

You can also use the **show security ipsec statistics** command to review statistics and errors for all SAs.

To clear all IPsec statistics, use the **clear security ipsec statistics** command.

Meaning If you see packet loss issues across a VPN, you can run the **show security ipsec statistics** or **show security ipsec statistics detail** command several times to confirm that the encrypted and decrypted packet counters are incrementing. You should also check whether the other error counters are incrementing.

Testing Traffic Flow Across the VPN

Purpose Verify the traffic flow across the VPN.

Action You can use the **ping** command from the SRX Series device to test traffic flow to a remote host PC. Make sure that you specify the source interface so that the route lookup is correct and the appropriate security zones are referenced during policy lookup.

From operational mode, enter the **ping** command.

```

ssg-> ping 10.10.11.10 interface ge-0/0/0 count 5

PING 10.10.11.10 (10.10.11.10): 56 data bytes
64 bytes from 10.10.11.10: icmp_seq=0 ttl=127 time=8.287 ms
64 bytes from 10.10.11.10: icmp_seq=1 ttl=127 time=4.119 ms
64 bytes from 10.10.11.10: icmp_seq=2 ttl=127 time=5.399 ms
64 bytes from 10.10.11.10: icmp_seq=3 ttl=127 time=4.361 ms
64 bytes from 10.10.11.10: icmp_seq=4 ttl=127 time=5.137 ms

--- 10.10.11.10 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 4.119/5.461/8.287/1.490 ms

```

You can also use the **ping** command from the SSG Series device.

```

user@host> ping 198.51.100.1 from ethernet0/6

Type escape sequence to abort
Sending 5, 100-byte ICMP Echos to 198.51.100.1, timeout is 1 seconds from
ethernet0/6
!!!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=4/4/5 ms

```

Meaning If the **ping** command fails from the SRX Series or SSG Series device, there might be a problem with the routing, security policies, end host, or encryption and decryption of ESP packets.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [Example: Configuring a Hub-and-Spoke VPN on page 71](#)
 - [Example: Configuring a Policy-Based VPN on page 518](#)

Release History Table

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, support for listed CoS features is added for the st0 interface for SRX4600 devices.
15.1X49-D70	Starting with Junos OS Release 15.1X49-D70 and Junos OS Release 17.3R1, support for queuing, scheduling, shaping, and virtual channels is added to the st0 interface for SRX5400, SRX5600, and SRX5800 devices. Support for all the listed CoS features is added for the st0 interface for SRX1500, SRX4100, and SRX4200 devices.
15.1X49-D60	Starting with Junos OS Release 15.1X49-D60 and Junos OS Release 17.3R1, class of service (CoS) features such as classifier, policer, queuing, scheduling, shaping, rewriting markers, and virtual channels can now be configured on the secure tunnel interface (st0) for point-to-point VPNs.

- Related Documentation**
- [Policy-Based IPsec VPNs on page 517](#)

VPNs for IKEv2

Internet Key Exchange version 2 (IKEv2) is an IPsec based tunneling protocol that provides a secure VPN communication channel between peer VPN devices and defines negotiation and authentication for IPsec security associations (SAs) in a protected manner.

- [Understanding Internet Key Exchange Version 2 on page 132](#)
- [Configuring Establish-Tunnel Responder-only in IKE on page 137](#)
- [Understanding IKEv2 Reauthentication on page 138](#)
- [Understanding Certificate Chains on page 139](#)
- [Example: Configuring a Device for Peer Certificate Chain Validation on page 141](#)
- [Understanding IKEv2 Fragmentation on page 150](#)
- [Example: Configuring a Route-Based VPN for IKEv2 on page 152](#)
- [Example: Configuring the SRX Series for Pico Cell Provisioning with IKEv2 Configuration Payload on page 170](#)
- [Configuring an IKE Policy with a Trusted CA on page 196](#)

Understanding Internet Key Exchange Version 2

Internet Key Exchange version 2 (IKEv2) is the latest version of the Internet Key Exchange (IKE) protocol defined in RFC 7296.

A VPN peer is configured as either IKEv1 or IKEv2. When a peer is configured as IKEv2, it cannot fall back to IKEv1 if its remote peer initiates IKEv1 negotiation. By default, Juniper Networks security devices are IKEv1 peers.

Use the **version v2-only** configuration statement at the `[edit security ike gateway gw-name]` hierarchy level to configure IKEv2. The IKE version is displayed in the output of the **show security ike security-associations** and **show security ipsec security-associations** CLI operational commands.

The advantages of using IKEv2 over IKEv1 are as follows:

- Replaces eight initial exchanges with a single four-message exchange.
- Reduces the latency for the IPsec SA setup and increases connection establishment speed.
- Increases robustness against DOS attacks.
- Improves reliability through the use of sequence numbers, acknowledgements, and error correction.
- Improves reliability, as all messages are requests or responses. The initiator is responsible for retransmitting if it does not receive a response.

IKEv2 includes support for:

- Route-based VPNs.



NOTE: IKEv2 does not support policy-based VPNs.

- Site-to-site VPNs.
- Dead peer detection.
- Chassis cluster.
- Certificate-based authentication.
- Child SAs. An IKEv2 child SA is known as a Phase 2 SA in IKEv1. In IKEv2, a child SA cannot exist without the underlying IKE SA. If a child SA is required, it is rekeyed. However, if child SAs are currently active, the corresponding IKE SA is rekeyed.



NOTE: On SRX Series devices, if an IPsec VPN tunnel is established using IKEv2, a small number of packet drops might be observed during CHILD_SA rekey as a result of "bad SPI" being logged. This occurs only when the SRX Series device is the responder for this rekey and the peer is a non-Juniper Networks device, and the latency between the peers is low and the packet rate is high. To avoid this issue, ensure that the SRX Series device always initiates the rekeys by setting its IPsec lifetime to a lower value than that of the peer.

- AutoVPN.
- Dynamic endpoint VPN.
- Traffic selectors.

IKEv2 does not support the following features:

- Policy-based VPN.
- Dialup tunnels.
- VPN monitoring.
- Multiple child SAs for the same traffic selectors for each QoS value.
- IP Payload Compression Protocol (IPComp).

EAP is supported for Remote Access using IKEv2.

Starting in Junos OS Release 19.1R1, two new options for establishment of IPsec tunnels are introduced, **responder-only** and **responder-only-no-rekey** are added to the **establish-tunnels** command under the **[edit security ipsec vpn vpn-name]** hierarchy-level.

The **responder-only** option does not establish any VPN tunnel from the device, so the VPN tunnel is initiated from the remote peer. An established tunnel rekeys both IKE and IPsec based on the configured IKE and IPsec lifetime values.

The **responder-only-no-rekey** option does not establish any VPN tunnel from the device, so the VPN tunnel is initiated from the remote peer. An established tunnel does not rekey from the device and relies on the remote peer to initiate rekey. If the remote peer does not initiate rekey, then the tunnel teardown occurs after hard-lifetime expires.

Understanding IKEv2 Configuration Payload

Configuration payload is an Internet Key Exchange version 2 (IKEv2) feature used to propagate provisioning information from a responder (or server) to an initiator (or client). IKEv2 configuration payload is supported with route-based VPNs only.

RFC 5996, *Internet Key Exchange Protocol Version 2 (IKEv2)*, defines 15 different configuration attributes that can be returned to the initiator by the responder.

[Table 19 on page 134](#) describes the IKEv2 configuration attributes supported on SRX Series devices.

Table 19: IKEv2 Configuration Attributes

Attribute Type	Value	Description	Length
INTERNAL_IP4_ADDRESS	1	Specifies an address on the internal network. Multiple internal addresses can be requested. The responder can send up to the number of addresses requested.	0 or 4 octets
INTERNAL_IP4_NETMASK	2	Specifies the internal network's netmask value. Only one netmask value is allowed in the request and response messages (for example, 255.255.255.0), and it must be used only with an INTERNAL_IP4_ADDRESS attribute.	0 or 4 octets
INTERNAL_IP4_DNS	3	Specifies an address of a DNS server within the network. Multiple DNS servers can be requested. The responder can respond with zero or more DNS server attributes.	0 or 4 octets
INTERNAL_IP4_NBNS	4	Specifies an address of a NetBIOS name server (NBNS), for example, a WINS server, within the network. Multiple NBNS servers can be requested. The responder can respond with zero or more NBNS server attributes.	0 or 4 octets
INTERNAL_IP4_DHCP	6	Instructs the host to send any internal DHCP request to the address contained within the attribute. Multiple DHCP servers can be requested. The responder can respond with zero or more DHCP server attributes.	0 or 4 octets

For the IKE responder to provide the initiator with provisioning information, it must acquire the information from a specified source such as a RADIUS server. Provisioning information can also be returned from a DHCP server through a RADIUS server. On the RADIUS server, the user information should not include an authentication password. The RADIUS server profile is bound to the IKE gateway using the **aaa access-profile profile-name** configuration at the **[edit security ike gateway gateway-name]** hierarchy level.

In a route-based VPN, secure tunnel (st0) interfaces operate in either point-to-multipoint or point-to-point mode. Dynamic address assignment through the IKEv2 configuration payload is supported for point-to-multipoint interfaces only. For point-to-multipoint interfaces, the interfaces must be numbered and the addresses in the configuration payload INTERNAL_IP4_ADDRESS attribute type must be within the subnetwork range of the associated point-to-multipoint interface.

Understanding Pico Cell Provisioning

IKEv2 configuration payload can be used to propagate provisioning information from an IKE responder, such as an SRX Series device, to multiple initiators, such as LTE pico cell base stations in a cellular network. The pico cells ship from the factory with a standard configuration that allows them to connect to the SRX Series device, but the pico cell provisioning information is stored on one or more provisioning servers within a protected network. The pico cells receive full provisioning information after establishing secure connections with the provisioning servers.

The workflow required to bootstrap and provision a pico cell and introduce it to service includes four distinct stages:

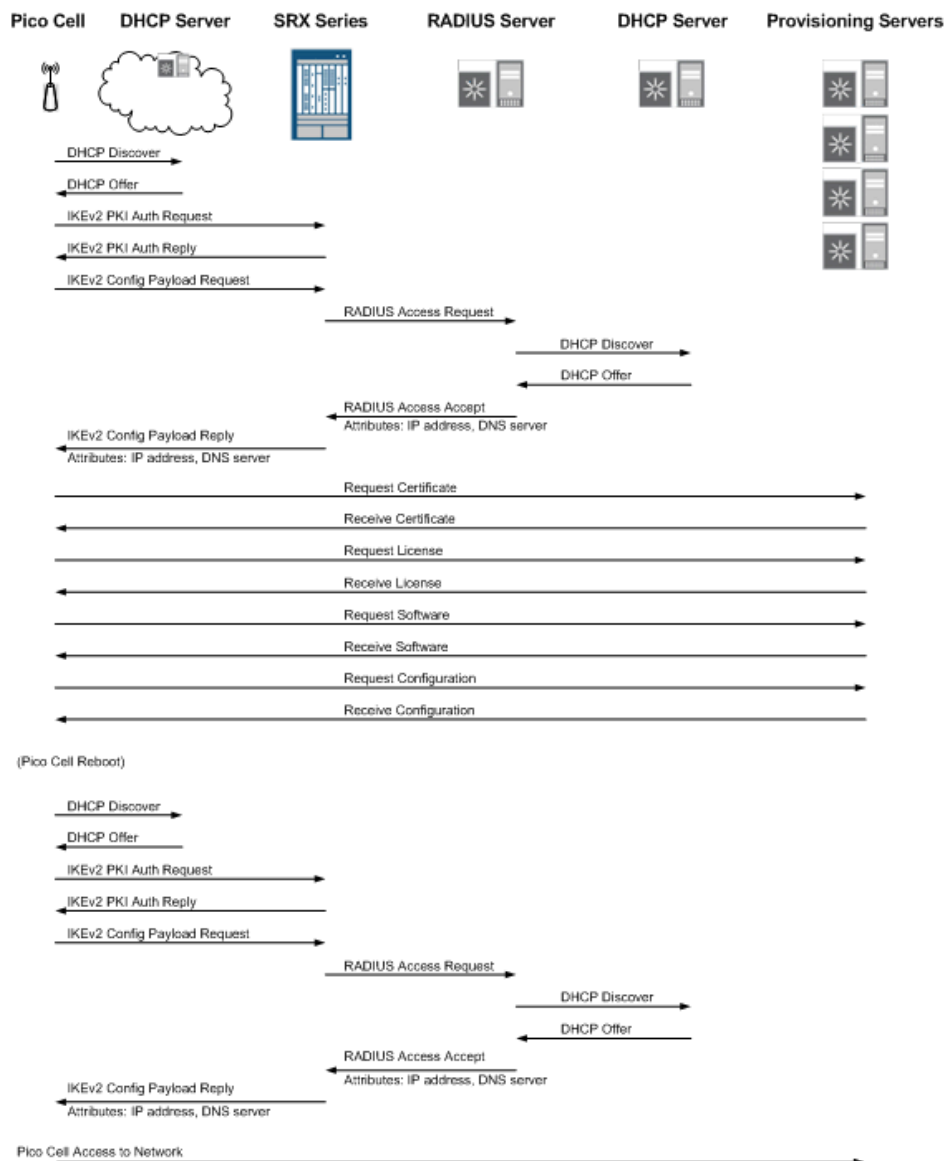
1. Initial addresses acquisition—The pico cell ships from the factory with the following information:
 - Configuration for the secure gateway tunnel to the SRX Series device
 - Digital certificate issued by the manufacturer
 - Fully qualified domain name (FQDN) of the provisioning servers that lie within the protected network

The pico cell boots up and acquires an address to be used for IKE negotiation from a DHCP server. A tunnel is then built to the secure gateway on the SRX Series device using this address. An address for Operation, Administration, and Management (OAM) traffic is also assigned by the DHCP server for use on the protected network.

2. Pico cell provisioning—Using its assigned OAM traffic address, the pico cell requests its provisioning information—typically operator certificate, license, software, and configuration information—from servers within the protected network.
3. Reboot—The pico cell reboots and uses the acquired provisioning information to make it specific to the service provider's network and operation model.
4. Service provision—When the pico cell enters service, it uses a single certificate that contains distinguished name (DN) and subject alternative name values with a FQDN to build two tunnels to the secure gateway on the SRX Series device: one for OAM traffic and the other for Third-Generation Partnership Project (3GPP) data traffic.

[Figure 13 on page 136](#) shows a typical workflow for a pico cell deployment.

Figure 13: Typical Pico Cell Deployment Workflow



NOTE: The IKEv2 configuration payload feature is supported only for point-to-multipoint secure tunnel (st0) interfaces. Point-to-multipoint interfaces must be numbered, and the addresses provided in the configuration payload must be within the subnetwork range of the associated point-to-multipoint interface.

See Also • [Example: Configuring NAT-T with Dynamic Endpoint VPN on page 629](#)

Configuring Establish-Tunnel Responder-only in IKE

This topic shows how to configure establish-tunnels responder-only in Internet Key Exchange (IKE). Initiate the tunnels from the remote peer and send the traffic through all the tunnels. Specifies when IKE is activated.

Before you begin:

- Understand how to establish an AutoKey IKE IPsec tunnel. Read [“IPsec VPN Overview” on page 31](#).

To configure establish-tunnel responder-only in IKE:

1. Configure establish-tunnel responder-only

```
user@host# set security ipsec vpn S2S_VPN establish-tunnel responder-only
```

2. Confirm your configuration by entering the **show security ipsec vpn IPSEC_VPN** command.

```
user@host# show security ipsec vpn IPSEC_VPN
bind-interface st0.1;
ike {
    gateway IKE_GW;
    ipsec-policy IPSEC_POL;
}
establish-tunnels responder-only;
```

3. Configure establish-tunnel responder-only-no-rekey

```
user@host# set security ipsec vpn S2S_VPN establish-tunnel responder-only-no-rekey
```

4. Confirm your configuration by entering the **show security ipsec vpn IPSEC_VPN** command.

```
user@host# show security ipsec vpn IPSEC_VPN
bind-interface st0.1;
ike {
    gateway IKE_GW;
    ipsec-policy IPSEC_POL;
}
establish-tunnels responder-only-no-rekey;
```



NOTE: In case of multiple VPN objects, the Responder-only mode will take precedence. If any of the VPN in a gateway is configured with responder-only mode, all VPN's in the gateway must be configured with the responder-only mode.

Understanding IKEv2 Reauthentication

- [Overview on page 138](#)
- [Supported Features on page 138](#)
- [Limitations on page 139](#)

Overview

With IKEv2, rekeying and reauthentication are separate processes. Rekeying establishes new keys for the IKE security association (SA) and resets message ID counters, but it does not reauthenticate the peers. Reauthentication verifies that VPN peers retain their access to authentication credentials. Reauthentication establishes new keys for the IKE SA and child SAs; rekeys of any pending IKE SA or child SA are no longer needed. After the new IKE and child SAs are created, the old IKE and child SAs are deleted.

IKEv2 reauthentication is disabled by default. You enable reauthentication by configuring a reauthentication frequency value between 1 and 100. The reauthentication frequency is the number of IKE rekeys that occurs before reauthentication occurs. For example, if the configured reauthentication frequency is 1, reauthentication occurs every time there is an IKE rekey. If the configured reauthentication frequency is 2, reauthentication occurs at every other IKE rekey. If the configured reauthentication frequency is 3, reauthentication occurs at every third IKE rekey, and so on.

You configure the reauthentication frequency with the **reauth-frequency** statement at the **[edit security ike policy *policy-name*]** hierarchy level. Reauthentication is disabled by setting the reauthentication frequency to 0 (the default). Reauthentication frequency is not negotiated by peers, and each peer can have its own reauthentication frequency value.

Supported Features

IKEv2 reauthentication is supported with the following features:

- IKEv2 initiators or responders
- Dead peer detection (DPD)
- Virtual routers and secure tunnel (st0) interfaces in virtual routers
- Network Address Translation traversal (NAT-T)
- Chassis clusters in active-active and active-passive mode for SRX5400, SRX5600, and SRX5800 devices
- In-service software upgrade (ISSU) on SRX5400, SRX5600, and SRX5800 devices
- Upgrade or insertion of a new Services Processing Unit (SPU) using the in-service hardware upgrade (ISHU) procedure

Limitations

Note the following caveats when using IKEv2 reauthentication:

- With NAT-T, a new IKE SA can be created with different ports from the previous IKE SA. In this scenario, the old IKE SA might not be deleted.
- In a NAT-T scenario, the initiator behind the NAT device can become the responder after reauthentication. If the NAT session expires, the NAT device might discard new IKE packets that might arrive on a different port. NAT-T keepalive or DPD must be enabled to keep the NAT session alive. For AutoVPN, we recommend that the reauthentication frequency configured on the spokes be smaller than the reauthentication frequency configured on the hub.
- Based on the reauthentication frequency, a new IKE SA can be initiated by either the initiator or the responder of the original IKE SA. Because Extensible Authentication Protocol (EAP) authentication and configuration payload require the IKE SA to be initiated by the same party as the original IKE SA, reauthentication is not supported with EAP authentication or configuration payload.

See Also

Understanding Certificate Chains

- [Multilevel Hierarchy for Certificate Authentication on page 139](#)

Multilevel Hierarchy for Certificate Authentication

Certificate-based authentication is an authentication method supported on SRX Series devices during IKE negotiation. In large networks, multiple certificate authorities (CAs) can issue end entity (EE) certificates to their respective end devices. It is common to have separate CAs for individual locations, departments, or organizations.

When a single-level hierarchy for certificate-based authentication is employed, all EE certificates in the network must be signed by the same CA. All firewall devices must have the same CA certificate enrolled for peer certificate validation. The certificate payload sent during IKE negotiation only contains EE certificates.

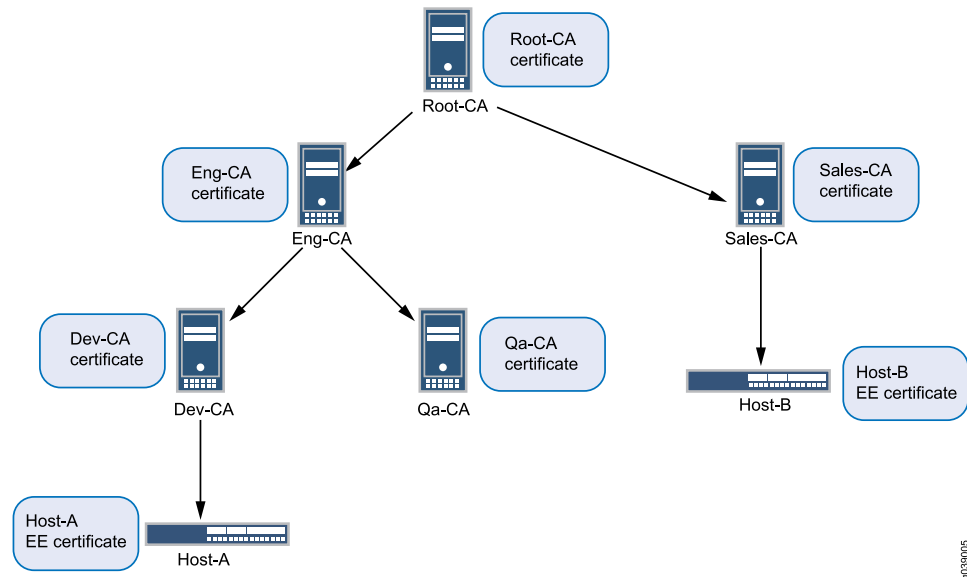
Alternatively, the certificate payload sent during IKE negotiation can contain a chain of EE and CA certificates. A certificate chain is the list of certificates required to validate a peer's EE certificate. The certificate chain includes the EE certificate and any CA certificates that are not present in the local peer.

The network administrator needs to ensure that all peers participating in an IKE negotiation have at least one common trusted CA in their respective certificate chains. The common trusted CA does not have to be the root CA. The number of certificates in the chain, including certificates for EEs and the topmost CA in the chain, cannot exceed 10.

Starting with Junos OS Release 18.1R1, validation of a configured IKE peer can be done with a specified CA server or group of CA servers. With certificate chains, the root CA must match the trusted CA group or CA server configured in the IKE policy

In the example CA hierarchy shown in [Figure 14 on page 140](#), Root-CA is the common trusted CA for all devices in the network. Root-CA issues CA certificates to the engineering and sales CAs, which are identified as Eng-CA and Sales-CA, respectively. Eng-CA issues CA certificates to the development and quality assurance CAs, which are identified as Dev-CA and Qa-CA, respectively. Host-A receives its EE certificate from Dev-CA while Host-B receives its EE certificate from Sales-CA.

Figure 14: Multilevel Hierarchy for Certificate-Based Authentication



Each end device needs to be loaded with the CA certificates in its hierarchy. Host-A must have Root-CA, Eng-CA, and Dev-CA certificates; Sales-CA and Qa-CA certificates are not necessary. Host-B must have Root-CA and Sales-CA certificates. Certificates can be loaded manually in a device or enrolled using the Simple Certificate Enrollment Process (SCEP).

Each end device must be configured with a CA profile for each CA in the certificate chain. The following output shows the CA profiles configured on Host-A:

```

admin@host-A# show security
pki {
  ca-profile Root-CA {
    ca-identity Root-CA;
    enrollment {
      url "www.example.net/scep/Root/";
    }
  }
  ca-profile Eng-CA {
    ca-identity Eng-CA;
    enrollment {
      url "www.example.net/scep/Eng/";
    }
  }
  ca-profile Dev-CA {
    ca-identity Dev-CA;
    enrollment {

```



```

        url "www.example.net/scep/Dev/";
    }
}

```

The following output shows the CA profiles configured on Host-B:

```

admin@host-B# show security
pki {
  ca-profile Root-CA {
    ca-identity Root-CA;
    enrollment {
      url "www.example.net/scep/Root/";
    }
  }
  ca-profile Sales-CA {
    ca-identity Sales-CA;
    enrollment {
      url "www.example.net/scep/Sales/";
    }
  }
}

```

- See Also**
- [Understanding Certificates and PKI on page 973](#)
 - [Understanding Certificate Authority Profiles on page 992](#)

Example: Configuring a Device for Peer Certificate Chain Validation

This example shows how to configure a device for certificate chains used to validate peer devices during IKE negotiation.

- [Requirements on page 141](#)
- [Overview on page 141](#)
- [Configuration on page 142](#)
- [Verification on page 148](#)
- [IKE and IPsec SA Failure for a Revoked Certificate on page 149](#)

Requirements

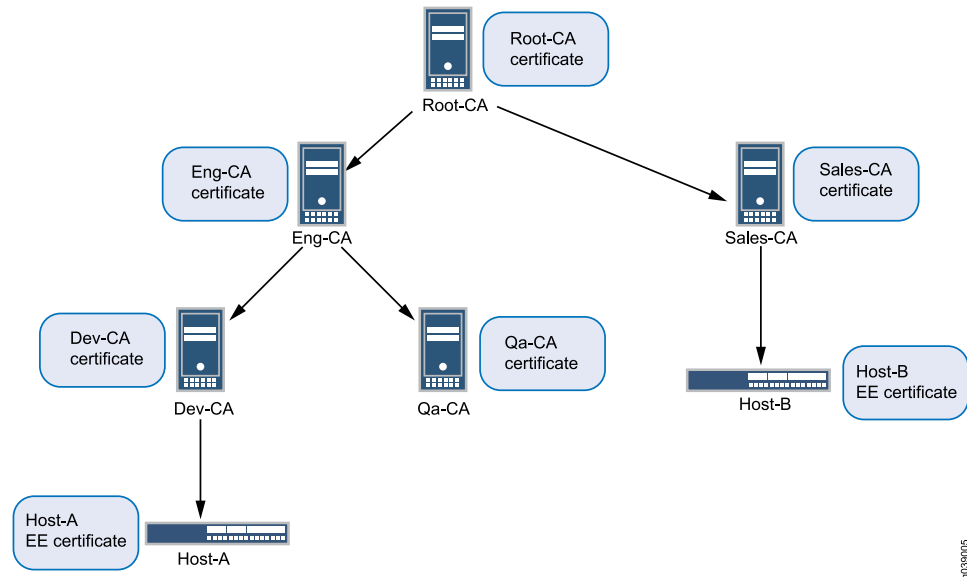
Before you begin, obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.

Overview

This example shows how to configure a local device for certificate chains, enroll CA and local certificates, check the validity of enrolled certificates, and check the revocation status of the peer device.

This example shows the configuration and operational commands on Host-A, as shown in [Figure 15 on page 142](#). A dynamic CA profile is automatically created on Host-A to allow Host-A to download the CRL from Sales-CA and check the revocation status of Host-B's certificate.

Figure 15: Certificate Chain Example



NOTE: The IPsec VPN configuration for Phase 1 and Phase 2 negotiation is shown for Host-A in this example. The peer device (Host-B) must be properly configured so that Phase 1 and Phase 2 options are successfully negotiated and security associations (SAs) are established. See [“Configuring Remote IKE IDs for Site-to-Site VPNs” on page 62](#) for examples of configuring peer devices for VPNs.

Configuration

To configure a device for certificate chains:

- [Configure CA Profiles on page 142](#)
- [Enroll Certificates on page 144](#)
- [Configure IPsec VPN Options on page 146](#)

Configure CA Profiles

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security pki ca-profile Root-CA ca-identity CA-Root
```

```

set security pki ca-profile Root-CA enrollment url http://198.51.100.230:8080/scep/Root/
set security pki ca-profile Root-CA revocation-check crl
set security pki ca-profile Eng-CA ca-identity Eng-CA
set security pki ca-profile Eng-CA enrollment url http://198.51.100.230:8080/scep/Eng/
set security pki ca-profile Eng-CA revocation-check crl
set security pki ca-profile Dev-CA ca-identity Dev-CA
set security pki ca-profile Dev-CA enrollment url http://198.51.100.230:8080/scep/Dev/
set security pki ca-profile Dev-CA revocation-check crl

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure CA profiles:

1. Create the CA profile for Root-CA.

```

[edit security pki]
user@host# set ca-profile Root-CA ca-identity CA-Root
user@host# set ca-profile Root-CA enrollment url
http://198.51.100.230:8080/scep/Root/
user@host# set ca-profile Root-CA revocation-check crl

```

2. Create the CA profile for Eng-CA.

```

[edit security pki]
user@host# set ca-profile Eng-CA ca-identity Eng-CA
user@host# set ca-profile Eng-CA enrollment url
http://198.51.100.230:8080/scep/Eng/
user@host# set ca-profile Eng-CA revocation-check crl

```

3. Create the CA profile for Dev-CA.

```

[edit security pki]
user@host# set ca-profile Dev-CA ca-identity Dev-CA
user@host# set ca-profile Dev-CA enrollment url
http://198.51.100.230:8080/scep/Dev/
user@host# set ca-profile Dev-CA revocation-check crl

```

Results From configuration mode, confirm your configuration by entering the **show security pki** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security pki
ca-profile Root-CA {
  ca-identity Root-CA;
  enrollment {

```

```

    url "http://198.51.100.230:8080/scep/Root/";
  }
  revocation-check {
    crl;
  }
}
ca-profile Eng-CA {
  ca-identity Eng-CA;
  enrollment {
    url "http://198.51.100.230:8080/scep/Eng/";
  }
  revocation-check {
    crl;
  }
}
ca-profile Dev-CA {
  ca-identity Dev-CA;
  enrollment {
    url "http://198.51.100.230:8080/scep/Dev/";
  }
  revocation-check {
    crl;
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Enroll Certificates

Step-by-Step Procedure

To enroll certificates:

1. Enroll the CA certificates.

```
user@host> request security pki ca-certificate enroll ca-profile Root-CA
```

```
user@host> request security pki ca-certificate enroll ca-profile Eng-CA
```

```
user@host> request security pki ca-certificate enroll ca-profile Dev-CA
```

Type **yes** at the prompts to load the CA certificate.

2. Verify that the CA certificates are enrolled in the device.

```
user@host> show security pki ca-certificate ca-profile Root-CA
```

```

Certificate identifier: Root-CA
  Issued to: Root-CA, Issued by: C = us, O = example, CN = Root-CA
  Validity:
    Not before: 08-14-2012 22:19
    Not after: 08-13-2017 22:19
  Public key algorithm: rsaEncryption(2048 bits)

```

```
user@host> show security pki ca-certificate ca-profile Eng-CA
```

```
Certificate identifier: Eng-CA
  Issued to: Eng-CA, Issued by: C = us, O = example, CN = Root-CA
  Validity:
    Not before: 08-15-2012 01:02
    Not after: 08-13-2017 22:19
  Public key algorithm: rsaEncryption(2048 bits)
```

```
user@host> show security pki ca-certificate ca-profile Dev-CA
```

```
Certificate identifier: Dev-CA
  Issued to: Dev-CA, Issued by: C = us, O = example, CN = Eng-CA
  Validity:
    Not before: 08-15-2012 17:41
    Not after: 08-13-2017 22:19
  Public key algorithm: rsaEncryption(2048 bits)
```

3. Verify the validity of the enrolled CA certificates.

```
user@host> request security pki ca-certificate verify ca-profile Root-CA
```

```
CA certificate Root-CA verified successfully
```

```
user@host> request security pki ca-certificate verify ca-profile Eng-CA
```

```
CA certificate Eng-CA verified successfully
```

```
user@host> request security pki ca-certificate verify ca-profile Dev-CA
```

```
CA certificate Dev-CA verified successfully
```

4. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Host-A type rsa
size 1024
```

5. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll certificate-id Host-A
ca-profile Dev-CA challenge-password example domain-name host-a.example.net
email host-a@example.net subject DC=example,CN=Host-A,
OU=DEV,O=PKI,L=Sunnyvale,ST=CA,C=US
```

6. Verify that the local certificate is enrolled in the device.

```
user@host> show security pki local-certificate
```

```
Issued to: Host-A, Issued by: C = us, O = example, CN = Dev-CA
  Validity:
    Not before: 09-17-2012 22:22
    Not after: 08-13-2017 22:19
  Public key algorithm: rsaEncryption(1024 bits)
```

7. Verify the validity of the enrolled local certificate.

```
user@host> request security pki local-certificate verify certificate-id Host-A
```

```
Local certificate Host-A verification success
```

8. Check the CRL download for configured CA profiles.

```
user@host> show security pki crl
```

```
CA profile: Root-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Root-CA
Effective date: 09- 9-2012 13:08
Next update: 09-21-2012 02:55

CA profile: Eng-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Eng-CA
Effective date: 08-22-2012 17:46
Next update: 10-24-2015 03:33

CA profile: Dev-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Dev-CA
Effective date: 09-14-2012 21:15
Next update: 09-26-2012 11:02
```

Configure IPsec VPN Options

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ike proposal ike_cert_prop_01 authentication-method rsa-signatures
set security ike proposal ike_cert_prop_01 dh-group group5
set security ike proposal ike_cert_prop_01 authentication-algorithm sha1
set security ike proposal ike_cert_prop_01 encryption-algorithm aes-256-cbc
set security ike policy ike_cert_pol_01 mode main
set security ike policy ike_cert_pol_01 proposals ike_cert_prop_01
set security ike policy ike_cert_pol_01 certificate local-certificate Host-A
set security ike gateway ike_cert_gw_01 ike-policy ike_cert_pol_01
set security ike gateway ike_cert_gw_01 address 192.0.2.51
set security ike gateway ike_cert_gw_01 external-interface ge-0/0/1.0
set security ike gateway ike_cert_gw_01 local-identity 192.0.2.31
set security ipsec proposal ipsec_prop_01 protocol esp
set security ipsec proposal ipsec_prop_01 authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_prop_01 encryption-algorithm 3des-cbc
set security ipsec proposal ipsec_prop_01 lifetime-seconds 300
set security ipsec policy ipsec_pol_01 proposals ipsec_prop_01
set security ipsec vpn ipsec_cert_vpn_01 bind-interface st0.1
set security ipsec vpn ipsec_cert_vpn_01 ike gateway ike_cert_gw_01
set security ipsec vpn ipsec_cert_vpn_01 ike ipsec-policy ipsec_pol_01
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec VPN options:

1. Configure Phase 1 options.

```
[edit security ike proposal ike_cert_prop_01]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy ike_cert_pol_01]
user@host# set mode main
user@host# set proposals ike_cert_prop_01
user@host# set certificate local-certificate Host-A

[edit security ike gateway ike_cert_gw_01]
user@host# set ike-policy ike_cert_pol_01
user@host# set address 192.0.2.51
user@host# set external-interface ge-0/0/1.0
user@host# set local-identity 192.0.2.31
```

2. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec_prop_01]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm 3des-cbc
user@host# set lifetime-seconds 300

[edit security ipsec policy ipsec_pol_01]
user@host# set proposals ipsec_prop_01

[edit security ipsec vpn ipsec_cert_vpn_01]
user@host# set bind-interface st0.1
user@host# set ike gateway ike_cert_gw_01
user@host# set ike ipsec-policy ipsec_pol_01
```

Results From configuration mode, confirm your configuration by entering the **show security ike** and **show security ipsec** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ike_cert_prop_01 {
  authentication-method rsa-signatures;
  dh-group group5;
```

```

authentication-algorithm sha1;
encryption-algorithm aes-256-cbc;
}
policy ike_cert_pol_01 {
    mode main;
    proposals ike_cert_prop_01;
    certificate {
        local-certificate Host-A;
    }
}
gateway ike_cert_gw_01 {
    ike-policy ike_cert_pol_01;
    address 192.0.2.51;
    external-interface ge-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec_prop_01 {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm 3des-cbc;
    lifetime-seconds 300;
}
policy ipsec_pol_01 {
    proposals ipsec_prop_01;
}
vpn ipsec_cert_vpn_01 {
    bind-interface st0.1;
    ike {
        gateway ike_cert_gw_01;
        ipsec-policy ipsec_pol_01;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

If certificate validation is successful during IKE negotiation between peer devices, both IKE and IPsec security associations (SAs) are established.

The IKE SA is UP if the certificate is valid. The IKE SA is DOWN and IPSEC SA is formed if the certificate is revoked, only if revocation check is configured on the peer device

- [Verifying IKE Phase 1 Status on page 148](#)
- [Verifying IPsec Phase 2 Status on page 149](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action Enter the **show security ike security-associations** command from operational mode.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
2090205	DOWN	285feacb50824495	59fca3f72b64da10	Main	192.0.2.51

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action Enter the **show security ipsec security-associations** command from operational mode.

```
user@host> show security ipsec security-associations
```

```

Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<131073 ESP:3des/sha1 a4756de9 207/  unlim   -   root 500   192.0.2.51
>131073 ESP:3des/sha1 353bacd3 207/  unlim   -   root 500   192.0.2.51

```

IKE and IPsec SA Failure for a Revoked Certificate

- [Checking for Revoked Certificates on page 149](#)

Checking for Revoked Certificates

Problem If certificate validation fails during IKE negotiation between peer devices, check to make sure that the peer's certificate has not been revoked. A dynamic CA profile allows the local device to download the CRL from the peer's CA and check the revocation status of the peer's certificate. To enable dynamic CA profiles, the **revocation-check crl** option must be configured on a parent CA profile.

Solution To check the revocation status of a peer's certificate:

1. Identify the dynamic CA profile that will show the CRL for the peer device by entering the **show security pki crl** command from operational mode.

```
user@host> show security pki crl
```

```

CA profile: Root-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Root-CA
Effective date: 09- 9-2012 13:08
Next update: 09-21-2012 02:55

CA profile: Eng-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Eng-CA

```

```
Effective date: 08-22-2012 17:46
Next update: 10-24-2015 03:33
```

```
CA profile: Dev-CA
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Dev-CA
Effective date: 09-14-2012 21:15
Next update: 09-26-2012 11:02
```

```
CA profile: dynamic-001
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Sales-CA
Effective date: 09-14-2012 21:15
Next update: 09-26-2012 11:02
```

The CA profile **dynamic-001** is automatically created on Host-A so that Host-A can download the CRL from Host-B's CA (Sales-CA) and check the revocation status of the peer's certificate.

2. Display CRL information for the dynamic CA profile by entering the **show security pki crl ca-profile dynamic-001 detail** command from operational mode.

Enter

```
user@host> show security pki crl ca-profile dynamic-001 detail
```

```
CA profile: dynamic-001
CRL version: V00000001
CRL issuer: C = us, O = example, CN = Sub11
Effective date: 09-19-2012 17:29
Next update: 09-20-2012 01:49
Revocation List:
  Serial number      Revocation date
  10647C84           09-19-2012 17:29 UTC
```

Host-B's certificate (serial number 10647084) has been revoked.

- See Also**
- [Understanding Certificates and PKI on page 973](#)
 - [Understanding Certificate Authority Profiles on page 992](#)

Understanding IKEv2 Fragmentation

- [Overview on page 150](#)
- [Message Fragmentation on page 151](#)
- [Configuration on page 151](#)
- [Caveats on page 151](#)

Overview

When certificate-based authentication is used, IKEv2 packets can exceed the path MTU if multiple certificates are transmitted. If the IKE message size exceeds the path MTU,

the messages are fragmented at the IP level. Some network equipment, such as NAT devices, does not allow IP fragments to pass through, which prevents the establishment of IPsec tunnels.

Message Fragmentation

IKEv2 message fragmentation, as described in RFC 7383, *Internet Key Exchange Protocol Version 2 (IKEv2) Message Fragmentation*, allows IKEv2 to operate in environments where IP fragments might be blocked and peers would not be able to establish an IPsec security association (SA). IKEv2 fragmentation splits a large IKEv2 message into a set of smaller ones so that there is no fragmentation at the IP level. Fragmentation takes place before the original message is encrypted and authenticated, so that each fragment is separately encrypted and authenticated. On the receiver, the fragments are collected, verified, decrypted, and merged into the original message.

For IKEv2 fragmentation to occur, both VPN peers *must* indicate fragmentation support by including the `IKEV2_FRAGMENTATION_SUPPORTED` notification payload in the `IKE_SA_INIT` exchange. If both peers indicate fragmentation support, it is up to the initiator of the message exchange to determine whether or not IKEv2 fragmentation is used.

On SRX Series devices, a maximum of 32 fragments are allowed per IKEv2 message. If the number of IKEv2 message fragments to be sent or received exceeds 32, the fragments are dropped and the tunnel is not established. Retransmission of individual message fragments is not supported.

Configuration

On SRX Series devices, IKEv2 fragmentation is enabled by default for IPv4 and IPv6 messages. To disable IKEv2 fragmentation, use the **disable** statement at the `[edit security ike gateway gateway-name fragmentation]` hierarchy level. You can also use the **size** statement to configure the size of the packet at which messages are fragmented; the packet size ranges from 500 to 1300 bytes. If **size** is not configured, the default packet size is 576 bytes for IPv4 traffic and 1280 bytes for IPv6 traffic. An IKEv2 packet that is larger than the configured packet size is fragmented.

After IKEv2 fragmentation is disabled or enabled or the packet fragment size is changed, the VPN tunnels that are hosted on the IKE gateway are brought down and IKE and IPsec SAs are renegotiated.

Caveats

The following features are not supported with IKEv2 fragmentation:

- Path MTU Discovery.
- SNMP.

See Also • [Understanding Certificate Authority Profiles on page 992](#)

Example: Configuring a Route-Based VPN for IKEv2

This example shows how to configure a route-based IPsec VPN to allow data to be securely transferred between a branch office and a corporate office.

- [Requirements on page 152](#)
- [Overview on page 152](#)
- [Configuration on page 154](#)
- [Verification on page 165](#)

Requirements

This example uses the following hardware:

- SRX240 device
- SSG140 device

Before you begin, read [“IPsec VPN Overview” on page 31](#).

Overview

In this example, you configure a route-based VPN for a branch office in Chicago, Illinois, because you want to conserve tunnel resources but still get granular restrictions on VPN traffic. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

In this example, you configure interfaces, an IPv4 default route, security zones, and address books. Then you configure IKE Phase 1, IPsec Phase 2, a security policy, and TCP-MSS parameters. See [Table 20 on page 152](#) through [Table 24 on page 154](#) for specific configuration parameters used in this example.

Table 20: Interface, Static Route, Security Zone, and Address Book Information

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/0.0	192.168.10.1/24
	ge-0/0/3.0	10.1.1.2/30
	st0.0 (tunnel interface)	10.11.11.10/24
Static routes	0.0.0.0/0 (default route)	The next hop is 10.1.1.1.
	192.168.168.0/24	The next hop is st0.0.

Table 20: Interface, Static Route, Security Zone, and Address Book Information (continued)

Feature	Name	Configuration Parameters
Security zones	trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/0.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/3.0 interface is bound to this zone.
	vpn-chicago	The st0.0 interface is bound to this zone.
Address book entries	sunnyvale	<ul style="list-style-type: none"> This address is for the trust zone's address book. The address for this address book entry is 192.168.10.0/24.
	chicago	<ul style="list-style-type: none"> This address is for the untrust zone's address book. The address for this address book entry is 192.168.168.0/24.

Table 21: IKE Phase 1 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ike-phase1-proposal	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: aes-128-cbc
Policy	ike-phase1-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-phase1-proposal IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gw-chicago	<ul style="list-style-type: none"> IKE policy reference: ike-phase1-policy External interface: ge-0/0/3.0 Gateway address: 10.2.2.2

Table 22: IPsec Phase 2 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipsec-phase2-proposal	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: aes-128-cbc
Policy	ipsec-phase2-policy	<ul style="list-style-type: none"> Proposal reference: ipsec-phase2-proposal PFS: Diffie-Hellman group2

Table 22: IPsec Phase 2 Configuration Parameters (continued)

Feature	Name	Configuration Parameters
VPN	ipsec-vpn-chicago	<ul style="list-style-type: none"> • IKE gateway reference: gw-chicago • IPsec policy reference: ipsec-phase2-policy • Bind to interface: st0.0

Table 23: Security Policy Configuration Parameters

Purpose	Name	Configuration Parameters
The security policy permits traffic from the trust zone to the vpn-chicago zone.	vpn-tr-chi	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address sunnyvale • destination-address chicago • application any • Action: permit
The security policy permits traffic from the vpn-chicago zone to the trust zone.	vpn-chi-tr	<ul style="list-style-type: none"> • Match criteria: <ul style="list-style-type: none"> • source-address chicago • destination-address sunnyvale • application any • Action: permit

Table 24: TCP-MSS Configuration Parameters

Purpose	Configuration Parameters
<p>TCP-MSS is negotiated as part of the TCP three-way handshake and limits the maximum size of a TCP segment to better fit the MTU limits on a network. For VPN traffic, the IPsec encapsulation overhead, along with the IP and frame overhead, can cause the resulting ESP packet to exceed the MTU of the physical interface, which causes fragmentation. Fragmentation increases bandwidth and device resources.</p> <p>NOTE: We recommend a value of 1350 as the starting point for most Ethernet-based networks with an MTU of 1500 or greater. You might need to experiment with different TCP-MSS values to obtain optimal performance. For example, you might need to change the value if any device in the path has a lower MTU, or if there is any additional overhead such as PPP or Frame Relay.</p>	MSS value: 1350

Configuration

- [Configuring Interface, Static Route, Security Zone, and Address Book Information on page 155](#)
- [Configuring IKE on page 158](#)

- [Configuring IPsec on page 160](#)
- [Configuring Security Policies on page 162](#)
- [Configuring TCP-MSS on page 164](#)
- [Configuring the SSG Series Device on page 165](#)

Configuring Interface, Static Route, Security Zone, and Address Book Information

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
set interfaces st0 unit 0 family inet address 10.11.10.1/24
set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
set routing-options static route 192.168.168.0/24 next-hop st0.0
set security zones security-zone untrust interfaces ge-0/0/3.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust address-book address sunnyvale 192.168.10.0/24
set security zones security-zone vpn-chicago interfaces st0.0
set security zones security-zone vpn-chicago address-book address chicago
192.168.168.0/24
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interface, static route, security zone, and address book information:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
user@host# set interfaces st0 unit 0 family inet address 10.11.10.1/24
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
user@host# set routing-options static route 192.168.168.0/24 next-hop st0.0
```

3. Configure the untrust security zone.

```
[edit ]
user@host# edit security zones security-zone untrust
```

4. Assign an interface to the security zone.

```
[edit security zones security-zone untrust]  
user@host# set interfaces ge-0/0/3.0
```

5. Specify allowed system services for the security zone.

```
[edit security zones security-zone untrust]  
user@host# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]  
user@host# edit security zones security-zone trust
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]  
user@host# set interfaces ge-0/0/0.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]  
user@host# set host-inbound-traffic system-services all
```

9. Configure the address book entry for the trust security zone.

```
[edit security zones security-zone trust]  
user@host# set address-book address sunnyvale 192.168.10.0/24
```

10. Configure the vpn-chicago security zone.

```
[edit]  
user@host# edit security zones security-zone vpn-chicago
```

11. Assign an interface to the security zone.

```
[edit security zones security-zone vpn-chicago]  
user@host# set interfaces st0.0
```

12. Configure the address book entry for the vpn-chicago zone.

```
[edit security zones security-zone vpn-chicago]  
user@host# set address-book address chicago 192.168.168.0/24
```


Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 192.168.10.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.1.1.2/30
    }
  }
}
st0 {
  unit 0 {
    family inet {
      address 10.11.11.10/24
    }
  }
}
```

```
[edit]
user@host# show routing-options
static {
  route 0.0.0.0/0 next-hop 10.1.1.1;
  route 192.168.168.0/24 next-hop st0.0;
}
```

```
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      ike;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
security-zone trust {
  address-book {
    address sunnyvale 192.168.10.0/24;
  }
  host-inbound-traffic {
```

```

system-services {
    all;
}
}
interfaces {
    ge-0/0/0.0;
}
}
security-zone vpn-chicago {
    host-inbound-traffic {
        address-book {
            address chicago 192.168.168.0/24;
        }
    }
    interfaces {
        st0.0;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-phase1-proposal authentication-method pre-shared-keys
set security ike proposal ike-phase1-proposal dh-group group2
set security ike proposal ike-phase1-proposal authentication-algorithm sha1
set security ike proposal ike-phase1-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-phase1-policy proposals ike-phase1-proposal
set security ike policy ike-phase1-policy pre-shared-key ascii-text "$ABC123"
set security ike gateway gw-chicago external-interface ge-0/0/3.0
set security ike gateway gw-chicago ike-policy ike-phase1-policy
set security ike gateway gw-chicago address 10.2.2.2
set security ike gateway gw-chicago version v2-only

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@host# set proposal ike-phase1-proposal

```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike-phase1-proposal]  
user@host# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike-phase1-proposal]  
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike-phase1-proposal]  
user@host# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike-phase1-proposal]  
user@host# set encryption-algorithm aes-128-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]  
user@host# set policy ike-phase1-policy
```

7. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-phase1-policy]  
user@host# set proposals ike-phase1-proposal
```

8. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike-phase1-policy]  
user@host# set pre-shared-key ascii-text "$ABC123"
```

9. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]  
user@host# set gateway gw-chicago external-interface ge-0/0/3.0
```

10. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway gw-chicago]  
user@host# set ike-policy ike-phase1-policy
```

11. Define the IKE Phase 1 gateway address.

```
[edit security ike gateway gw-chicago]
user@host# set address 10.2.2.2
```

12. Define the IKE Phase 1 gateway version.

```
[edit security ike gateway gw-chicago]
user@host# set version v2-only
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ike-phase1-proposal {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-phase1-policy {
  proposals ike-phase1-proposal;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway gw-chicago {
  ike-policy ike-phase1-policy;
  address 10.2.2.2;
  external-interface ge-0/0/3.0;
  version v2-only;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec-phase2-proposal protocol esp
set security ipsec proposal ipsec-phase2-proposal authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec-phase2-proposal encryption-algorithm aes-128-cbc
set security ipsec policy ipsec-phase2-policy proposals ipsec-phase2-proposal
set security ipsec policy ipsec-phase2-policy perfect-forward-secrecy keys group2
set security ipsec vpn ipsec-vpn-chicago ike gateway gw-chicago
set security ipsec vpn ipsec-vpn-chicago ike ipsec-policy ipsec-phase2-policy
set security ipsec vpn ipsec-vpn-chicago bind-interface st0.0
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@host# set security ipsec proposal ipsec-phase2-proposal
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@host# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@host# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]
user@host# set encryption-algorithm aes-128-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set policy ipsec-phase2-policy
```

6. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec-phase2-policy]
user@host# set proposals ipsec-phase2-proposal
```

7. Specify IPsec Phase 2 PFS to use Diffie-Hellman group 2.

```
[edit security ipsec policy ipsec-phase2-policy]
user@host# set perfect-forward-secrecy keys group2
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set vpn ipsec-vpn-chicago ike gateway gw-chicago
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn ipsec-vpn-chicago ike ipsec-policy ipsec-phase2-policy
```

10. Specify the interface to bind.

```
[edit security ipsec]
user@host# set vpn ipsec-vpn-chicago bind-interface st0.0
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ipsec
proposal ipsec-phase2-proposal {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-128-cbc;
}
policy ipsec-phase2-policy {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec-phase2-proposal;
}
vpn ipsec-vpn-chicago {
  bind-interface st0.0;
  ike {
    gateway gw-chicago;
    ipsec-policy ipsec-phase2-policy;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone vpn-chicago policy vpn-tr-chi match
source-address sunnyvale
set security policies from-zone trust to-zone vpn-chicago policy vpn-tr-chi match
destination-address chicago
set security policies from-zone trust to-zone vpn-chicago policy vpn-tr-chi match
application any
```

```

set security policies from-zone trust to-zone vpn-chicago policy vpn-tr-chi then permit
set security policies from-zone vpn-chicago to-zone trust policy vpn-chi-tr match
  source-address chicago
set security policies from-zone vpn-chicago to-zone trust policy vpn-chi-tr match
  destination-address sunnyvale
set security policies from-zone vpn-chicago to-zone trust policy vpn-chi-tr match
  application any
set security policies from-zone vpn-chicago to-zone trust policy vpn-chi-tr then permit

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the vpn-chicago zone.

```

[edit security policies from-zone trust to-zone vpn-chicago]
user@host# set policy vpn-tr-chi match source-address sunnyvale
user@host# set policy vpn-tr-chi match destination-address chicago
user@host# set policy vpn-tr-chi match application any
user@host# set policy vpn-tr-chi then permit

```

2. Create the security policy to permit traffic from the vpn-chicago zone to the trust zone.

```

[edit security policies from-zone vpn-chicago to-zone trust]
user@host# set policy vpn-chi-tr match source-address sunnyvale
user@host# set policy vpn-chi-tr match destination-address chicago
user@host# set policy vpn-chi-tr match application any
user@host# set policy vpn-chi-tr then permit

```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security policies
from-zone trust to-zone vpn-chicago {
  policy vpn-tr-vpn {
    match {
      source-address sunnyvale;
      destination-address chicago;
      application any;
    }
    then {
      permit;
    }
  }
}

```

```

    }
  }
  from-zone vpn-chicago to-zone trust {
    policy vpn-tr-vpn {
      match {
        source-address chicago;
        destination-address sunnyvale;
        application any;
      }
      then {
        permit;
      }
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure TCP-MSS information:

1. Configure TCP-MSS information.

```

[edit]
user@host# set security flow tcp-mss ipsec-vpn mss 1350

```

Results From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security flow
tcp-mss {
  ipsec-vpn {
    mss 1350;
  }
}

```


If you are done configuring the device, enter **commit** from configuration mode.

Configuring the SSG Series Device

CLI Quick Configuration For reference, the configuration for the SSG Series device is provided. For information about configuring SSG Series devices, see the *Concepts & Examples ScreenOS Reference Guide*, which is located at <https://www.juniper.net/documentation>.

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set zone name vpn-chicago
set interface ethernet0/6 zone Trust
set interface ethernet0/0 zone Untrust
set interface tunnel.1 zone vpn-chicago
set interface ethernet0/6 ip 192.168.168.1/24
set interface ethernet0/6 route
set interface ethernet0/0 ip 10.2.2.2/30
set interface ethernet0/0 route
set interface tunnel.1 ip 10.11.11.11/24
set flow tcp-mss 1350
set address Trust "192.168.168-net" 192.168.168.0 255.255.255.0
set address vpn-chicago "192.168.10-net" 192.168.10.0 255.255.255.0
set ike gateway corp-ike address 10.1.1.2 IKEv2 outgoing-interface ethernet0/0 preshare
  395psksecr3t sec-level standard
set vpn corp-vpn gateway corp-ike replay tunnel idletime 0 sec-level standard
set vpn corp-vpn monitor optimized rekey
set vpn corp-vpn bind interface tunnel.1
set policy from Trust to Untrust "ANY" "ANY" "ANY" nat src permit
set policy from Trust to vpn-chicago "192.168.168-net" "192.168.10-net" "ANY" permit
set policy from vpn-chicago to Trust "192.168.10-net" "192.168.168-net" "ANY" permit
set route 192.168.10.0/24 interface tunnel.1
set route 0.0.0.0/0 interface ethernet0/0 gateway 10.2.2.1
```

Verification

Confirm that the configuration is working properly.

- [Verifying the IKE Phase 1 Status on page 165](#)
- [Verifying the IPsec Phase 2 Status on page 167](#)
- [Reviewing Statistics and Errors for an IPsec Security Association on page 169](#)
- [Testing Traffic Flow Across the VPN on page 169](#)

Verifying the IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you need to send traffic from a host in the 192.168.10/24 network to a host in the 192.168.168/24 network. For route-based VPNs, traffic can be initiated by the SRX Series device through the tunnel. We recommend that when testing IPsec tunnels, test traffic be sent from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate a ping from 192.168.10.10 to 192.168.168.10.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
1	10.2.2.2	UP	744a594d957dd513	1e1307db82f58387	IKEv2

```
user@host> show security ike security-associations index 1 detail
```

```
IKE peer 10.2.2.2, Index 1,
  Role: Responder, State: UP
  Initiator cookie: 744a594d957dd513, Responder cookie: 1e1307db82f58387
  Exchange type: IKEv2, Authentication method: Pre-shared-keys
  Local: 10.1.1.2:500, Remote: 10.2.2.2:500
  Lifetime: Expires in 28570 seconds
  Algorithms:
    Authentication      : sha1
    Encryption          : aes-cbc (128 bits)
    Pseudo random function: hmac-sha1
  Traffic statistics:
    Input bytes      :      852
    Output bytes     :      940
    Input packets    :         5
    Output packets   :         5
  Flags: Caller notification sent
  IPSec security associations: 1 created, 0 deleted
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote Address—Verify that the remote IP address is correct.
- State
 - UP—The Phase 1 SA has been established.

- DOWN—There was a problem establishing the Phase 1 SA.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets).
- IKE policy parameters.
- Preshared key information.
- Phase 1 proposal parameters (must match on both peers).

The **show security ike security-associations index 1 detail** command lists additional information about the SA with an index number of 1:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created

Verifying the IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
total configured sa: 2
ID   Gateway   Port  Algorithm   SPI      Life:sec/kb  Mon vsys
<16384 10.2.2.2   500   ESP:aes-128/sha1  76d64d1d 3363/ unlim - 0
>16384 10.2.2.2   500   ESP:aes-128/sha1  a1024ee2 3363/ unlim - 0
```

```
user@host> show security ipsec security-associations index 16384 detail
```

```
Virtual-system: Root
Local Gateway: 10.1.1.2, Remote Gateway: 10.2.2.2
Local Identity: ipv4_subnet(any:0,[0..7]=192.168.10.0/24)
Remote Identity: ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
```

```

Version: IKEv2

DF-bit: clear

Direction: inbound, SPI: 1993755933, AUX-SPI: 0
Hard lifetime: Expires in 3352 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2775 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)

Anti-replay service: enabled, Replay window size: 32

Direction: outbound, SPI: 2701283042, AUX-SPI: 0
Hard lifetime: Expires in 3352 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2775 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc
(128 bits)
Anti-replay service: enabled, Replay window size: 32

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 16384. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500.
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3363/ unlim value indicates that the Phase 2 lifetime expires in 3363 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, because Phase 2 is not dependent on Phase 1 after the VPN is up.
- The vsys is the root system, and it is always listed as 0.
- The IKEv2 allows connections from a version 2 peer and will initiate a version 2 negotiation.

The output from the **show security ipsec security-associations index 16384 detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a Phase 2 failure. If no IPsec SA is listed, confirm that Phase 2 proposals, including the proxy ID settings, are correct for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Another common reason for Phase 2 failure is not specifying the ST interface binding. If IPsec cannot complete, check the `kmd` log or set trace options.

Reviewing Statistics and Errors for an IPsec Security Association

Purpose Review ESP and authentication header counters and errors for an IPsec SA.

Action From operational mode, enter the `show security ipsec statistics index index_number` command, using the index number of the VPN for which you want to see statistics.

```
user@host> show security ipsec statistics index 16384
```

```
ESP Statistics:
  Encrypted bytes:          920
  Decrypted bytes:         6208
  Encrypted packets:        5
  Decrypted packets:       87
AH Statistics:
  Input bytes:              0
  Output bytes:             0
  Input packets:            0
  Output packets:          0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
```

You can also use the `show security ipsec statistics` command to review statistics and errors for all SAs.

To clear all IPsec statistics, use the `clear security ipsec statistics` command.

Meaning If you see packet loss issues across a VPN, you can run the `show security ipsec statistics` or `show security ipsec statistics detail` command several times to confirm that the encrypted and decrypted packet counters are incrementing. You should also check that the other error counters are incrementing.

Testing Traffic Flow Across the VPN

Purpose Verify the traffic flow across the VPN.

Action You can use the `ping` command from the SRX Series device to test traffic flow to a remote host PC. Make sure that you specify the source interface so that the route lookup is correct and the appropriate security zones are referenced during policy lookup.

From operational mode, enter the `ping` command.

```
ssg-> ping 192.168.168.10 interface ge-0/0/0 count 5
PING 192.168.168.10 (192.168.168.10): 56 data bytes
64 bytes from 192.168.168.10: icmp_seq=0 ttl=127 time=8.287 ms
```

```
64 bytes from 192.168.168.10: icmp_seq=1 ttl=127 time=4.119 ms
64 bytes from 192.168.168.10: icmp_seq=2 ttl=127 time=5.399 ms
64 bytes from 192.168.168.10: icmp_seq=3 ttl=127 time=4.361 ms
64 bytes from 192.168.168.10: icmp_seq=4 ttl=127 time=5.137 ms

--- 192.168.168.10 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 4.119/5.461/8.287/1.490 ms
```

You can also use the **ping** command from the SSG Series device.

```
user@host> ping 192.168.10.10 from ethernet0/6

Type escape sequence to abort
Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 1 seconds from
ethernet0/6
!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=4/4/5 ms
```

Meaning If the **ping** command fails from the SRX Series or SSG Series device, there might be a problem with the routing, security policies, end host, or encryption and decryption of ESP packets.

See Also

- [IPsec VPN Overview on page 31](#)
- [Example: Configuring a Hub-and-Spoke VPN on page 71](#)
- [Example: Configuring a Policy-Based VPN on page 518](#)

Example: Configuring the SRX Series for Pico Cell Provisioning with IKEv2 Configuration Payload

In networks where many devices are being deployed, managing the network needs to be simple. The IKEv2 configuration payload feature supports the provisioning of these devices without touching either the device configuration or the SRX Series configuration. This example shows how to configure an SRX Series to support pico cell provisioning using the IKEv2 configuration payload feature.

- [Requirements on page 170](#)
- [Overview on page 171](#)
- [Configuration on page 175](#)
- [Verification on page 192](#)

Requirements

This example uses the following hardware and software components:

- Two SRX Series devices configured in a chassis cluster
- One SRX Series device configured as an intermediate router
- Two pico cell clients

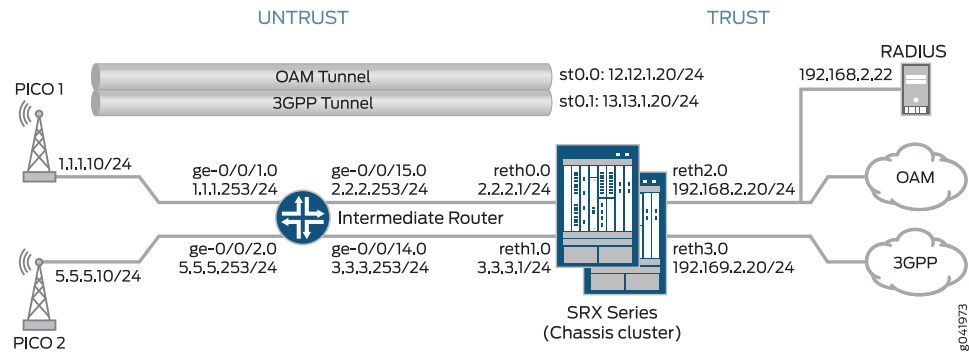
- One RADIUS server configured with pico cell client provisioning information
- Junos OS Release 12.1X46-D10 or later for IKEv2 configuration payload support

Overview

In this example, an SRX Series uses the IKEv2 configuration payload feature to propagate provisioning information to a series of pico cells. The pico cells ship from the factory with a standard configuration that allows them to connect to the SRX Series, but the pico cell provisioning information is stored on an external RADIUS server. The pico cells receive full provisioning information after establishing secure connections with provisioning servers in a protected network. The IKEv2 configuration payload feature is supported for IPv4 only.

Figure 16 on page 171 shows a topology in which the SRX Series supports pico cell provisioning using the IKEv2 configuration payload feature.

Figure 16: SRX Series Support for Pico Cell Provisioning with IKEv2 Configuration Payload



Each pico cell in this topology initiates two IPsec VPNs: one for management and one for data. In this example, management traffic uses the tunnel labeled OAM Tunnel, while the data traffic flows through the tunnel labeled 3GPP Tunnel. Each tunnel supports connections with OAM and 3GPP provisioning servers on separate, configurable networks, requiring separate routing instances and VPNs. This example provides the IKE Phase 1 and Phase 2 options for establishing the OAM and 3GPP VPNs.

In this example, the SRX Series acts as the IKEv2 configuration payload server, acquiring provisioning information from the RADIUS server and providing that information to the pico cell clients. The SRX Series returns the provisioning information for each authorized client in the IKEv2 configuration payload during tunnel negotiation. The SRX Series cannot be used as a client device.

Additionally, the SRX Series uses the IKEv2 configuration payload information to update the Traffic Selector initiator (TSi) and Traffic Selector responder (TSr) values exchanged with the client during tunnel negotiation. The configuration payload uses the TSi and TSr values that are configured on the SRX Series using the **proxy-identity** statement at the **[edit security ipsec vpn vpn-name ike]** hierarchy level. The TSi and TSr values define the network traffic for each VPN.

The intermediate router routes pico cell traffic to the appropriate interfaces on the SRX Series.

The following process describes the connection sequence:

1. The pico cell initiates an IPsec tunnel with the SRX Series using the factory configuration.
2. The SRX Series authenticates the client using the client certificate information and the root certificate of the CA that is enrolled in the SRX Series. After authentication, the SRX Series passes the IKE identity information from the client certificate to the RADIUS server in an authorization request.
3. After authorizing the client, the RADIUS server responds to the SRX Series with the client provisioning information:
 - IP address (TSi value)
 - IP subnet mask (optional; the default is 32 bit)
 - DNS address (optional)
4. The SRX Series returns the provisioning information in the IKEv2 configuration payload for each client connection, and exchanges final TSi and TSr values with the pico cells. In this example, the SRX Series provides the following TSi and TSr information for each VPN:

VPN Connection	TSi/TSr Values Provided by SRX
Pico 1 OAM	TSi: 12.12.1.201/32, TSr: 192.168.2.0/24
Pico 1 3GPP	TSi: 13.13.1.201/32, TSr: 192.169.2.0/24, TSr: 13.13.0.0/16
Pico 2 OAM	TSi: 12.12.1.205/32, TSr: 192.168.2.0/24
Pico 2 3GPP	TSi: 13.13.1.205/32, TSr: 192.169.2.0/24, TSr: 13.13.0.0/16



NOTE: If the provisioning information supplied by the RADIUS server includes a subnet mask, the SRX Series returns a second TSr value for the client connection that includes the IP subnet. This enables intrapeer communication for devices on that subnet. In this example, intrapeer communication is enabled for the subnet associated with the 3GPP VPN (13.13.0.0/16).



NOTE: The IKEv2 configuration payload feature is supported only for point-to-multipoint secure tunnel (st0) interfaces. For point-to-multipoint interfaces, the interfaces must be numbered, and the addresses provided in the configuration payload must be within the subnetwork range of the associated point-to-multipoint interface.

Table 25 on page 173 shows the Phase 1 and Phase 2 options configured on the SRX Series, including information for establishing both OAM and 3GPP tunnels.

Table 25: Phase 1 and Phase 2 Options for the SRX Series

Option	Value
IKE proposal:	
Proposal name	IKE_PROP
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	group5
Authentication algorithm	SHA-1
Encryption algorithm	AES 256 CBC
IKE policy:	
IKE Policy name	IKE_POL
Local certificate	Example_SRX
IKE gateway (OAM):	
IKE policy	IKE_POL
Remote IP address	dynamic
IKE user type	group-ike-id
Local IKE ID	hostname srx_series.example.net
Remote IKE ID	hostname .pico_cell.net
External interface	reth0.0
Access profile	radius_pico
IKE version	v2-only
IKE gateway (3GPP):	

Table 25: Phase 1 and Phase 2 Options for the SRX Series (continued)

Option	Value
IKE policy	IKE_POL
Remote IP address	Dynamic
IKE user type	group-ike-id
Local IKE ID	distinguished-name wildcard OU=srx_series
Remote IKE ID	distinguished-name wildcard OU=pico_cell
External interface	reth1
Access profile	radius_pico
IKE version	v2-only
IPsec proposal:	
Proposal name	IPSEC_PROP
Protocol	ESP
Authentication algorithm	HMAC SHA-1 96
Encryption algorithm	AES 256 CBC
IPsec policy:	
Policy name	IPSEC_POL
Perfect Forward Secrecy (PFS) keys	group5
IPsec proposals	IPSEC_PROP
IPsec VPN (OAM):	
Bind interface	st0.0
IKE gateway	OAM_GW
Local proxy-identity	192.168.2.0/24
Remote proxy-identity	0.0.0.0/0
IPsec policy	IPSEC_POL
IPsec VPN (3GPP):	
Bind interface	st0.1

Table 25: Phase 1 and Phase 2 Options for the SRX Series (continued)

Option	Value
IKE gateway	3GPP_GW
Local proxy-identity	192.169.2.0/24
Remote proxy-identity	0.0.0.0/0
IPsec policy	IPSEC_POL

Certificates are stored on the pico cells and the SRX Series.



NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Configuration

- [Configuring the SRX Series on page 175](#)
- [Configuring the Intermediate Router on page 185](#)
- [Configuring the Pico Cell \(Sample Configuration\) on page 188](#)
- [Configuring the RADIUS Server \(Sample Configuration using a FreeRADIUS\) on page 190](#)

Configuring the SRX Series

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set chassis cluster reth-count 5
set chassis cluster node 0
set chassis cluster node 1
set chassis cluster redundancy-group 0 node 0 priority 250
set chassis cluster redundancy-group 0 node 1 priority 150
set chassis cluster redundancy-group 1 node 0 priority 220
set chassis cluster redundancy-group 1 node 1 priority 149
set chassis cluster redundancy-group 1 interface-monitor ge-3/0/0 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/0/0 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-3/0/1 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/0/1 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-3/2/0 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/2/0 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-3/2/1 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/2/1 weight 255
set interfaces ge-3/0/0 gigether-options redundant-parent reth0
set interfaces ge-3/0/1 gigether-options redundant-parent reth1
```

```
set interfaces ge-3/2/0 gigether-options redundant-parent reth2
set interfaces ge-3/2/1 gigether-options redundant-parent reth3
set interfaces ge-8/0/0 gigether-options redundant-parent reth0
set interfaces ge-8/0/1 gigether-options redundant-parent reth1
set interfaces ge-8/2/0 gigether-options redundant-parent reth2
set interfaces ge-8/2/1 gigether-options redundant-parent reth3
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 2.2.2.1/24
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 3.3.3.1/24
set interfaces reth2 redundant-ether-options redundancy-group 1
set interfaces reth2 unit 0 family inet address 192.168.2.20/24
set interfaces reth3 redundant-ether-options redundancy-group 1
set interfaces reth3 unit 0 family inet address 192.169.2.20/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 12.12.1.20/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 13.13.1.20/24
set routing-options static route 1.1.0.0/16 next-hop 2.2.2.253
set routing-options static route 5.5.0.0/16 next-hop 2.2.2.253
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces reth0.0
set security zones security-zone untrust interfaces reth1.0
set security zones security-zone oam-trust host-inbound-traffic system-services all
set security zones security-zone oam-trust host-inbound-traffic protocols all
set security zones security-zone oam-trust interfaces reth2.0
set security zones security-zone oam-trust interfaces st0.0
set security zones security-zone 3gpp-trust host-inbound-traffic system-services all
set security zones security-zone 3gpp-trust host-inbound-traffic protocols all
set security zones security-zone 3gpp-trust interfaces reth3.0
set security zones security-zone 3gpp-trust interfaces st0.1
set access profile radius_pico authentication-order radius
set access profile radius_pico radius-server 192.168.2.22 secret "$ABC123"
set access profile radius_pico radius-server 192.168.2.22 routing-instance VR-OAM
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate example_SRX
set security ike gateway OAM_GW ike-policy IKE_POL
set security ike gateway OAM_GW dynamic hostname .pico_cell.net
set security ike gateway OAM_GW dynamic ike-user-type group-ike-id
set security ike gateway OAM_GW local-identity hostname srx_series.example.net
set security ike gateway OAM_GW external-interface reth0.0
set security ike gateway OAM_GW aaa access-profile radius_pico
set security ike gateway OAM_GW version v2-only
set security ike gateway 3GPP_GW ike-policy IKE_POL
set security ike gateway 3GPP_GW dynamic distinguished-name wildcard OU=pico_cell
set security ike gateway 3GPP_GW dynamic ike-user-type group-ike-id
set security ike gateway 3GPP_GW local-identity distinguished-name wildcard
OU=srx_series
set security ike gateway 3GPP_GW external-interface reth1.0
set security ike gateway 3GPP_GW aaa access-profile radius_pico
```

```

set security ike gateway 3GPP_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc
set security ipsec proposal IPSEC_PROP lifetime-seconds 300
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn OAM_VPN bind-interface st0.0
set security ipsec vpn OAM_VPN ike gateway OAM_GW
set security ipsec vpn OAM_VPN ike proxy-identity local 192.168.2.0/24
set security ipsec vpn OAM_VPN ike proxy-identity remote 0.0.0.0/0
set security ipsec vpn OAM_VPN ike ipsec-policy IPSEC_POL
set security ipsec vpn 3GPP_VPN bind-interface st0.1
set security ipsec vpn 3GPP_VPN ike gateway 3GPP_GW
set security ipsec vpn 3GPP_VPN ike proxy-identity local 192.169.2.0/24
set security ipsec vpn 3GPP_VPN ike proxy-identity remote 0.0.0.0/0
set security ipsec vpn 3GPP_VPN ike ipsec-policy IPSEC_POL
set routing-instances VR-OAM instance-type virtual-router
set routing-instances VR-OAM interface reth2.0
set routing-instances VR-OAM interface st0.0
set routing-instances VR-3GPP instance-type virtual-router
set routing-instances VR-3GPP interface reth3.0
set routing-instances VR-3GPP interface st0.1
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the SRX Series:

1. Configure the chassis cluster.

```

[edit chassis cluster]
user@host# set reth-count 5
user@host# set node 0
user@host# set node 1
user@host# set redundancy-group 0 node 0 priority 250
user@host# set redundancy-group 0 node 1 priority 150
user@host# set redundancy-group 1 node 0 priority 220
user@host# set redundancy-group 1 node 1 priority 149
user@host# set redundancy-group 1 interface-monitor ge-3/0/0 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/0/0 weight 255
user@host# set redundancy-group 1 interface-monitor ge-3/0/1 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/0/1 weight 255
user@host# set redundancy-group 1 interface-monitor ge-3/2/0 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/2/0 weight 255
user@host# set redundancy-group 1 interface-monitor ge-3/2/1 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/2/1 weight 255

```

2. Configure interfaces.

```
[edit interfaces]
user@host# set ge-3/0/0 gigether-options redundant-parent reth0
user@host# set ge-3/0/1 gigether-options redundant-parent reth1
user@host# set ge-3/2/0 gigether-options redundant-parent reth2
user@host# set ge-3/2/1 gigether-options redundant-parent reth3
user@host# set ge-8/0/0 gigether-options redundant-parent reth0
user@host# set ge-8/0/1 gigether-options redundant-parent reth1
user@host# set ge-8/2/0 gigether-options redundant-parent reth2
user@host# set ge-8/2/1 gigether-options redundant-parent reth3
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet address 2.2.2.1/24
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 3.3.3.1/24
user@host# set reth2 redundant-ether-options redundancy-group 1
user@host# set reth2 unit 0 family inet address 192.168.2.20/24
user@host# set reth3 redundant-ether-options redundancy-group 1
user@host# set reth3 unit 0 family inet address 192.169.2.20/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 12.12.1.20/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 13.13.1.20/24
```

3. Configure routing options.

```
[edit routing-options]
user@host# set static route 1.1.0.0/16 next-hop 2.2.2.253
user@host# set static route 5.5.0.0/16 next-hop 2.2.2.253
```

4. Specify security zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic protocols all
user@host# set host-inbound-traffic system-services all
user@host# set interfaces reth0.0
user@host# set interfaces reth1.0
```

```
[edit security zones security-zone oam-trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces reth2.0
user@host# set interfaces st0.0
```

```
[edit security zones security-zone 3gpp-trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces reth3.0
user@host# set interfaces st0.1
```

5. Create the RADIUS profile.

```
[edit access profile radius_pico]
```

```

user@host# set authentication-order radius
user@host# set radius-server 192.168.2.22 secret "$ABC123"
user@host# set radius-server 192.168.2.22 routing-instance VR-OAM

```

6. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate example_SRX

[edit security ike gateway OAM_GW]
user@host# set ike-policy IKE_POL
user@host# set dynamic hostname .pico_cell.net
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity hostname srx.example.net
user@host# set external-interface reth0.0
user@host# set aaa access-profile radius_pico
user@host# set version v2-only

[edit security ike gateway 3GPP_GW]
user@host# set ike-policy IKE_POL
user@host# set dynamic distinguished-name wildcard OU=pico_cell
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name wildcard OU=srx_series
user@host# set external-interface reth1.0
user@host# set aaa access-profile radius_pico
user@host# set version v2-only

```

7. Specify Phase 2 options.

```

[edit set security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 300

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn OAM_VPN]
user@host# set bind-interface st0.0
user@host# set ike gateway OAM_GW
user@host# set ike proxy-identity local 192.168.2.0/24
user@host# set ike proxy-identity remote 0.0.0.0/0

```

```

user@host# set ike ipsec-policy IPSEC_POL

[edit security ipsec vpn 3GPP_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway 3GPP_GW
user@host# set ike proxy-identity local 192.169.2.0/24
user@host# set ike proxy-identity remote 0.0.0.0/0
user@host# set ike ipsec-policy IPSEC_POL

```

8. Specify the routing instances.

```

[edit routing-instances VR-OAM]
user@host# set instance-type virtual router
user@host# set interface reth2.0
user@host# set interface st0.0

[edit routing-instances VR-3GPP]
user@host# set instance-type virtual router
user@host# set interface reth3.0
user@host# set interface st0.1

```

9. Specify security policies to permit site-to-site traffic.

```

[edit security policies]
user@host# set default-policy permit-all

```

Results From configuration mode, confirm your configuration by entering the **show chassis cluster**, **show interfaces**, **show security zones**, **show access profile radius_pico**, **show security ike**, **show security ipsec**, **show routing-instances**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show chassis cluster
reth-count 5
node 0
node 1
redundancy-group 0 {
  node 0 priority 250;
  node 1 priority 150;
  redundancy-group 1 {
    node 0 priority 220;
    node 1 priority 149;
    interface-monitor {
      ge-3/0/0 weight 255;
      ge-8/0/0 weight 255;
      ge-3/0/1 weight 255;
      ge-8/0/1 weight 255;
      ge-3/2/0 weight 255;
    }
  }
}

```



```
    ge-8/2/0 weight 255;
    ge-3/2/1 weight 255;
    ge-8/2/1 weight 255;
  }
}
[edit]
user@host# show interfaces
ge-3/0/0 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-3/0/1 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-3/2/0 {
  gigether-options {
    redundant-parent reth2;
  }
}
ge-3/2/1 {
  gigether-options {
    redundant-parent reth3;
  }
}
ge-8/0/0 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-8/0/1 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-8/2/0 {
  gigether-options {
    redundant-parent reth2;
  }
}
ge-8/2/1 {
  gigether-options {
    redundant-parent reth3;
  }
}
reth0 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 2.2.2.1/24;
    }
  }
}
```

```
}  
}  
reth1 {  
  redundant-ether-options {  
    redundancy-group 1;  
  }  
  unit 0 {  
    family inet {  
      address 3.3.3.1/24;  
    }  
  }  
}  
reth2 {  
  redundant-ether-options {  
    redundancy-group 1;  
  }  
  unit 0 {  
    family inet {  
      address 192.168.2.20/24;  
    }  
  }  
}  
reth3 {  
  redundant-ether-options {  
    redundancy-group 1;  
  }  
  unit 0 {  
    family inet {  
      address 192.169.2.20/24;  
    }  
  }  
}  
st0 {  
  unit 0 {  
    multipoint;  
    family inet {  
      address 12.12.1.20/24;  
    }  
  }  
  unit 1 {  
    multipoint;  
    family inet {  
      address 13.13.1.20/24;  
    }  
  }  
}  
[edit]  
user@host# show routing-options  
static {  
  route 1.1.0.0/16 next-hop 2.2.2.253;  
  route 5.5.0.0/16 next-hop 2.2.2.253;  
}  
[edit]  
user@host# show security zones  
security-zone untrust {
```

```
host-inbound-traffic {
  system-services {
    all;
  }
  protocols {
    all;
  }
}
interfaces {
  reth1.0;
  reth0.0;
}
}
security-zone oam-trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    reth2.0;
    st0.0;
  }
}
security-zone 3gpp-trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    reth3.0;
    st0.1;
  }
}
}
[edit]
user@host# show access profile radius_pico
authentication-order radius;
radius-server {
  192.168.2.22 {
    secret "$ABC123";
    routing-instance VR-OAM;
  }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group5;
```

```
authentication-algorithm sha1;
encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
  proposals IKE_PROP;
  certificate {
    local-certificate example_SRX;
  }
}
gateway OAM_GW {
  ike-policy IKE_POL;
  dynamic {
    hostname .pico_cell.net;
    ike-user-type group-ike-id;
  }
  local-identity hostname srx_series.example.net;
  external-interface reth0.0;
  aaa access-profile radius_pico;
  version v2-only;
}
gateway 3GPP_GW {
  ike-policy IKE_POL;
  dynamic {
    distinguished-name {
      wildcard OU=pico_cell;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface reth1.0;
  aaa access-profile radius_pico;
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 300;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group5;
  }
  proposals IPSEC_PROP;
}
vpn OAM_VPN {
  bind-interface st0.0;
  ike {
    gateway OAM_GW;
    proxy-identity {
      local 192.168.2.0/24;
      remote 0.0.0.0/0;
    }
  }
}
```

```

    ipsec-policy IPSEC_POL;
  }
}
vpn 3GPP_VPN {
  bind-interface st0.1;
  ike {
    gateway 3GPP_GW;
    proxy-identity {
      local 192.169.2.0/24;
      remote 0.0.0.0/0;
    }
    ipsec-policy IPSEC_POL;
  }
}
[edit]
user@host# show routing-instances
VR-OAM {
  instance-type virtual-router;
  interface reth2.0;
  interface st0.0;
}
VR-3GPP {
  instance-type virtual-router;
  interface reth3.0;
  interface st0.1;
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Intermediate Router

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 1.1.1.253/24
set interfaces ge-0/0/2 unit 0 family inet address 5.5.5.253/24
set interfaces ge-0/0/14 unit 0 family inet address 3.3.3.253/24
set interfaces ge-0/0/15 unit 0 family inet address 2.2.2.253/24
set routing-options static route 192.169.2.0/24 next-hop 2.2.2.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/14.0
set security zones security-zone trust interfaces ge-0/0/15.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0

```

```
set security zones security-zone untrust interfaces ge-0/0/2.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the intermediate router:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 1.1.1.253/24
user@host# set ge-0/0/2 unit 0 family inet address 5.5.5.253/24
user@host# set ge-0/0/14 unit 0 family inet address 3.3.3.253/24
user@host# set ge-0/0/15 unit 0 family inet address 2.2.2.253/24
```

2. Configure routing options.

```
[edit routing-options]
user@host# set static route 192.169.2.0/24 next-hop 2.2.2.1
```

3. Specify security zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic protocols all
user@host# set host-inbound-traffic system-services all
user@host# set interfaces ge-0/0/14.0
user@host# set interfaces ge-0/0/15.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces ge-0/0/2.0
```

4. Specify security policies.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
```

```
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 1.1.1.253/24;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 5.5.5.253/24;
    }
  }
}
ge-0/0/14 {
  unit 0 {
    family inet {
      address 3.3.3.253/24;
    }
  }
}
ge-0/0/15 {
  unit 0 {
    family inet {
      address 2.2.2.253/24;
    }
  }
}
[edit]
user@host# show routing-options
static {
  route 192.169.2.0/24 next-hop 2.2.2.1;
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/14.0;
    ge-0/0/15.0;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
}
```

```

protocols {
  all;
}
}
interfaces {
  ge-0/0/1.0;
  ge-0/0/2.0;
}
}
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Pico Cell (Sample Configuration)

Step-by-Step Procedure

The pico cell information in this example is provided for reference. Detailed pico cell configuration information is beyond the scope of this document. The pico cell factory configuration must include the following information:

- Local certificate (X.509v3) and IKE identity information
- Traffic Selector (TSi, TSr) values set to any/any (0.0.0.0/0)
- SRX Series IKE identity information and public IP address
- Phase 1 and Phase 2 proposals that match the SRX Series configuration

The pico cells in this example use strongSwan open source software for IPsec-based VPN connections. This information is used by the SRX Series for pico cell provisioning using the IKEv2 configuration payload feature. In networks where many devices are being deployed, the pico cell configuration can be identical except for the certificate (leftcert) and identity (leftid) information. The following sample configurations illustrate factory settings.

1. Review the Pico 1 configuration:

```

conn %default
    ikelifetime=8h
    keylife=1h
    rekeymargin=1m
    keyingtries=1
    keyexchange=ikev2
    authby=pubkey
    mobike=no

conn oam
    left=%any
    leftsourceip=%config
    leftcert=/usr/local/etc/ipsec.d/certs/<cert_name>
    leftid=pico1.pico_cell.net

```



```

leftfirewall=yes
reauth=yes
right=2.2.2.1/24
rightid=srx_series.example.net
rightsubnet=0.0.0.0/0 #peer net for proxy id
ike=aes256-sha-modp1536!
esp=aes256-sha-modp1536!
auto=add

conn 3gpp
left=%any
leftsourceip=%config
leftcert=/usr/local/etc/ipsec.d/certs/<cert_name>
leftid="C=US, ST=CA, L=Sunnyvale, O=org, OU=pico_cell, CN=pico1"
leftfirewall=yes
reauth=yes
right=3.3.3.1/24
rightid="OU=srx_series"
rightsubnet=0.0.0.0/0 #peer net for proxy id
ike=aes256-sha-modp1536!
esp=aes256-sha-modp1536!
auto=add

```

2. Review the Pico 2 configuration:

```

conn %default
    ikelifetime=8h
    keylife=1h
    rekeymargin=1m
    keyingtries=1
    keyexchange=ikev2
    authby=pubkey
    mobike=no

conn oam
left=%any
leftsourceip=%config
leftcert=/usr/local/etc/ipsec.d/certs/<cert_name>
leftid=pico2.pico_cell.net
leftfirewall=yes
#reauth=no
right=2.2.2.1/24
rightid=srx_series.example.net
rightsubnet=0.0.0.0/0 #peer net for proxy id
ike=aes256-sha-modp1536!
esp=aes256-sha-modp1536!
auto=add

conn 3gpp
left=%any
leftsourceip=%config
leftcert=/usr/local/etc/ipsec.d/certs/<cert_name>
leftid="C=US, ST=CA, L=Sunnyvale, O=org, OU=pico_cell, CN=pico2"
leftfirewall=yes
#reauth=no
right=3.3.3.1/24
rightid="OU=srx_series"
rightsubnet=0.0.0.0/0 #peer net for proxy id
ike=aes256-sha-modp1536!

```

```
esp=aes256-sha-modp1536!
auto=add
```

Configuring the RADIUS Server (Sample Configuration using a FreeRADIUS)

Step-by-Step Procedure The RADIUS server information in this example is provided for reference. Complete RADIUS server configuration information is beyond the scope of this document. The following information is returned to the SRX Series by the RADIUS server:

- Framed-IP-Address
- Framed-IP-Netmask (optional)
- Primary-DNS and Secondary-DNS (optional)

In this example, the RADIUS server has separate provisioning information for the OAM and 3GPP connections. The User-Name is taken from the client certificate information provided in the SRX Series authorization request.



NOTE: If the RADIUS server acquires client provisioning information from a DHCP server, the client identity information relayed to the DHCP server by the RADIUS server must be consistent with the client IKE identity information relayed to the RADIUS server by the SRX Series device. This ensures the continuity of the client identity across the various protocols.



NOTE: The communication channel between the SRX Series device and the RADIUS server is protected by a RADIUS shared secret.

1. Review the RADIUS configuration for the Pico 1 OAM VPN. The RADIUS server has the following information:

Sample RADIUS configuration earlier to Junos OS Releases 17.3R3, 17.4R2, 18.1R3, 18.2R2, 18.3R1, and 18.1R3-S2:

FreeRADIUS configuration example:

```
DEFAULT User-Name =~ "device@example.net", Cleartext-Password := "juniper"
Service-Type = Framed-User,
Framed-IP-Address = 12.12.1.201,
Framed-IP-Netmask = 255.255.255.255,
Primary-Dns = 192.168.2.104,
Secondary-Dns = 192.168.2.106,
```

Sample RADIUS configuration starting from Junos OS Releases 17.3R3, 17.4R2, 18.1R3, 18.2R2, 18.3R1, and 18.1R3-S2:

FreeRADIUS configuration example:

```

DEFAULT User-Name =~ "device@example.net", Auth-Type := "Accept"
Service-Type = Framed-User,
Framed-IP-Address = 12.12.1.201,
Framed-IP-Netmask = 255.255.255.255,
Primary-Dns = 192.168.2.104,
Secondary-Dns = 192.168.2.106,

```

In this case, the RADIUS server provides the default subnet mask (255.255.255.255), which blocks intrapeer traffic.

2. Review the RADIUS configuration for the Pico 1 3GPP VPN. The RADIUS server has the following information:

Sample RADIUS configuration earlier to Junos OS Release 17.3R4, 17.4R2, 18.1R3, 18.2R2, 18.3R1, and 18.1R2-S3:

FreeRADIUS configuration example:

```

DEFAULT User-Name =~ "device@example.net", Cleartext-Password := "juniper"
Service-Type = Framed-User,
Framed-IP-Address = 13.13.1.201.10,
Framed-IP-Netmask = 255.255.0.0,
Primary-Dns = 192.168.2.104,
Secondary-Dns = 192.168.2.106,

```

Sample RADIUS configuration starting from Junos OS Release 17.3R4, 17.4R2, 18.1R3, 18.2R2, 18.3R1, and 18.1R2-S3:

FreeRADIUS configuration example:

```

DEFAULT User-Name =~ "device@example.net", Auth-Type := "Accept"
Service-Type = Framed-User,
Framed-IP-Address = 13.13.1.201.10,
Framed-IP-Netmask = 255.255.0.0,
Primary-Dns = 192.168.2.104,
Secondary-Dns = 192.168.2.106,

```

In this case, the RADIUS server provides a subnet mask value (255.255.0.0), which enables intrapeer traffic.



NOTE: The clear-text password is hard-coded and is not configurable. Additionally, this example creates two tunnels from the same client certificate by using different parts of the certificate for User-Name (IKE identity) information.

Verification

Confirm that the configuration is working properly.

- [Verifying the IKE Phase 1 Status for the SRX Series on page 192](#)
- [Verifying IPsec Security Associations for the SRX Series on page 193](#)

Verifying the IKE Phase 1 Status for the SRX Series

Purpose Verify the IKE Phase 1 status.

Action From operational mode on node 0, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations detail** command.

```
user@host# show security ike security-associations
```

```
node0:
```

```
-----
Index      State Initiator cookie Responder cookie Mode Remote Address
553329718  UP    99919a471d1a5278 3be7c5a49172e6c2 IKEv2 1.1.1.1
1643848758 UP    9e31d4323195a195 4d142438106d4273 IKEv2 1.1.1.1
```

```
user@host# show security ike security-associations index 553329718 detail
```

```
node0:
```

```
-----
IKE peer 1.1.1.1, Index 553329718, Gateway Name: OAM_GW
Location: FPC 2, PIC 0, KMD-Instance 1
Role: Responder, State: UP
Initiator cookie: 99919a471d1a5278, Responder cookie: 3be7c5a49172e6c2
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 2.2.2.1:500, Remote: 1.1.1.1:500
Lifetime: Expires in 28738 seconds
Peer ike-id: C=US, ST=CA, L=Sunnyvale, O=org, OU=pico_cell, CN=pico1
aaa assigned IP: 12.12.1.201
Algorithms:
Authentication      : hmac-sha1-96
Encryption           : aes256-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes  :          2104
Output bytes :           425
Input packets:           2
Output packets:          1
IPsec security associations: 0 created, 0 deleted
Phase 2 negotiations in progress: 1
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs with pico cells devices. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

This example shows only the IKE Phase 1 SA for the OAM VPN; however, a separate IKE Phase 1 SA will be displayed showing the IKE Phase 1 parameters for the 3GPP VPN.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA: you can use the **show security ike security-associations index detail** command to get more information about the SA.
- Remote address—Verify that the local IP address is correct and that port 500 is being used for peer-to-peer communication.
- Role responder state:
 - Up—The Phase 1 SA has been established.
 - Down—There was a problem establishing the Phase 1 SA.
- Peer (remote) IKE ID—Verify the certificate information is correct.
- Local identity and remote identity—Verify these addresses are correct.
- Mode—Verify that the correct mode is being used.

Verify that the following items are correct in your configuration:

- External interfaces (the interface must be the one that sends IKE packets)
- IKE policy parameters
- Phase 1 proposal parameters (must match between peers)

The **show security ike security-associations** command lists the following additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the SRX Series

Purpose Verify the IPsec status.

Action From operational mode on node 0, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations detail** command.

```
user@host# show security ipsec security-associations
```

```
node0:
```

```
-----
Total active tunnels: 2
ID          Algorithm          SPI      Life:sec/kb Mon lsys Port Gateway
<214171651 ESP:aes-cbc-256/sha1 cc2869e2 3529/    -   root 500  1.1.1.1
>214171651 ESP:aes-cbc-256/sha1 c0a54936 3529/    -   root 500  1.1.1.1
<205520899 ESP:aes-cbc-256/sha1 84e49026 3521/    -   root 500  1.1.1.1
>205520899 ESP:aes-cbc-256/sha1 c4ed1849 3521/    -   root 500  1.1.1.1
```

```
user@host# show security ipsec security-associations detail
```

```
node0:
```

```
-----
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x604a29
Last Tunnel Down Reason: SA not initiated
  ID: 214171651 Virtual-system: root, VPN Name: 3GPP_VPN
  Local Gateway: 3.3.3.1, Remote Gateway: 1.1.1.1
  Local Identity: list(any:0,ipv4_subnet(any:0-65535,[0..7]=192.169.2.0/24),
  ipv4_subnet(any:0-65535,[0..7]=13.13.0.0/16))
  Remote Identity: ipv4(any:0,[0..3]=13.13.1.201)
  DF-bit: clear
  Bind-interface: st0.1

Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Last Tunnel Down Reason: SA not initiated
  Location: FPC 6, PIC 0, KMD-Instance 2
  Direction: inbound, SPI: cc2869e2, AUX-SPI: 0
  , VPN Monitoring: -
  Hard lifetime: Expires in 3523 seconds
  Lifesize Remaining:
  Soft lifetime: Expires in 2965 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

  Location: FPC 6, PIC 0, KMD-Instance 2
  Direction: outbound, SPI: c0a54936, AUX-SPI: 0
  , VPN Monitoring: -
  Hard lifetime: Expires in 3523 seconds
  Lifesize Remaining:
  Soft lifetime: Expires in 2965 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

ID: 205520899 Virtual-system: root, VPN Name: OAM_VPN
Local Gateway: 2.2.2.1, Remote Gateway: 1.1.1.1
Local Identity: ipv4_subnet(any:0-65535,[0..7]=192.168.2.0/24)
Remote Identity: ipv4(any:0,[0..3]=12.12.1.201)
Version: IKEv2
  DF-bit: clear
  Bind-interface: st0.0

Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
```

```

Last Tunnel Down Reason: SA not initiated
Location: FPC 2, PIC 0, KMD-Instance 1
Direction: inbound, SPI: 84e49026, AUX-SPI: 0
              , VPN Monitoring: -
Hard lifetime: Expires in 3515 seconds
Lifesize Remaining:
Soft lifetime: Expires in 2933 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

Location: FPC 2, PIC 0, KMD-Instance 1
Direction: outbound, SPI: c4ed1849, AUX-SPI: 0
              , VPN Monitoring: -
Hard lifetime: Expires in 3515 seconds
Lifesize Remaining:
Soft lifetime: Expires in 2933 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning This examples shows the active IKE Phase 2 SAs for Pico 1. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IPsec policy parameters in your configuration. For each Phase 2 SA (OAM and 3GPP), information is provided in both the inbound and outboard direction. The output from the **show security ipsec security-associations** command lists the following information:

- The remote gateway has an IP address of 1.1.1.1.
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3529/ value indicates that the Phase 2 lifetime expires in 3529 seconds, and that no lifesize has been specified, which indicates that it is unlimited. The Phase 2 lifetime can differ from the Phase 1 lifetime, because Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

The above output from the **show security ipsec security-associations index *index_id* detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a Phase 2 failure. If no IPsec SA is listed, confirm that Phase 2 proposals, including the proxy ID settings, are correct for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Authentication and encryption algorithms used.
- Phase 2 proposal parameters (must match between peers).
- Secure tunnel (st0.0 and st0.1) bindings to the OAM and 3GPP gateways.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [Understanding Certificates and PKI on page 973](#)

Configuring an IKE Policy with a Trusted CA

This example shows how to bind a trusted CA server to an IKE policy of the peer.

Before you begin, you must have a list of all the trusted CAs you want to associate with the IKE policy of the peer.

You can associate an IKE policy to a single trusted CA profile or a trusted CA group. For establishing a secure connection, the IKE gateway uses the IKE policy to limit itself to the configured group of CAs (ca-profiles) while validating the certificate. A certificate issued by any source other than the trusted CA or trusted CA group is not validated. If there is a certificate validation request coming from an IKE policy then the associated CA profile of the IKE policy will validate the certificate. If an IKE policy is not associated with any CA then by default the certificate is validated by any one of the configured CA profiles.

In this example, a CA profile named **root-ca** is created and a **root-ca-identity** is associated to the profile.



NOTE: You can configure a maximum of 20 CA profiles that you want to add to a trusted CA group. You cannot commit your configuration if you configure more than 20 CA profiles in a trusted CA group.

1. Create a CA profile and associate a CA identifier to the profile.

```
[edit]
user@host# set security pki ca-profile root-ca ca-identity root-ca
```

2. Define an IKE proposal and the IKE proposal authentication method.


```
[edit]
user@host# set security ike proposal ike_prop authentication-method rsa-signatures
```

3. Define the Diffie-Hellman group, authentication algorithm, an encryption algorithm for the IKE proposal.

```
[edit]
user@host# set security ike proposal ike_prop dh-group group2
user@host# set security ike proposal ike_prop authentication-algorithm sha-256
user@host# set security ike proposal ike_prop encryption-algorithm aes-256-cbc
```

4. Configure an IKE policy and associate the policy with the IKE proposal.

```
[edit]
user@host# set security ike policy ike_policy proposals ike_prop
```

5. Configure a local certificate identifier for the IKE policy.

```
[edit]
user@host# set security ike policy ike_policy certificate local-certificate SPOKE
```

6. Define the CA to be used for the IKE policy.

```
[edit]
user@host# set security ike policy ike_policy certificate trusted-ca ca-profile root-ca
```

To view the CA profiles and the trusted CA groups configured on your device, run **show security pki** command.

```
user@host# show security ike
  proposal ike_prop {
    authentication-method rsa-signatures;
    dh-group group2;
    authentication-algorithm sha-256;
    encryption-algorithm aes-256-cbc;
  }
  policy ike_policy {
    proposals ike_prop;
    certificate {
      local-certificate SPOKE;
      trusted-ca ca-profile root-ca;
    }
  }
```

The **show security ike** command displays the CA profile group under the IKE policy named **ike_policy** and the certificate associated with the IKE policy.

See Also • [trusted-ca \(Security IKE Policy\) on page 1258](#)

- [Understanding Certificate Authority Profiles on page 992](#)

Release History Table

Release	Description
18.1R1	Starting with Junos OS Release 18.1R1, validation of a configured IKE peer can be done with a specified CA server or group of CA servers.

Related Documentation

- [Configuring Certificate Authority Profiles on page 992](#)

Secure Tunnel Interface in a Virtual Router

A secure tunnel interface (st0) is an internal interface that is used by route-based VPNs to route cleartext traffic to an IPsec VPN tunnel.

- [Understanding Virtual Router Support for Route-Based VPNs on page 198](#)
- [Example: Configuring an st0 Interface in a Virtual Router on page 199](#)

Understanding Virtual Router Support for Route-Based VPNs

This feature includes routing-instance support for route-based VPNs. In previous releases, when an st0 interface was put in a nondefault routing instance, the VPN tunnels on this interface did not work properly. In the Junos OS 10.4 release, the support is enabled to place st0 interfaces in a routing instance, where each unit is configured in point-to-point mode or multipoint mode. Therefore, VPN traffic now works correctly in a nondefault VR. You can now configure different subunits of the st0 interface in different routing instances. The following functions are supported for nondefault routing instances:

- Manual key management
- Transit traffic
- Self-traffic
- VPN monitoring
- Hub-and-spoke VPNs
- Encapsulating Security Payload (ESP) protocol
- Authentication Header (AH) protocol
- Aggressive mode or main mode
- st0 anchored on the loopback (lo0) interface
- Maximum number of virtual routers (VRs) supported on an SRX Series device
- Applications such as Application Layer Gateway (ALG), Intrusion Detection and Prevention (IDP), and Unified Threat Management (UTM)
- Dead peer detection (DPD)
- Chassis cluster active/backup

- Open Shortest Path First (OSPF) over st0
- Routing Information Protocol (RIP) over st0
- Policy-based VPN inside VR

Understanding Virtual Router Limitations

The following features are not supported for virtual router (VR):

- Public key infrastructure (PKI) inside VR
- Chassis cluster active/active with VPN inside VR

When you configure VPN on SRX Series devices, overlapping of IP addresses across virtual routers is supported with the following limitations:

- An IKE external interface address cannot overlap with any other virtual router.
- An internal or trust interface address can overlap across any other virtual router.
- An st0 interface address cannot overlap in route-based VPN in point-to-multipoint tunnels such as NHTB.
- An st0 interface address can overlap in route-based VPN in point-to-point tunnels.

See Also • [IPsec VPN Overview on page 31](#)

Example: Configuring an st0 Interface in a Virtual Router

This example shows how to configure an st0 interface in a virtual router.

- [Requirements on page 199](#)
- [Overview on page 199](#)
- [Configuration on page 200](#)
- [Verification on page 203](#)

Requirements

Before you begin, configure the interfaces and assign the interfaces to security zones. See "[Security Zones Overview](#)".

Overview

In this example, you perform the following operations:

- Configure the interfaces.
- Configure IKE Phase 1 proposals.
- Configure IKE policies, and reference the proposals.
- Configure an IKE gateway, and reference the policy.
- Configure Phase 2 proposals.

- Configure policies, and reference the proposals.
- Configure AutoKey IKE, and reference the policy and gateway.
- Configure the security policy.
- Configure the routing instance.
- Configure the VPN bind to tunnel interface.
- Configure the routing options.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 10.1.1.2/30
set interfaces ge-0/0/1 unit 0 family inet address 10.2.2.2/30
set interfaces st0 unit 0 family inet address 10.3.3.2/30
set security ike proposal first_ikeprop authentication-method pre-shared-keys
set security ike proposal first_ikeprop dh-group group2
set security ike proposal first_ikeprop authentication-algorithm md5
set security ike proposal first_ikeprop encryption-algorithm 3des-cbc
set security ike policy first_ikepol mode main
set security ike policy first_ikepol proposals first_ikeprop
set security ike policy first_ikepol pre-shared-key ascii-text "$ABC123"
set security ike gateway first ike-policy first_ikepol
set security ike gateway first address 10.4.4.2
set security ike gateway first external-interface ge-0/0/0.0
set security ipsec proposal first_ipsecprop protocol esp
set security ipsec proposal first_ipsecprop authentication-algorithm hmac-md5-96
set security ipsec proposal first_ipsecprop encryption-algorithm 3des-cbc
set security ipsec policy first_ipsecpol perfect-forward-secrecy keys group1
set security ipsec policy first_ipsecpol proposals first_ipsecprop
set security ipsec vpn first_vpn bind-interface st0.0
set security ipsec vpn first_vpn ike gateway first
set security ipsec vpn first_vpn ike ipsec-policy first_ipsecpol
set security ipsec vpn first_vpn establish-tunnels immediately
set security policies default-policy permit-all
set routing-instances VR1 instance-type virtual-router
set routing-instances VR1 interface ge-0/0/1.0
set routing-instances VR1 interface st0.0
set routing-instances VR1 routing-options static route 10.6.6.0/24 next-hop st0.0
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure an st0 in a VR:

1. Configure the interfaces.

```
[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 10.1.1.2/30
user@host# set interfaces ge-0/0/1 unit 0 family inet address 10.2.2.2/30
user@host# set interfaces st0 unit 0 family inet address 10.3.3.2/30
```

2. Configure Phase 1 of the IPsec tunnel.

```
[edit security ike]
user@host# set proposal first_ikeprop authentication-method pre-shared-keys
user@host# set proposal first_ikeprop dh-group group2
user@host# set proposal first_ikeprop authentication-algorithm md5
user@host# set proposal first_ikeprop encryption-algorithm 3des-cbc
```

3. Configure the IKE policies, and reference the proposals.

```
[edit security ike]
user@host# set policy first_ikepol mode main
user@host# set policy first_ikepol proposals first_ikeprop
user@host# set policy first_ikepol pre-shared-key ascii-text "$ABC123"
```

4. Configure the IKE gateway, and reference the policy.

```
[edit security ike]
user@host# set gateway first_ike-policy first_ikepol
user@host# set gateway first address 10.4.4.2
user@host# set gateway first external-interface ge-0/0/0.0
```

5. Configure Phase 2 of the IPsec tunnel.

```
[edit security ipsec]
user@host# set proposal first_ipsecprop protocol esp
user@host# set proposal first_ipsecprop authentication-algorithm hmac-md5-96
user@host# set proposal first_ipsecprop encryption-algorithm 3des-cbc
```

6. Configure the policies, and reference the proposals.

```
[edit security ipsec]
user@host# set policy first_ipsecpol perfect-forward-secrecy keys group1
user@host# set policy first_ipsecpol proposals first_ipsecprop
```

7. Configure AutoKey IKE, and reference the policy and gateway.

```
[edit security ipsec]
user@host# set vpn first_vpn ike gateway first
user@host# set vpn first_vpn ike ipsec-policy first_ipsecpol
user@host# set vpn first_vpn establish-tunnels immediately
```

8. Configure the VPN bind to tunnel interface.

```
[edit security ipsec]
user@host# set vpn first_vpn bind-interface st0.0
```

9. Configure the security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

10. Configure the st0 in the routing instance.

```
[edit routing-instances]
user@host# set VR1 instance-type virtual-router
user@host# set VR1 interface ge-0/0/1.0
user@host# set VR1 interface st0.0
```

11. Configure the routing options.

```
[edit routing-instances VR1 routing-options]
user@host# set static route 10.6.6.0/24 next-hop st0.0
```

Results From configuration mode, confirm your configuration by entering the **show security** and **show routing-instances** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host# show security
ike {
  proposal first_ikeprop {
    authentication-method pre-shared-keys;
    dh-group group2;
    authentication-algorithm md5;
    encryption-algorithm 3des-cbc;
  }
  policy first_ikepol {
    mode main;
    proposals first_ikeprop;
    pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
  }
  gateway first {
    ike-policy first_ikepol;
    address 10.4.4.2;
    external-interface ge-0/0/0.0;
  }
}
ipsec {
  proposal first_ipsecprop {
    protocol esp;
    authentication-algorithm hmac-md5-96;
```

```

        encryption-algorithm 3des-cbc;
    }
    policy first_ipsecpol {
        perfect-forward-secrecy {
            keys group1;
        }
        proposals first_ipsecprop;
    }
    vpn first_vpn {
        bind-interface st0.0;
        ike {
            gateway first;
            ipsec-policy first_ipsecpol;
        }
        establish-tunnels immediately;
    }
}
policies {
    default-policy {
        permit-all;
    }
}
}
user@host# show routing-instances
VR1 {
    instance-type virtual-router;
    interface ge-0/0/1.0;
    interface st0.0;
    routing-options {
        static {
            route 10.6.6.0/24 next-hop st0.0;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform this task:

- [Verifying an st0 interface in the Virtual Router on page 203](#)

Verifying an st0 interface in the Virtual Router

Purpose Verify the st0 interface in the virtual router.

Action From operational mode, enter the **show interfaces st0.0 detail** command. The number listed for routing table corresponds to the order that the routing tables in the **show route all** command.

See Also • [Understanding Virtual Router Support for Route-Based VPNs on page 198](#)

- Related Documentation**
- [Route-Based IPsec VPNs on page 109](#)

Traffic Selectors in Route-Based VPNs

A traffic selector is an agreement between IKE peers to permit traffic through a VPN tunnel if the traffic matches a specified pair of local and remote addresses. Only the traffic that conforms to a traffic selector is permitted through the associated security association (SA).

- [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)
- [Example: Configuring Traffic Selectors in a Route-Based VPN on page 210](#)

Understanding Traffic Selectors in Route-Based VPNs

A traffic selector is an agreement between IKE peers to permit traffic through a tunnel if the traffic matches a specified pair of local and remote addresses. With this feature, you can define a traffic selector within a specific route-based VPN, which can result in multiple Phase 2 IPsec security associations (SAs). Only traffic that conforms to a traffic selector is permitted through the associated SA.

Starting with Junos OS Release 12.1X46-D10 and Junos OS Release 17.3R1, traffic selectors can be configured with IKEv1 site-to-site VPNs. Starting with Junos OS Release 15.1X49-D100, traffic selectors can be configured with IKEv2 site-to-site VPNs.

- [Traffic Selector Configuration on page 204](#)
- [Understanding Auto Route Insertion on page 205](#)
- [Understanding Traffic Selectors and Overlapping IP Addresses on page 206](#)

Traffic Selector Configuration

To configure a traffic selector, use the **traffic-selector** configuration statement at the **[edit security ipsec vpn vpn-name]** hierarchy level. The traffic selector is defined with the mandatory **local-ip ip-address/netmask** and **remote-ip ip-address/netmask** statements. The CLI operational command **show security ipsec security-association detail** displays traffic selector information for SAs. The **show security ipsec security-association traffic-selector traffic-selector-name** CLI command displays information for a specified traffic selector.

For a given traffic selector, a single address and netmask is specified for the local and remote addresses. Traffic selectors can be configured with IPv4 or IPv6 addresses. Address books cannot be used to specify local or remote addresses.

Multiple traffic selectors can be configured for the same VPN. A maximum of 200 traffic selectors can be configured for each VPN. Traffic selectors can be used with IPv4-in-IPv4, IPv4-in-IPv6, IPv6-in-IPv6, or IPv6-in-IPv4 tunnel modes.

Below features are not supported with traffic selectors:

- VPN monitoring
- Different address families configured for the local and remote IP addresses in a traffic selector
- A remote address of 0.0.0.0/0 (IPv4) or 0::0 (IPv6) for site-to-site VPNs

Starting with Junos OS Release 15.1X49-D140, on all SRX Series devices and vSRX instances, when you configure the traffic-selector with a remote address of 0::0 (IPv6), the following “**error: configuration check-out failed**” message is displayed when performing the commit and the configuration checkout fails.

- Point-to-multipoint interfaces
- Dynamic routing protocols configured on st0 interfaces

When there are multiple traffic selectors configured for a route-based VPN, clear traffic may enter a VPN tunnel without matching a traffic selector if the IKE gateway external interface is moved to another virtual router (VR). The software does not handle the multiple asynchronous interface events generated when an IKE gateway external interface is moved to another VR. As a workaround, first deactivate the IPsec VPN tunnel and commit the configuration without that tunnel before moving the IKE gateway external interface to another VR.

Understanding Auto Route Insertion

Auto route insertion (ARI) automatically inserts a static route for the remote network and hosts protected by a remote tunnel endpoint. A route is created based on the remote IP address configured in the traffic-selector. In the case of traffic selectors, the configured remote address is inserted as a route in the routing instance associated with the st0 interface that is bound to the VPN.



NOTE: Routing protocols and traffic selector configuration are mutually exclusive ways of steering traffic to a tunnel. ARI routes might conflict with routes that are populated through routing protocols. Therefore, you should not configure routing protocols on an st0 interface that is bound to a VPN on which traffic selectors are configured.

ARI is also known as reverse route insertion (RRI). ARI routes are inserted in the routing table as follows:

- If the **establish-tunnels immediately** option is configured at the [edit security ipsec vpn *vpn-name*] hierarchy level, ARI routes are added after Phase 1 and Phase 2 negotiations are complete. Because a route is not added until SAs are established, a failed negotiation does not result in traffic being routed to a st0 interface that is down. An alternate or backup tunnel is used instead.
- If the **establish-tunnels immediately** option is not configured at the [edit security ipsec vpn *vpn-name*] hierarchy level, ARI routes are added at configuration commit.

- An ARI route is not added if the configured or negotiated remote address in a traffic selector is 0.0.0.0/0 or 0::0.

The preference for the static ARI route is 5. This value is necessary to avoid conflict with similar routes that might be added by a routing protocol process. There is no configuration of the metric for the static ARI route.



NOTE: The static ARI route cannot be leaked to other routing instances using the `rib-groups` configuration. Use the `import-policy` configuration to leak static ARI routes.

Understanding Traffic Selectors and Overlapping IP Addresses

This section discusses overlapping IP addresses in traffic selector configurations.

- [Overlapping IP Addresses in Different VPNs Bound to the Same st0 Interface on page 206](#)
- [Overlapping IP Addresses in the Same VPN Bound to the Same st0 Interface on page 206](#)
- [Overlapping IP Addresses in Different VPNs Bound to Different st0 Interfaces on page 207](#)

Overlapping IP Addresses in Different VPNs Bound to the Same st0 Interface

This scenario is not supported with traffic selectors. Traffic selectors cannot be configured on different VPNs that are bound to the same point-to-multipoint st0 interface, as shown in the following example:

```
[edit]
user@host# show security ipsec
vpn vpn-1 {
    bind-interface st0.1;
}
vpn vpn-2 {
    bind-interface st0.1;
}
```

Overlapping IP Addresses in the Same VPN Bound to the Same st0 Interface

When overlapping IP addresses are configured for multiple traffic selectors in the same VPN, the first configured traffic selector that matches the packet determines the tunnel used for packet encryption.

In the following example, four traffic selectors (ts-1, ts-2, ts-3, and ts-4) are configured for the VPN (vpn-1), which is bound to the point-to-point st0.1 interface:

```
[edit]
user@host# show security ipsec vpn vpn-1
vpn vpn-1 {
    bind-interface st0.1;
    traffic-selector ts-1 {
        local-ip 192.168.5.0/24;
        remote-ip 10.1.5.0/24;
    }
}
```

```

traffic-selector ts-2 {
    local-ip 192.168.0.0/16;
    remote-ip 10.1.0.0/16;
}
traffic-selector ts-3 {
    local-ip 172.16.0.0/16;
    remote-ip 10.2.0.0/16;
}
traffic-selector ts-4 {
    local-ip 172.16.5.0/24;
    remote-ip 10.2.5.0/24;
}
}

```

A packet with a source address 192.168.5.5 and a destination address 10.1.5.10 matches traffic selectors ts-1 and ts-2. However, traffic selector ts-1 is the first configured match and the tunnel associated with ts-1 is used for packet encryption.

A packet with a source address 172.16.5.5 and a destination address 10.2.5.10 matches the traffic selectors ts-3 and ts-4. However, traffic selector ts-3 is the first configured match and the tunnel associated with traffic selector ts-3 is used for packet encryption.

Overlapping IP Addresses in Different VPNs Bound to Different st0 Interfaces

When overlapping IP addresses are configured for multiple traffic selectors in different VPNs that are bound to different point-to-point st0 interfaces, an st0 interface is first selected by the longest prefix match for a given packet. Within the VPN that is bound to the selected st0 interface, the traffic selector is then selected based on the first configured match for the packet.

In the following example, a traffic selector is configured in each of two VPNs. The traffic selectors are configured with the same local subnetwork but different remote subnetworks.

```

[edit]
user@host# show security ipsec
vpn vpn-1 {
    bind-interface st0.1;
    traffic-selector ts-1 {
        local-ip 192.168.1.0/24;
        remote-ip 10.1.1.0/24;
    }
}
vpn vpn-2 {
    bind-interface st0.2;
    traffic-selector ts-2 {
        local-ip 192.168.1.0/24;
        remote-ip 10.2.2.0/24;
    }
}

```

Different remote subnetworks are configured in each traffic selector, therefore two different routes are added to the routing table. Route lookup uses the st0 interface bound to the appropriate VPN.

In the following example, a traffic selector is configured in each of two VPNs. The traffic selectors are configured with different remote subnetworks. The same local subnetwork is configured for each traffic selector, but different netmask values are specified.

```
[edit]
user@host# show security ipsec
vpn vpn-1 {
  bind-interface st0.1;
  traffic-selector ts-1 {
    local-ip 192.168.0.0/8;
    remote-ip 10.1.1.0/24;
  }
}
vpn vpn-2 {
  bind-interface st0.2;
  traffic-selector ts-2 {
    local-ip 192.168.0.0/16;
    remote-ip 10.2.2.0/24;
  }
}
```

A different remote subnetwork is configured in each traffic selector, therefore two different routes are added to the routing table. Route lookup uses the st0 interface bound to the appropriate VPN.

In the following example, traffic selectors are configured in each of two VPNs. The traffic selectors are configured with different local and remote subnetworks.

```
[edit]
user@host# show security ipsec
vpn vpn-1 {
  bind-interface st0.1;
  traffic-selector ts-1 {
    local-ip 192.168.1.0/24;
    remote-ip 10.1.1.0/24;
  }
}
vpn vpn-2 {
  bind-interface st0.2;
  traffic-selector ts-2 {
    local-ip 172.16.1.0/24;
    remote-ip 10.2.2.0/24;
  }
}
```

In this case, the traffic selectors do not overlap. The remote subnetworks configured in the traffic selectors are different, therefore two different routes are added to the routing table. Route lookup uses the st0 interface bound to the appropriate VPN.

In the following example, a traffic selector is configured in each of two VPNs. The traffic selectors are configured with the same local subnetwork. The same remote subnetwork is configured for each traffic selector, but different netmask values are specified.

```
[edit]
user@host# show security ipsec
vpn vpn-1 {
  bind-interface st0.1;
  traffic-selector ts-1 {
    local-ip 192.168.1.0/24;
    remote-ip 10.1.1.0/24;
  }
}
vpn vpn-2 {
  bind-interface st0.2;
  traffic-selector ts-2 {
    local-ip 192.168.1.0/24;
    remote-ip 10.1.0.0/16;
  }
}
```

Note that the **remote-ip** configured for ts-1 is 10.1.1.0/24 while the **remote-ip** configured for ts-2 is 10.1.0.0/16. For a packet destined to 10.1.1.1, route lookup selects the st0.1 interface as it has the longer prefix match. The packet is encrypted based on the tunnel corresponding to the st0.1 interface.

In some cases, valid packets can be dropped due to traffic selector traffic enforcement. In the following example, traffic selectors are configured in each of two VPNs. The traffic selectors are configured with different local subnetworks. The same remote subnetwork is configured for each traffic selector, but different netmask values are specified.

```
[edit]
user@host# show security ipsec
vpn vpn-1 {
  bind-interface st0.1;
  traffic-selector ts-1 {
    local-ip 192.168.1.0/24;
    remote-ip 10.1.1.0/24;
  }
}
vpn vpn-2 {
  bind-interface st0.2;
  traffic-selector ts-2 {
    local-ip 172.16.1.0/16;
    remote-ip 10.1.0.0/16;
  }
}
```

Two routes to 10.1.1.0 (10.1.1.0/24 via interface st0.1 and 10.1.0.0/16 via interface st0.2) are added to the routing table. A packet sent from source 172.16.1.1 to destination 10.1.1.1 matches the routing table entry for 10.1.1.0/24 via interface st0.1. However, the packet does not match the traffic specified by traffic selector ts-1 and is dropped.



NOTE: If multiple traffic selectors are configured with the same remote subnetwork and netmask, equal cost routes are added to the routing table. This case is not supported with traffic selectors as the route chosen cannot be predicted.

See Also • [Understanding VPN Tunnel Modes on page 649](#)

Example: Configuring Traffic Selectors in a Route-Based VPN

This example shows how to configure traffic selectors for a route-based VPN.

- [Requirements on page 210](#)
- [Overview on page 210](#)
- [Configuration on page 211](#)
- [Verification on page 222](#)

Requirements

Before you begin, read “[Understanding Traffic Selectors in Route-Based VPNs](#)” on page 204.

Overview

This example configures traffic selectors to allow traffic to flow between subnetworks on SRX_A and subnetworks on SRX_B.

[Table 26 on page 210](#) shows the traffic selectors for this example. Traffic selectors are configured under Phase 2 options.

Table 26: Traffic Selector Configurations

SRX_A			SRX_B		
Traffic Selector Name	Local IP	Remote IP	Traffic Selector Name	Local IP	Remote IP
TS1-ipv6	2001:db8:10::0/64	2001:db8:20::0/64	TS1-ipv6	2001:db8:20::0/64	2001:db8:10::0/64
TS2-ipv4	192.168.10.0/24	192.168.0.0/16	TS2-ipv4	192.168.0.0/16	192.168.10.0/24

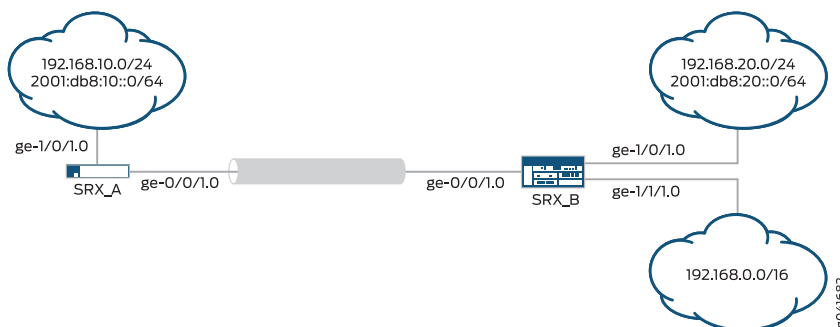


NOTE: Flow-based processing of IPv6 traffic must be enabled with the mode **flow-based** configuration option at the [edit security forwarding-options family inet6] hierarchy level.

Topology

In Figure 17 on page 211, an IPv6 VPN tunnel carries both IPv4 and IPv6 traffic between the SRX_A and SRX_B devices. That is, the tunnel operates in both IPv4-in-IPv6 and IPv6-in-IPv6 tunnel modes.

Figure 17: Traffic Selector Configuration Example



Configuration

- [Configuring SRX_A on page 211](#)
- [Configuring SRX_B on page 217](#)

Configuring SRX_A

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:2000::1/64
set interfaces st0 unit 1 family inet
set interfaces st0 unit 1 family inet6
set interfaces ge-1/0/1 unit 0 family inet address 192.168.10.1/24
set interfaces ge-1/0/1 unit 0 family inet6 address 2001:db8:10::0/64
set security ike proposal PSK-DH14-AES256-SHA256 authentication- method
pre-shared-keys
set security ike proposal PSK-DH14-AES256-SHA256 dh-group group14
set security ike proposal PSK-DH14-AES256-SHA256 authentication- algorithm sha-256
set security ike proposal PSK-DH14-AES256-SHA256 encryption- algorithm aes-256-cbc
set security ike policy site-2-site mode main
set security ike policy site-2-site proposals PSK-DH14-AES256-SHA256
set security ike policy site-2-site pre-shared-key ascii-text "$ABC123"
set security ike gateway SRX_A-to-SRX_B ike-policy site-2-site
set security ike gateway SRX_A-to-SRX_B address 192.168.20.2
set security ike gateway SRX_A-to-SRX_B external-interface ge-0/0/1.0
set security ike gateway SRX_A-to-SRX_B local-address 192.168.10.1
set security ipsec proposal ESP-AES256-SHA256 protocol esp
set security ipsec proposal ESP-AES256-SHA256 authentication- algorithm
hmac-sha-256-128
set security ipsec proposal ESP-AES256-SHA256 encryption- algorithm aes-256-cbc
```

```

set security ipsec policy site-2-site perfect-forward-secrecy keys group14
set security ipsec policy site-2-site proposals ESP-AES256-SHA256
set security ipsec vpn SRX_A-to-SRX_B bind-interface st0.1
set security ipsec vpn SRX_A-to-SRX_B ike ipsec-policy site-2-site
set security ipsec vpn SRX_A-to-SRX_B ike gateway SRX_A-to-SRX_B
set security ipsec vpn SRX_A-to-SRX_B traffic-selector TS1- ipv6 local-ip
    2001:db8:10::0/64 remote-ip 2001:db8:20::0/64
set security ipsec vpn SRX_A-to-SRX_B traffic-selector TS2- ipv4 local-ip 192.168.10.0/24
    remote-ip 192.168.0.0/16
set security forwarding-options family inet6 mode flow-based
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-1/0/1.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone VPN interfaces st0.1
set security policies from-zone VPN to-zone trust policy 1 match source-address any
set security policies from-zone VPN to-zone trust policy 1 match destination-address any
set security policies from-zone VPN to-zone trust policy 1 match application any
set security policies from-zone VPN to-zone trust policy 1 then permit
set security policies from-zone trust to-zone VPN policy 1 match source-address any
set security policies from-zone trust to-zone VPN policy 1 match destination-address any
set security policies from-zone trust to-zone VPN policy 1 match application any
set security policies from-zone trust to-zone VPN policy 1 then permit
set security policies default-policy deny -all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure traffic selectors:

1. Configure the external interface.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:2000::1/64

```

2. Configure the secure tunnel interface.

```

[edit interfaces]
user@host# set st0 unit 1 family inet
user@host# set st0 unit 1 family inet6

```

3. Configure the internal interface.

```

[edit interfaces]
user@host# set ge-1/0/1 unit 0 family inet address 192.168.10.1/24
user@host# set ge-1/0/1 unit 0 family inet6 address 2001:db8:10::0/64

```

4. Configure Phase 1 options.


```
[edit security ike proposal PSK-DH14-AES256-SHA256]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security ike policy site-2-site]
user@host# set mode main
user@host# set proposals PSK-DH14-AES256-SHA256
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security ike gateway SRX_A-to-SRX_B]
user@host# set ike-policy site-2-site
user@host# set address 192.168.20.2
user@host# set external-interface ge-0/0/1.0
user@host# set local-address 192.168.10.1
```

5. Configure Phase 2 options.

```
[edit security ipsec proposal ESP-AES256-SHA256]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security ipsec policy site-2-site]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ESP-AES256-SHA256
```

```
[edit security ipsec vpn SRX_A-to-SRX_B]
user@host# set bind-interface st0.1
user@host# set ike gateway SRX_A-to-SRX_B
user@host# set ike ipsec-policy site-2-site
user@host# set traffic-selector TS1-ipv6 local-ip 2001:db8:10::0/64 remote-ip
2001:db8:20::0/64
user@host# set traffic-selector TS2-ipv4 local-ip 192.168.10.0/24 remote-ip
192.168.0.0/16
```

6. Enable IPv6 flow-based forwarding.

```
[edit security forwarding-options]
user@host# set family inet6 mode flow-based
```

7. Configure security zones and the security policy.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-1/0/1.0
```

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
user@host# set interfaces ge-0/0/1.0

[edit security zones security-zone VPN]
user@host# set interfaces st0.1

[edit security policies from-zone VPN to-zone trust ]
user@host# set policy 1 match source-address any
user@host# set policy 1 match destination-address any
user@host# set policy 1 match application any
user@host# set policy 1 then permit
[edit security policies from-zone trust to-zone VPN ]
user@host# set policy 1 match source-address any
user@host# set policy 1 match destination-address any
user@host# set policy 1 match application any
user@host# set policy 1 then permit
[edit security policies]
user@host# set default-policy deny-all

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show security forwarding-options**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:2000::1/64;
    }
  }
}
ge-1/0/1 {
  unit 0 {
    family inet {
      address 192.168.10.1/24;
    }
    family inet6 {
      address 10::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet;
    family inet6;
  }
}
[edit]

```

```

user@host# show security ike
proposal PSK-DH14-AES256-SHA256 {
  authentication-method pre-shared-keys;
  dh-group group14;
  authentication-algorithm sha-256;
  encryption-algorithm aes-256-cbc;
}
policy site-2-site {
  mode main;
  proposals PSK-DH14-AES256-SHA256;
  pre-shared-key ascii-text
"$ABC123"; ## SECRET-DATA
}
gateway SRX_A-to-SRX_B {
  ike-policy site-2-site;
  address 192.168.20.2;
  external-interface ge-0/0/1.0;
  local-address 192.168.10.1;
}
[edit]
user@host# show security ipsec
proposal ESP-AES256-SHA256 {
  protocol esp;
  authentication-algorithm hmac-sha-256-128;
  encryption-algorithm aes-256-cbc;
}
policy site-2-site {
  perfect-forward-secrecy keys group14;
  proposals ESP-AES256-SHA256;
}
vpn SRX_A-to-SRX_B {
  bind-interface st0.1;
  ike {
    ipsec-policy site-2-site;
    gateway SRX_A-to-SRX_B;
  }
  traffic-selector TS1-ipv6 {
    local-ip 2001:db8:10::0/64;
    remote-ip 2001:db8:20::0/64;
  }
  traffic-selector TS2-ipv4 {
    local-ip 192.168.10.0/24;
    remote-ip 192.168.0.0/16;
  }
}
[edit]
user@host# show security forwarding-options
family {
  inet6 {
    mode flow-based;
  }
}
[edit]
user@host# show security zones
security-zone trust {

```

```
host-inbound-traffic {
  system-services {
    all;
  }
  protocols {
    all;
  }
}
interfaces {
  ge-1/0/1.0;
}
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      ike;
    }
  }
  interfaces {
    ge-0/0/1.0;
  }
}
security-zone VPN {
  interfaces {
    st0.1;
  }
}
[edit]
user@host# show security policies
from-zone VPN to-zone trust {
  policy 1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone trust to-zone VPN {
  policy 1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
    }
  }
}
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring SRX_B

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:2000::2/64
set interfaces st0 unit 1 family inet
set interfaces st0 unit 1 family inet6
set interfaces ge-1/0/1 unit 0 family inet address 192.168.20.1/24
set interfaces ge-1/0/1 unit 0 family inet6 address 2001:db8:20::0/64
set interfaces ge-1/1/1 unit 0 family inet address 192.168.0.1/24
set security ike proposal PSK-DH14-AES256-SHA256 authentication-method
pre-shared-keys
set security ike proposal PSK-DH14-AES256-SHA256 dh-group group14
set security ike proposal PSK-DH14-AES256-SHA256 authentication-algorithm sha-256
set security ike proposal PSK-DH14-AES256-SHA256 encryption-algorithm aes-256-cbc
set security ike policy site-2-site mode main
set security ike policy site-2-site proposals PSK-DH14-AES256-SHA256
set security ike policy site-2-site pre-shared-key ascii-text "$ABC123"
set security ike gateway SRX_B-to-SRX_A ike-policy site-2-site
set security ike gateway SRX_B-to-SRX_A address 192.168.10.1
set security ike gateway SRX_B-to-SRX_A external-interface ge-0/0/1.0
set security ike gateway SRX_B-to-SRX_A local-address 192.168.20.2
set security ipsec proposal ESP-AES256-SHA256 protocol esp
set security ipsec proposal ESP-AES256-SHA256 authentication-algorithm
hmac-sha-256-128
set security ipsec proposal ESP-AES256-SHA256 encryption-algorithm aes-256-cbc
set security ipsec policy site-2-site perfect-forward-secrecy keys group14
set security ipsec policy site-2-site proposals ESP-AES256-SHA256
set security ipsec vpn SRX_B-to-SRX-A bind-interface st0.1
set security ipsec vpn SRX_B-to-SRX-A ike ipsec-policy site-2-site
set security ipsec vpn SRX_B-to-SRX-A ike gateway SRX_B-to-SRX_A
set security ipsec vpn SRX_B-to-SRX-A traffic-selector TS1-ipv6 local-ip
2001:db8:20::0/64 remote-ip 2001:db8:10::0/64
set security ipsec vpn SRX_B-to-SRX-A traffic-selector TS2-ipv4 local-ip 192.168.0.0/16
remote-ip 192.168.10.0/24
set security forwarding-options family inet6 mode flow-based
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-1/0/1.0
set security zones security-zone trust interfaces ge-1/1/1.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone VPN interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set security policies from-zone VPN to-zone trust policy 1 match source-address any
set security policies from-zone VPN to-zone trust policy 1 match destination-address any
set security policies from-zone VPN to-zone trust policy 1 match application any
set security policies from-zone VPN to-zone trust policy 1 then permit
set security policies from-zone trust to-zone VPN policy 1 match source-address any
set security policies from-zone trust to-zone VPN policy 1 match destination-address any
set security policies from-zone trust to-zone VPN policy 1 match application any
set security policies from-zone trust to-zone VPN policy 1 then permit

```

```
set security policies default-policy deny -all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure traffic selectors:

1. Configure the external interface.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:2000::2/64
```

2. Configure the secure tunnel interface.

```
[edit interfaces]
user@host# set st0 unit 1 family inet
user@host# set st0 unit 1 family inet6
```

3. Configure the internal interfaces.

```
[edit interfaces]
user@host# set ge-1/0/1 unit 0 family inet address 192.168.20.1/24
user@host# set ge-1/0/1 unit 0 family inet6 address 2001:db8:20::0/64
user@host# set ge-1/1/1 unit 0 family inet address 192.168.0.1/24
```

4. Configure Phase 1 options.

```
[edit security ike proposal PSK-DH14-AES256-SHA256]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security ike policy site-2-site]
user@host# set mode main
user@host# set proposals PSK-DH14-AES256-SHA256
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security ike gateway SRX_B-to-SRX_A]
user@host# set ike-policy site-2-site
user@host# set address 192.168.10.1
user@host# set external-interface ge-0/0/1.0
user@host# set local-address 192.168.20.2
```

5. Configure Phase 2 options.

```
[edit security ipsec proposal ESP-AES256-SHA256]
```

```

user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy site-2-site]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ESP-AES256-SHA256

[edit security ipsec vpn SRX_B-to-SRX-A]
user@host# set bind-interface st0.1
user@host# set ike gateway SRX_B-to-SRX_A
user@host# set ike ipsec-policy site-2-site
user@host# set traffic-selector TS1-ipv6 local-ip 2001:db8:20::0/64 remote-ip
2001:db8:10::0/64
user@host# set traffic-selector TS2-ipv4 local-ip 192.168.0.0/16 remote-ip
192.168.10.0/24

```

6. Enable IPv6 flow-based forwarding.

```

[edit security forwarding-options]
user@host# set family inet6 mode flow-based

```

7. Configure security zones and the security policy.

```

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-1/0/1.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
user@host# set interfaces ge-0/0/1.0

[edit security zones security-zone VPN]
user@host# set interfaces st0.1

[edit security policies from-zone VPN to-zone trust ]
user@host# set policy 1 match source-address any
user@host# set policy 1 match destination-address any
user@host# set policy 1 match application any
user@host# set policy 1 then permit
[edit security policies from-zone trust to-zone VPN ]
user@host# set policy 1 match source-address any
user@host# set policy 1 match destination-address any
user@host# set policy 1 match application any
user@host# set policy 1 then permit
[edit security policies]
user@host# set default-policy deny-all

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show security forwarding-options**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:2000::2/64;
    }
  }
}
ge-1/0/1 {
  unit 0 {
    family inet {
      address 192.168.20.1/24;
    }
    family inet6 {
      address 2001:db8:20::0/64;
    }
  }
}
ge-1/1/1 {
  unit 0 {
    family inet {
      address 192.168.0.1/24;
    }
  }
}
st0 {
  unit 1 {
    family inet;
    family inet6;
  }
}
[edit]
user@host# show security ike
proposal PSK-DH14-AES256-SHA256 {
  authentication-method pre-shared-keys;
  dh-group group14;
  authentication-algorithm sha-256;
  encryption-algorithm aes-256-cbc;
}
policy site-2-site {
  mode main;
  proposals PSK-DH14-AES256-SHA256;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway SRX_B-to-SRX_A {
  ike-policy site-2-site;
  address 192.168.10.1;
  external-interface ge-0/0/1.0;
```



```

    local-address 192.168.20.2;
}
[edit]
user@host# show security ipsec
proposal ESP-AES256-SHA256 {
    protocol esp;
    authentication-algorithm hmac-sha-256-128;
    encryption-algorithm aes-256-cbc;
}
policy site-2-site {
    perfect-forward-secrecy keys group14;
    proposals ESP-AES256-SHA256;
}
vpn SRX_B-to-SRX-A {
    bind-interface st0.1;
    ike {
        ipsec-policy site-2-site;
        gateway SRX_B-to-SRX_A;
    }
    traffic-selector TS1-ipv6 {
        local-ip 2001:db8:20::0/64;
        remote-ip 2001:db8:10::0/64;
    }
    traffic-selector TS2-ipv4 {
        local-ip 192.168.0.0/16;
        remote-ip 192.168.10.0/24;
    }
}
[edit]
user@host# show security forwarding-options
family {
    inet6 {
        mode flow-based;
    }
}
[edit]
user@host# show security zones
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-1/0/1.0;
        ge-1/1/1.0;
    }
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            ike;
        }
    }
}

```

```

    }
  }
  interfaces {
    ge-0/0/1.0;
  }
}
security-zone VPN {
  interfaces {
    st0.1;
  }
}
[edit]
user@host# show security policies
from-zone VPN to-zone trust {
  policy 1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone trust to-zone VPN {
  policy 1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.



NOTE: The sample outputs shown are on SRX-A.

- [Verifying IPsec Phase 2 Status on page 223](#)
- [Verifying Traffic Selectors on page 224](#)
- [Verifying Routes on page 224](#)

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 3
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<268173313 ESP:3des/ sha-256 3d75aeff 2984/ unlim - root 500  2001:db8:2000::2

>268173313 ESP:3des/ sha-256 a468fece 2984/ unlim - root 500  2001:db8:2000::2

<268173316 ESP:3des/ sha-256 417f3cea 3594/ unlim - root 500  2001:db8:2000::2

>268173316 ESP:3des/ sha-256 a4344027 3594/ unlim - root 500  2001:db8:2000::2
```

From operational mode, enter the **show security ipsec security-associations detail** command.

```
user@host> show security ipsec security-associations detail
```

```
ID: 268173313 Virtual-system: root, VPN Name: SRX_A-to-SRX_B
Local Gateway: 192.168.10.1, Remote Gateway: 2192.168.20.2
Traffic Selector Name: TS1-ipv6
Local Identity: ipv6(2001:db8:10::-2001:db8:10::ffff:ffff:ffff:ffff)
Remote Identity: ipv6(2001:db8:20::-2001:db8:20::ffff:ffff:ffff:ffff)
Version: IKEv1
  DF-bit: clear
  Bind-interface: st0.1

Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: c608b29
Tunnel Down Reason: SA not initiated
  Direction: inbound, SPI: 3d75aeff, AUX-SPI: 0
                    , VPN Monitoring: -
  Hard lifetime: Expires in 2976 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2354 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha-256-128, Encryption: aes-256-cbc
  Anti-replay service: counter-based enabled, Replay window size: 64

  Direction: outbound, SPI: a468fece, AUX-SPI: 0
                    , VPN Monitoring: -
  Hard lifetime: Expires in 2976 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2354 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha-256-128, Encryption: aes-256-cbc
  Anti-replay service: counter-based enabled, Replay window size: 64

ID: 268173316 Virtual-system: root, VPN Name: SRX_A-to-SRX_B
Local Gateway: 192.168.10.1, Remote Gateway: 192.168.20.2
Traffic Selector Name: TS2-ipv4
Local Identity: ipv4(192.168.10.0-192.168.10.255)
Remote Identity: ipv4(192.168.20.0-192.168.20.255)
```

```

Version: IKEv1
DF-bit: clear
Bind-interface: st0.1

Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: c608b29
Tunnel Down Reason: SA not initiated
Direction: inbound, SPI: 417f3cea, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3586 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2948 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256-128, Encryption: aes-256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: a4344027, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3586 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2948 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256-128, Encryption: aes-256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the peer devices.

Verifying Traffic Selectors

Purpose Verify negotiated traffic selectors on the secure tunnel interface.

Action From operational mode, enter the **show security ipsec traffic-selector st0.1** command.

```
user@host> show security ipsec traffic-selector st0.1
```

Source IP	Interface	Destination IP	Tunnel-id	IKE-ID
2001:db8:10::-2001:db8:10::ffff:ffff:ffff:ffff				
2001:db8:20::-2001:db8:20::ffff:ffff:ffff:ffff			st0.1	268173313
2001:db8:2000::1				
192.168.10.0-192.168.10.255			192.168.0.0-192.168.255.255	
	st0.1		268173316	2001:db8:2000::1
192.168.10.0-192.168.10.255			192.168.20.0-192.168.20.255	
	st0.1		268173317	2001:db8:2000::1

Verifying Routes

Purpose Verify active routes

Action From operational mode, enter the **show route** command.

```
user@host> show route

inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.0.0/16      *[Static/5] 00:00:32
                   > via st0.1
2001:db8:20::0/64  *[Static/5] 00:00:34
                   > via st0.1
```

Meaning The **show route** command lists active entries in the routing tables. Routes to the remote IP address configured in each traffic selector should be present with the correct st0 interface.

See Also • [Understanding VPN Tunnel Modes on page 649](#)

Release History Table

Release	Description
15.1X49-D140	Starting with Junos OS Release 15.1X49-D140, on all SRX Series devices and vSRX instances, when you configure the traffic-selector with a remote address of 0::0 (IPv6), the following “error: configuration check-out failed” message is displayed when performing the commit and the configuration checkout fails.
15.1X49-D100	Starting with Junos OS Release 15.1X49-D100, traffic selectors can be configured with IKEv2 site-to-site VPNs.
12.1X46-D10	Starting with Junos OS Release 12.1X46-D10 and Junos OS Release 17.3R1, traffic selectors can be configured with IKEv1 site-to-site VPNs.

Related Documentation • [Route-Based IPsec VPNs on page 109](#)

AutoVPN on Hub-and-Spoke Devices

AutoVPN supports an IPsec VPN aggregator (known as a hub) that serves as a single termination point for multiple tunnels to remote sites (known as spokes). AutoVPN allows network administrators to configure a hub for current and future spokes.

- [Understanding AutoVPN on page 226](#)
- [Understanding Spoke Authentication in AutoVPN Deployments on page 229](#)
- [AutoVPN Configuration Overview on page 231](#)
- [Example: Configuring Basic AutoVPN with iBGP on page 232](#)
- [Example: Configuring Basic AutoVPN with iBGP for IPv6 Traffic on page 259](#)

- [Example: Configuring AutoVPN with iBGP and ECMP on page 290](#)
- [Example: Configuring AutoVPN with iBGP and Active-Backup Tunnels on page 317](#)
- [Example: Configuring Basic AutoVPN with OSPF on page 346](#)
- [Example: Configuring AutoVPN with OSPFv3 for IPv6 Traffic on page 372](#)
- [Example: Forwarding Traffic Through an AutoVPN Tunnel with Traffic Selectors on page 400](#)
- [Example: Ensuring VPN Tunnel Availability with AutoVPN and Traffic Selectors on page 417](#)

Understanding AutoVPN

AutoVPN supports an IPsec VPN aggregator (known as a *hub*) that serves as a single termination point for multiple tunnels to remote sites (known as *spokes*). AutoVPN allows network administrators to configure a hub for current and future spokes. No configuration changes are required on the hub when spoke devices are added or deleted, thus allowing administrators flexibility in managing large-scale network deployments.

- [Secure Tunnel Modes on page 226](#)
- [Authentication on page 227](#)
- [Configuration and Management on page 227](#)
- [Understanding AutoVPN Limitations on page 227](#)
- [Understanding AutoVPN with Traffic Selectors on page 227](#)

Secure Tunnel Modes

AutoVPN is supported on route-based IPsec VPNs. For route-based VPNs, you configure a secure tunnel (st0) interface and bind it to an IPsec VPN tunnel. st0 interfaces in AutoVPN networks can be configured in one of two modes:

- **Point-to-point mode**—By default, an st0 interface configured at the `[edit interfaces st0 unit x]` hierarchy level is in point-to-point mode. Starting with Junos OS Release 17.4R1, IPv6 address is supported on AutoVPN.
- **Point-to-multipoint mode**—In this mode, the **multipoint** option is configured at the `[edit interfaces st0 unit x]` hierarchy level on both AutoVPN hub and spokes. st0 interfaces on the hub and spokes must be numbered and the IP address configured on a spoke must exist in the hub's st0 interface subnetwork.

[Table 27 on page 226](#) compares AutoVPN point-to-point and point-to-multipoint secure tunnel interface modes.

Table 27: Comparison Between AutoVPN Point-to-Point and Point-to-Multipoint Secure Tunnel Modes

Point-to-Point Mode	Point-to-Multipoint Mode
Supports IKEv1 or IKEv2.	Supports IKEv1 or IKEv2.
Supports IPv4 and IPv6 traffic.	Supports IPv4 or IPv6.

Table 27: Comparison Between AutoVPN Point-to-Point and Point-to-Multipoint Secure Tunnel Modes (continued)

Point-to-Point Mode	Point-to-Multipoint Mode
Traffic selectors	Dynamic routing protocols (OSPF, OSPFv3 and iBGP)
Dead peer detection	Dead peer detection
Allows spoke devices to be SRX Series or third-party devices.	This mode is only supported with SRX Series devices.

Authentication

The supported authentication for AutoVPN hubs and spokes is X.509 public key infrastructure (PKI) certificates. The group IKE user type configured on the hub allows strings to be specified to match the alternate subject field in spoke certificates. Partial matches for the subject fields in spoke certificates can also be specified. See [“Understanding Spoke Authentication in AutoVPN Deployments” on page 229](#).

Configuration and Management

AutoVPN is configured and managed on SRX Series devices using the CLI. Multiple AutoVPN hubs can be configured on a single SRX Series device. The maximum number of spokes supported by a configured hub is specific to the model of the SRX Series device.

Understanding AutoVPN Limitations

The following features are not supported for AutoVPN:

- Policy-based VPNs are not supported.
- The RIP dynamic routing protocol is not supported with AutoVPN tunnels.
- Manual keys and Autokey IKE with preshared keys are not supported.
- Configuring static next-hop tunnel binding (NHTB) on the hub for spokes is not supported.
- Multicast is not supported.
- The group IKE ID user type is not supported with an IP address as the IKE ID.
- When the group IKE ID user type is used, the IKE ID should not overlap with other IKE gateways configured on the same external interface.

Understanding AutoVPN with Traffic Selectors

AutoVPN hubs can be configured with multiple traffic selectors to protect traffic to spokes. This feature provides the following benefits:

- A single VPN configuration can support many different peers.
- VPN peers can be non-SRX Series devices.

- A single peer can establish multiple tunnels with the same VPN.
- A larger number of tunnels can be supported than with AutoVPN with dynamic routing protocols.

Starting with Junos OS Release 17.4R1, AutoVPN networks that use secure tunnel interfaces in point-to-point mode support IPv6 addresses for traffic selectors and for IKE peers.

When the hub-to-spoke tunnel is established, the hub uses auto route insertion (ARI), known in previous releases as *reverse route insertion (RRI)*, to insert the route to the spoke prefix in its routing table. The ARI route can then be imported to routing protocols and distributed to the core network.

AutoVPN with traffic selectors can be configured with the secure tunnel (st0) interface in point-to-point mode for both IKEv1 and IKEv2.



NOTE: Dynamic routing protocols are not supported on st0 interfaces when traffic selectors are configured.

Note the following caveats when configuring AutoVPN with traffic selectors:

- Dynamic routing protocols are not supported with traffic selectors with st0 interfaces in point-to-point mode.
- Auto Discovery VPN and IKEv2 configuration payload cannot be configured with AutoVPN with traffic selectors.
- Spokes can be non-SRX Series devices; however, note the following differences:
 - In IKEv2, a non-SRX Series spoke can propose multiple traffic selectors in a single SA negotiation. This is not supported on SRX Series devices and the negotiation is rejected.
 - A non-SRX Series spoke can identify specific ports or protocols for traffic selector use. Ports and protocols are not supported with traffic selectors on SRX Series devices and the negotiation is rejected.

- See Also**
- [Understanding Spoke Authentication in AutoVPN Deployments on page 229](#)
 - [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)
 - [Example: Configuring Traffic Selectors in a Route-Based VPN on page 210](#)

Understanding Spoke Authentication in AutoVPN Deployments

In AutoVPN deployments, the hub and spoke devices must have valid X.509 PKI certificates loaded. You can use the **show security pki local-certificate detail** command to display information about the certificates loaded in a device.

This topic covers the configuration on the hub that allows spokes to authenticate and connect to the hub:

- [Group IKE ID Configuration on the Hub on page 229](#)
- [Excluding a Spoke Connection on page 231](#)

Group IKE ID Configuration on the Hub

The group IKE ID feature allows a number of spoke devices to share an IKE configuration on the hub. The certificate holder's identification, in the subject or alternate subject fields in each spoke's X.509 certificate, must contain a part that is common to all spokes; the common part of the certificate identification is specified for the IKE configuration on the hub.

For example, the IKE ID **example.net** can be configured on the hub to identify spokes with the hostnames **device1.example.net**, **device2.example.net**, and **device3.example.net**. The certificate on each spoke must contain a hostname identity in the alternate subject field with **example.net** in the right-most part of the field; for example, **device1.example.net**. In this example, all spokes use this hostname identity in their IKE ID payload. During IKE negotiation, the IKE ID from a spoke is used to match the common part of the peer IKE identity configured on the hub. A valid certificate authenticates the spoke.

The common part of the certificate identification can be one of the following:

- A partial hostname in the right-most part of the alternate subject field of the certificate, for example **example.net**.
- A partial e-mail address in the right-most part of the alternate subject field of the certificate, for example **@example.net**.
- A container string, a set of wildcards, or both to match the subject fields of the certificate. The subject fields contain details of the digital certificate holder in Abstract Syntax Notation One (ASN.1) distinguished name (DN) format. Fields can include organization, organizational unit, country, locality, or common name.

To configure a group IKE ID to match subject fields in certificates, you can specify the following types of identity matches:

- **Container**—The hub authenticates the spoke's IKE ID if the subject fields of the spoke's certificate exactly match the values configured on the hub. Multiple entries can be specified for each subject field (for example, **ou=eng,ou=sw**). The order of values in the fields must match.
- **Wildcard**—The hub authenticates the spoke's IKE ID if the subject fields of the spoke's certificate match the values configured on the hub. The wildcard match supports only one value per field (for example, **ou=eng** or **ou=sw** but not **ou=eng,ou=sw**). The order of the fields is inconsequential.

The following example configures a group IKE ID with the partial hostname **example.net** in the alternate subject field of the certificate.

```
[edit]
security {
  ike {
    policy common-cert-policy {
      proposals common-ike-proposal;
      certificate {
        local-certificate hub-local-certificate;
      }
    }
    gateway common-gateway-to-all-spoke-peer {
      ike-policy common-cert-policy;
      dynamic {
        hostname example.net;
        ike-user-type group-ike-id;
      }
      external-interface fe-0/0/2;
    }
  }
}
```

In this example, **example.net** is the common part of the hostname identification used for all spokes. All X.509 certificates on the spokes must contain a hostname identity in the alternate subject field with **example.net** in the right-most part. All spokes must use the hostname identity in their IKE ID payload.

The following example configures a group IKE ID with wildcards to match the values **sales** in the organizational unit and **example** in the organization subject fields of the certificate.

```
[edit]
security {
  ike {
    policy common-cert-policy {
      proposals common-ike-proposal;
      certificate {
        local-certificate hub-local-certificate;
      }
    }
    gateway common-gateway-to-all-spoke-peer {
      ike-policy common-cert-policy;
      dynamic {
        distinguished-name {
          wildcard ou=sales,o=example;
        }
        ike-user-type group-ike-id;
      }
      external-interface fe-0/0/2;
    }
  }
}
```

In this example, the fields **ou=sales,o=example** are the common part of the subject field in the certificates expected from the spokes. During IKE negotiation, if a spoke presents a certificate with the subject fields **cn=alice,ou=sales,o=example** in its certificate, authentication succeeds and the tunnel is established. If a spoke presents a certificate with the subject fields **cn=thomas,ou=engineer,o=example** in its certificate, the certificate is rejected by the hub as the organization unit should be **sales**.

Excluding a Spoke Connection

To exclude a particular spoke from connecting to the hub, the certificate for that spoke must be revoked. The hub needs to retrieve the latest certificate revocation list (CRL) from the CA that contains the serial number of the revoked certificate. The hub will then refuse a VPN connection from the revoked spoke. Until the latest CRL is available in the hub, the hub might continue to establish a tunnel from the revoked spoke. For more information, see [“Understanding Online Certificate Status Protocol and Certificate Revocation Lists” on page 1011](#) and [“Understanding Certificate Authority Profiles” on page 992](#).

See Also • [IPsec VPN with Autokey IKE Configuration Overview on page 55](#)

AutoVPN Configuration Overview

The following steps describe the basic tasks for configuring AutoVPN on hub and spoke devices. The AutoVPN hub is configured *once* for all current and new spokes.

To configure the AutoVPN hub:

1. Enroll a CA certificate and the local certificate in the device.
2. Create a secure tunnel (st0) interface and configure it in point-to-multipoint mode.
3. Configure a single IKE policy.
4. Configure an IKE gateway with a group IKE ID that is common to all spokes.
5. Configure a single IPsec policy and VPN.
6. Configure a dynamic routing protocol.

To configure an SRX Series AutoVPN spoke device:

1. Enroll a CA certificate and the local certificate in the device.
2. Create an st0 interface and configure it in point-to-multipoint mode.
3. Configure an IKE policy to match the IKE policy configured on the hub.

4. Configure an IKE gateway with an ID to match the group IKE ID configured on the hub.
5. Configure an IPsec policy to match the IPsec policy configured on the hub.
6. Configure a dynamic routing protocol.

See Also • [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)

Example: Configuring Basic AutoVPN with iBGP

This example shows how to configure an AutoVPN hub to act as a single termination point, and then configure two spokes to act as tunnels to remote sites. This example configures iBGP to forward packets through the VPN tunnels.

- [Requirements on page 232](#)
- [Overview on page 232](#)
- [Configuration on page 235](#)
- [Verification on page 257](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as AutoVPN hub and spokes
- Junos OS Release 12.1X44-D10 and later that support AutoVPN

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels. For more information about specific requirements for a dynamic routing protocol, see the *Routing Protocols Overview*.

Overview

This example shows the configuration of an AutoVPN hub and the subsequent configurations of two spokes.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). The certificates for the spokes contain the organizational unit (OU) value “SLT” in the subject field; the hub is configured with a group IKE ID to match the value “SLT” in the OU field.

The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and all spokes must have the same values. [Table 28 on page 233](#) shows the options used in this example.

Table 28: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke Configurations

Option	Value
<i>IKE proposal:</i>	
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	2
Authentication algorithm	SHA-1
Encryption algorithm	AES 128 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Authentication algorithm	HMAC MD5 96
Encryption algorithm	DES CBC
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	14

The same certificate authority (CA) is configured on all devices.



NOTE: Junos OS only supports a single level of certificate hierarchy.

[Table 29 on page 233](#) shows the options configured on the hub and on all spokes.

Table 29: AutoVPN Configuration for Hub and All Spokes

Option	Hub	All Spokes
<i>IKE gateway:</i>		
Remote IP address	Dynamic	1.1.1.1

Table 29: AutoVPN Configuration for Hub and All Spokes (continued)

Option	Hub	All Spokes
Remote IKE ID	Distinguished name (DN) on the spoke's certificate with the string SLT in the organizational unit (OU) field	DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	ge-0/0/1.0	Spoke 1: fe-0/0/1.0 Spoke 2: ge-0/0/1.0
VPN:		
Bind interface	st0.0	st0.0
Establish tunnels	(not configured)	Immediately on configuration commit

[Table 30 on page 234](#) shows the configuration options that are different on each spoke.

Table 30: Comparison Between the Spoke Configurations

Option	Spoke 1	Spoke 2
st0.0 interface	10.10.10.2/24	10.10.10.3/24
Interface to internal network	(fe-0.0/4.0) 60.60.60.1/24	(fe-0.0/4.0) 70.70.70.1/24
Interface to Internet	(fe-0/0/1.0) 2.2.2.1/30	(ge-0/0/1.0) 3.3.3.1/30

Routing information for all devices is exchanged through the VPN tunnels.

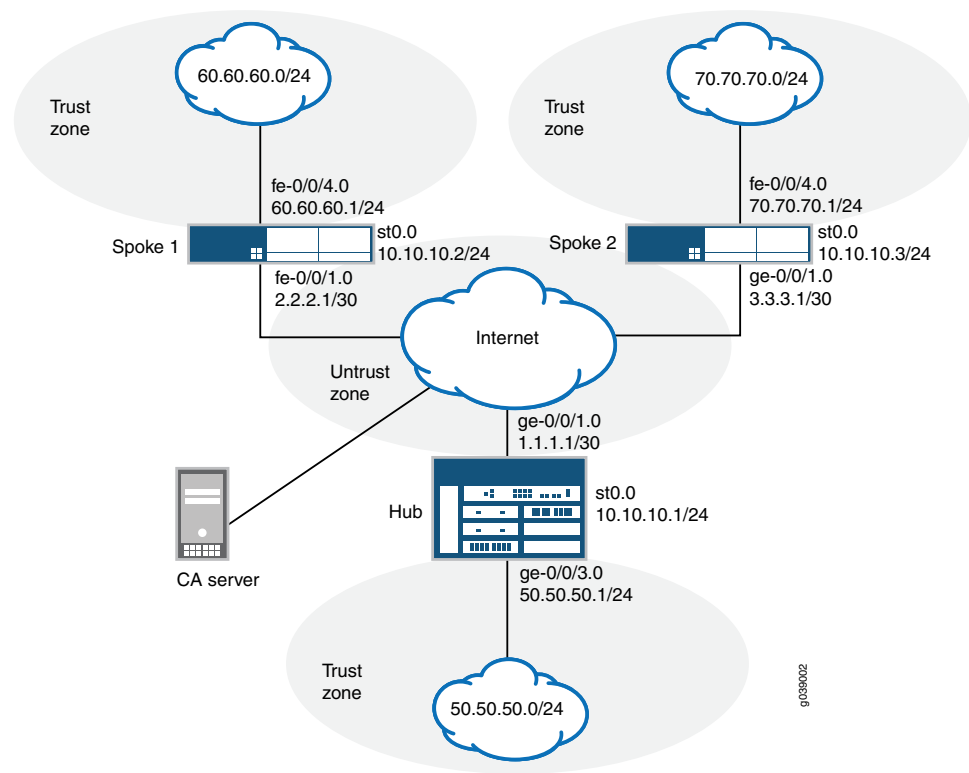


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

[Figure 18 on page 235](#) shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 18: Basic AutoVPN Deployment with iBGP



Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 235](#)
- [Configuring the Hub on page 240](#)
- [Configuring Spoke 1 on page 246](#)
- [Configuring Spoke 2 on page 251](#)

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
```

```
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal
Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,
  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
```



```
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal
Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,
  Locality: Mysore, Common name: spoke1, Domain component: example.net
```

```

Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Step-by-Step Procedure

To enroll digital certificates with SCEP on spoke 2:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```

user@host> request security pki generate-key-pair certificate-id Local1

```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke2@example.net
ip-address 3.3.3.1 subject
DC=example.net,CN=spoke2,OU=SLT,O=example,L=Tumkur,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40bb71d400000000258f
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Tumkur, Common name: spoke2, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2
Alternate subject: "spoke2@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 6-2012 10:02
  Not after: 11- 6-2013 10:12
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b6:2e:e2:da:e6:ac:57:e4:5d:ff:de:f6:89
27:d6:3e:1b:4a:3f:b2:2d:b3:d3:61:ed:ed:6a:07:d9:8a:d2:24:03
77:1a:fe:84:e1:12:8a:2d:63:6e:bf:02:6b:15:96:5a:4f:37:a0:46
44:09:96:c0:fd:bb:ab:79:2c:5d:92:bd:31:f0:3b:29:51:ce:89:8e
7c:2b:02:d0:14:5b:0a:a9:02:93:21:ea:f9:fc:4a:e7:08:bc:b1:6d
7c:f8:3e:53:58:8e:f1:86:13:fe:78:b5:df:0b:8e:53:00:4a:46:11
58:4a:38:e9:82:43:d8:25:47:7d:ef:18:f0:ef:a7:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  1a:6d:77:ac:fd:94:68:ce:cf:8a:85:f0:39:fc:e0:6b:fd:fe:b8:66 (sha1)
  00:b1:32:5f:7b:24:9c:e5:02:e6:72:75:9e:a5:f4:77 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Configuring the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 1.1.1.1/30
set interfaces ge-0/0/3 unit 0 family inet address 50.50.50.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.1/24
set policy-options policy-statement lan_nw from interface ge-0/0/3.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 10.10.10.1
set protocols bgp group ibgp export lan_nw
set protocols bgp group ibgp cluster 1.2.3.4
set protocols bgp group ibgp peer-as 10
set policy-options policy-statement lan_nw from interface ge-0/0/3.0
set policy-options policy-statement lan_nw then accept
set policy-options policy-statement bgp_nh_self term 1 from protocol bgp
set policy-options policy-statement bgp_nh_self term 1 then next-hop self
set policy-options policy-statement bgp_nh_self term 1 then accept
set protocols bgp group ibgp export bgp_nh_self
set protocols bgp group ibgp allow 10.10.10.0/24
set routing-options static route 2.2.2.0/30 next-hop 1.1.1.2
set routing-options static route 3.3.3.0/30 next-hop 1.1.1.2
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1
set security ike gateway hub-to-spoke-gw ike-policy ike-policy1
set security ike gateway hub-to-spoke-gw dynamic distinguished-name wildcard OU=SLT
set security ike gateway hub-to-spoke-gw dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw local-identity distinguished-name
set security ike gateway hub-to-spoke-gw external-interface ge-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn hub-to-spoke-vpn bind-interface st0.0
set security ipsec vpn hub-to-spoke-vpn ike gateway hub-to-spoke-gw
set security ipsec vpn hub-to-spoke-vpn ike ipsec-policy vpn-policy1
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all

```

```

set security zones security-zone trust interfaces ge-0/0/3.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 1.1.1.1/30
user@host# set ge-0/0/3 unit 0 family inet address 50.50.50.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.1/24

```

2. Configure routing protocol.

```

[edit policy-options]
user@host# set policy-statement lan_nw from interface ge-0/0/3.0
user@host# set policy-statement lan_nw then accept
user@host# set policy-statement bgp_nh_self term 1 from protocol bgp
user@host# set policy-statement bgp_nh_self term 1 then next-hop self
user@host# set policy-statement bgp_nh_self term 1 then accept

```

```

[edit protocols bgp]
user@host# set group ibgp type internal
user@host# set group ibgp local-address 10.10.10.1
user@host# set group ibgp export lan_nw
user@host# set group ibgp cluster 1.2.3.4
user@host# set group ibgp peer-as 10
user@host# set group ibgp allow 10.10.10.0/24
user@host# set group ibgp export bgp_nh_self

```

```

[edit routing-options]
user@host# set static route 2.2.2.0/30 next-hop 1.1.1.2
user@host# set static route 3.3.3.0/30 next-hop 1.1.1.2
user@host# set autonomous-system 10

```

3. Configure Phase 1 options.

```

[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

```

```
[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway hub-to-spoke-gw]
user@host# set ike-policy ike-policy1
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/1.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn hub-to-spoke-vpn]
user@host# set bind-interface st0.0
user@host# set ike gateway hub-to-spoke-gw
user@host# set ike ipsec-policy vpn-policy1
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/3.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
```

```

user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 1.1.1.1/30;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 50.50.50.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.1/24;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement bgp_nh_self {
  term 1 {
    from protocol bgp;
    then {
      next-hop self;
      accept;
    }
  }
}
policy-statement lan_nw {
  from interface ge-0/0/3.0;
  then accept;
}
[edit]
user@host# show protocols

```

```
bgp {
  group ibgp {
    type internal;
    local-address 10.10.10.1;
    export lan_nw;
    cluster 1.2.3.4;
    peer-as 10;
    allow 10.10.10.0/24;
    export bgp_nh_self;
  }
}
[edit]
user@host# show routing-options
static {
  route 2.2.2.0/30 next-hop 1.1.1.2;
  route 3.3.3.0/30 next-hop 1.1.1.2;
}
autonomous-system 10;
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local1;
  }
}
gateway hub-to-spoke-gw {
  ike-policy ike-policy1;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy1 {
  perfect-forward-secrecy {
    keys group14;
  }
}
```



```
    proposals ipsec-proposal;
  }
  vpn hub-to-spoke-vpn {
    bind-interface st0.0;
    ike {
      gateway hub-to-spoke-gw;
      ipsec-policy vpn-policy1;
    }
  }
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    st0.0;
    ge-0/0/1.0;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
  ca-identity ca-profile1;
  enrollment {
    url http://pc4/certsrv/mscep/mscep.dll;
  }
  revocation-check {
    disable;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces fe-0/0/1 unit 0 family inet address 2.2.2.1/30
set interfaces fe-0/0/4 unit 0 family inet address 60.60.60.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.2/24
set policy-options policy-statement lan_nw from interface fe-0/0/4.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 10.10.10.2
set protocols bgp group ibgp export lan_nw
set protocols bgp group ibgp neighbor 10.10.10.1
set routing-options static route 1.1.1.0/30 next-hop 2.2.2.2
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1
set security ike gateway spoke-to-hub-gw ike-policy ike-policy1
set security ike gateway spoke-to-hub-gw address 1.1.1.1
set security ike gateway spoke-to-hub-gw local-identity distinguished-name
set security ike gateway spoke-to-hub-gw remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw external-interface fe-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn spoke-to-hub bind-interface st0.0
set security ipsec vpn spoke-to-hub ike gateway spoke-to-hub-gw
set security ipsec vpn spoke-to-hub ike ipsec-policy vpn-policy1
set security ipsec vpn spoke-to-hub establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces fe-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```
[edit interfaces]
user@host# set fe-0/0/1 unit 0 family inet address 2.2.2.1/30
user@host# set fe-0/0/4 unit 0 family inet address 60.60.60.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.2/24
```

2. Configure routing protocol.

```
[edit policy-options]
user@host# set policy-statement lan_nw from interface fe-0/0/4.0
user@host# set policy-statement lan_nw then accept

[edit protocols bgp]
user@host# set group ibgp type internal
user@host# set group ibgp local-address 10.10.10.2
user@host# set group ibgp export lan_nw
user@host# set group ibgp neighbor 10.10.10.1

[edit routing-options]
user@host# set static route 1.1.1.0/30 next-hop 2.2.2.2
user@host# set autonomous-system 10
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway spoke-to-hub-gw]
user@host# set ike-policy ike-policy1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/1.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn spoke-to-hub]
user@host# set bind-interface st0.0
user@host# set ike gateway spoke-to-hub-gw
user@host# set ike ipsec-policy vpn-policy1
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/1.0
user@host# set interfaces st0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
fe-0/0/1 {
  unit 0 {
    family inet {
      address 2.2.2.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 60.60.60.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.2/24;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement lan_nw {
  from interface fe-0/0/4.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  group ibgp {
    type internal;
    local-address 10.10.10.2;
    export lan_nw;
    neighbor 10.10.10.1;
  }
}
[edit]
user@host# show routing-options
static {
  route 1.1.1.0/30 next-hop 2.2.2.2;
}
autonomous-system 10;
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
```

```
mode main;
proposals ike-proposal;
certificate {
    local-certificate Local1;
}
}
gateway spoke-to-hub-gw {
    ike-policy ike-policy1;
    address 1.1.1.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
    protocol esp;
    authentication-algorithm hmac-md5-96;
    encryption-algorithm des-cbc;
}
policy vpn-policy1 {
    perfect-forward-secrecy {
        keys group14;
    }
    proposals ipsec-proposal;
}
vpn spoke-to-hub {
    bind-interface st0.0;
    ike {
        gateway spoke-to-hub-gw;
        ipsec-policy vpn-policy1;
    }
    establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        fe-0/0/1.0;
        st0.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
    }
}
```

```

    protocols {
        all;
    }
}
interfaces {
    fe-0/0/4.0;
}
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {
        disable;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 2

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 3.3.3.1/30
set interfaces fe-0/0/4 unit 0 family inet address 70.70.70.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.3/24
set policy-options policy-statement lan_nw from interface fe-0/0/4.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 10.10.10.3
set protocols bgp group ibgp export lan_nw
set protocols bgp group ibgp neighbor 10.10.10.1
set routing-options static route 1.1.1.0/30 next-hop 3.3.3.2
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1

```

```

set security ike gateway spoke-to-hub-gw ike-policy ike-policy1
set security ike gateway spoke-to-hub-gw address 1.1.1.1
set security ike gateway spoke-to-hub-gw local-identity distinguished-name
set security ike gateway spoke-to-hub-gw remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw external-interface ge-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn spoke-to-hub bind-interface st0.0
set security ipsec vpn spoke-to-hub ike gateway spoke-to-hub-gw
set security ipsec vpn spoke-to-hub ike ipsec-policy vpn-policy1
set security ipsec vpn spoke-to-hub establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 2:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 3.3.3.1/30
user@host# set fe-0/0/4 unit 0 family inet address 70.70.70.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.3/24

```

2. Configure routing protocol.

```

[edit policy-options]
user@host# set policy-statement lan_nw from interface fe-0/0/4.0
user@host# set policy-statement lan_nw then accept

[edit protocols bgp]
user@host# set group ibgp type internal
user@host# set group ibgp local-address 10.10.10.3
user@host# set group ibgp export lan_nw
user@host# set group ibgp neighbor 10.10.10.1

```



```
[edit routing-options]
user@host# set static route 1.1.1.0/30 next-hop 3.3.3.2
user@host# set autonomous-system 10
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway spoke-to-hub-gw]
user@host# set ike-policy ike-policy1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface ge-0/0/1.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn spoke-to-hub]
user@host# set bind-interface st0.0
user@host# set ike gateway spoke-to-hub-gw
user@host# set ike ipsec-policy vpn-policy1
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.0
```

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 3.3.3.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 70.70.70.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.3/24;
    }
  }
}
[edit]
```

```
user@host# show policy-options
policy-statement lan_nw {
  from interface fe-0/0/4.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  group ibgp {
    type internal;
    local-address 10.10.10.3;
    export lan_nw;
    neighbor 10.10.10.1;
  }
}
[edit]
user@host# show routing-options
static {
  route 1.1.1.0/30 next-hop 3.3.3.2;
}
autonomous-system 10;
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local1;
  }
}
gateway spoke-to-hub-gw {
  ike-policy ike-policy1;
  address 1.1.1.1;
  local-identity distinguished-name;
  remote-identity distinguished-name;
  external-interface ge-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy1 {
  perfect-forward-secrecy {
    keys group14;
  }
  proposals ipsec-proposal;
```

```
}
vpn spoke-to-hub {
  bind-interface st0.0;
  ike {
    gateway spoke-to-hub-gw;
    ipsec-policy vpn-policy1;
  }
  establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/1.0;
    st0.0;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    fe-0/0/4.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
  ca-identity ca-profile1;
  enrollment {
    url http://pc4/certsrv/mscep/mscep.dll;
  }
  revocation-check {
    disable;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Phase 1 Status on page 257](#)
- [Verifying IPsec Phase 2 Status on page 257](#)
- [Verifying IPsec Next-Hop Tunnels on page 258](#)
- [Verifying BGP on page 258](#)
- [Verifying Learned Routes on page 259](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
5480163	UP	a558717f387074ab	6d0135c5ecaed61d	Main	3.3.3.1
5480162	UP	7a63d16a5a723df1	c471f7ae166d3a34	Main	2.2.2.1

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **security ipsec security-associations** command.

```
user@host> security ipsec security-associations
```

```
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<268173400 ESP:des/ md5 9bf33bc7 3567/ unlim -   root 500  2.2.2.1
>268173400 ESP:des/ md5 aae5196b 3567/ unlim -   root 500  2.2.2.1
<268173401 ESP:des/ md5 69c24d81 622/ unlim -   root 500  3.3.3.1
>268173401 ESP:des/ md5 e3fe0231 622/ unlim -   root 500  3.3.3.1
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
		XAUTH username		
10.10.10.2	st0.0	hub-to-spoke-vpn	Auto	C=IN,
		DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1		
10.10.10.3	st0.0	hub-to-spoke-vpn	Auto	C=IN,
		DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2		

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying BGP

Purpose Verify that BGP references the IP addresses for the **st0** interfaces of the spokes.

Action From operational mode, enter the **show bgp summary** command.

```
user@host> show bgp summary
```

Table	Tot	Paths	Act	Paths	Suppressed	History	Damp	State	Pending
inet.0	2			2		0	0	0	0
Peer		AS		InPkt		OutPkt	OutQ	Flaps	Last Up/Dwn
State #Active/Received/Accepted/Damped...									
10.10.10.2		10		116		119	0	0	50:25
1/1/1/0		0/0/0/0							
10.10.10.3		10		114		114	0	0	50:04
1/1/1/0		0/0/0/0							

Verifying Learned Routes

Purpose Verify that routes to the spokes have been learned.

Action From operational mode, enter the **show route 60.60.60.0** command.

```
user@host> show route 60.60.60.0
```

inet.0: 45 destinations, 45 routes (44 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

```
60.60.60.0/24      *[BGP/170] 00:50:57, localpref 100
                   AS path: I
                   > to 10.10.10.2 via st0.0
```

From operational mode, enter the **show route 70.70.70.0** command.

```
user@host> show route 70.70.70.0
```

inet.0: 45 destinations, 45 routes (44 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

```
70.70.70.0/24      *[BGP/170] 00:50:42, localpref 100
                   AS path: I
                   > to 10.10.10.3 via st0.0
```

See Also

- [Example: Configuring a Route-Based VPN on page 112](#)
- *Routing Protocols Overview*

Example: Configuring Basic AutoVPN with iBGP for IPv6 Traffic

This example shows how to configure an AutoVPN hub to act as a single termination point, and then configure two spokes to act as tunnels to remote sites. This example

configures AutoVPN for IPv6 environment using iBGP to forward packets through the VPN tunnels.

- [Requirements on page 260](#)
- [Overview on page 260](#)
- [Configuration on page 263](#)
- [Verification on page 287](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as AutoVPN hub and spokes.
- Junos OS Release 18.1R1 and later releases.

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels. For more information about specific requirements for a dynamic routing protocol, see the *Routing Protocols Overview*.

Overview

This example shows the configuration of an AutoVPN hub and the subsequent configurations of two spokes.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). The certificates for the spokes contain the organizational unit (OU) value “SLT” in the subject field; the hub is configured with a group IKE ID to match the value “SLT” in the OU field.

The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and all spokes must have the same values. [Table 31 on page 260](#) shows the options used in this example.

Table 31: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke Configurations

Option	Value
<i>IKE proposal:</i>	
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	19

Table 31: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke Configurations (continued)

Option	Value
Authentication algorithm	SHA-384
Encryption algorithm	AES 256 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Lifetime Seconds	3000
Encryption algorithm	AES 256 GCM
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	19

The same certificate authority (CA) is configured on all devices.



NOTE: Junos OS only supports a single level of certificate hierarchy.

Table 32 on page 261 shows the options configured on the hub and on all spokes.

Table 32: AutoVPN Configuration for Hub and All Spokes

Option	Hub	All Spokes
<i>IKE gateway:</i>		
Remote IP address	Dynamic	2001:db8:2000::1
Remote IKE ID	Distinguished name (DN) on the spoke's certificate with the string SLT in the organizational unit (OU) field	DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	ge-0/0/0	Spoke 1: ge-0/0/0.0 Spoke 2: ge-0/0/0.0
<i>VPN:</i>		

Table 32: AutoVPN Configuration for Hub and All Spokes (continued)

Option	Hub	All Spokes
Bind interface	st0.1	st0.1
Establish tunnels	(not configured)	establish-tunnels on-traffic

Table 33 on page 262 shows the configuration options that are different on each spoke.

Table 33: Comparison Between the Spoke Configurations

Option	Spoke 1	Spoke 2
st0.0 interface	2001:db8:7000::2/64	2001:db8:7000::3/64
Interface to internal network	(ge-0/0/1.0) 2001:db8:4000::1/64	(ge-0/0/1.0) 2001:db8:6000::1/64
Interface to Internet	(ge-0/0/0.0) 2001:db8:3000::2/64	(ge-0/0/0.0) 2001:db8:5000::2/64

Routing information for all devices is exchanged through the VPN tunnels.

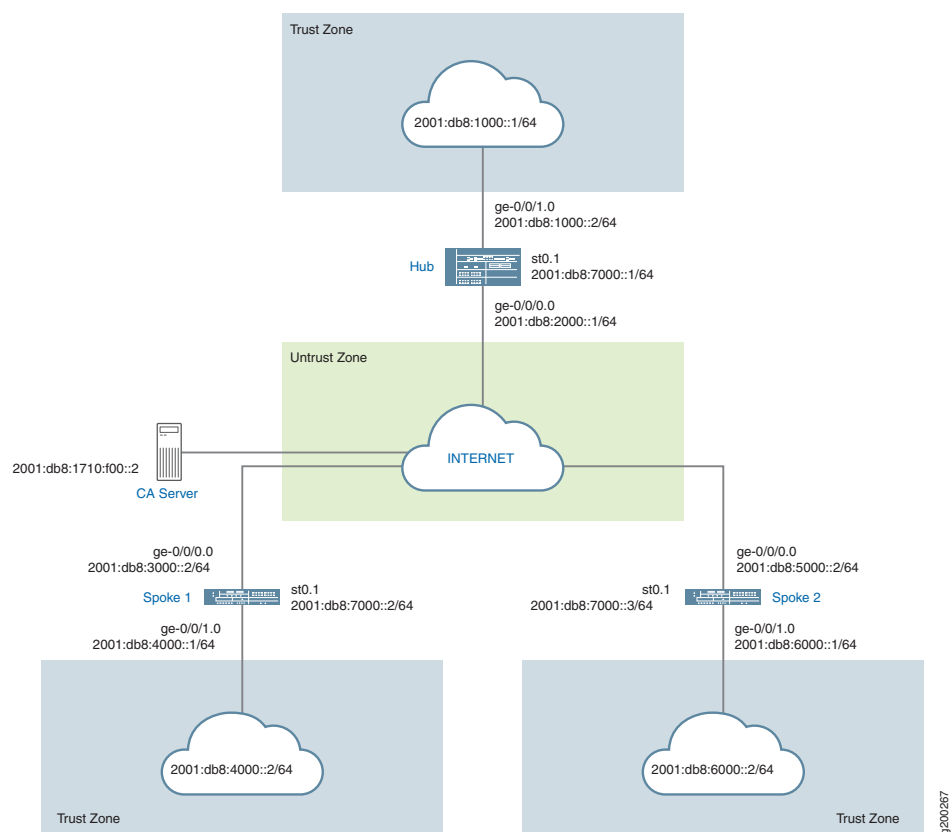


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

Figure 19 on page 263 shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 19: Basic AutoVPN Deployment with iBGP



Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- Enroll Device Certificates with SCEP on page 263
- Configuring the Hub on page 268
- Configuring Spoke 1 on page 274
- Configuring Spoke 2 on page 281

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
```

```

6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```

user@host> request security pki generate-key-pair certificate-id Local1

```

4. Enroll the local certificate.

```

user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>

```

5. Verify the local certificate.

```

user@host> show security pki local-certificate detail

```

```

Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

```

```

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 2:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke2@example.net
ip-address 3.3.3.1 subject
DC=example.net,CN=spoke2,OU=SLT,O=example,L=Tumkur,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40bb71d400000000258f
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Tumkur, Common name: spoke2, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2
Alternate subject: "spoke2@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 6-2012 10:02
  Not after: 11- 6-2013 10:12
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b6:2e:e2:da:e6:ac:57:e4:5d:ff:de:f6:89
27:d6:3e:1b:4a:3f:b2:2d:b3:d3:61:ed:ed:6a:07:d9:8a:d2:24:03
77:1a:fe:84:e1:12:8a:2d:63:6e:bf:02:6b:15:96:5a:4f:37:a0:46
44:09:96:c0:fd:bb:ab:79:2c:5d:92:bd:31:f0:3b:29:51:ce:89:8e
7c:2b:02:d0:14:5b:0a:a9:02:93:21:ea:f9:fc:4a:e7:08:bc:b1:6d
7c:f8:3e:53:58:8e:f1:86:13:fe:78:b5:df:0b:8e:53:00:4a:46:11
58:4a:38:e9:82:43:d8:25:47:7d:ef:18:f0:ef:a7:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  1a:6d:77:ac:fd:94:68:ce:cf:8a:85:f0:39:fc:e0:6b:fd:fe:b8:66 (sha1)
  00:b1:32:5f:7b:24:9c:e5:02:e6:72:75:9e:a5:f4:77 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Configuring the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate HUB
set security ike gateway IKE_GWA_1 ike-policy IKE_POL
set security ike gateway IKE_GWA_1 dynamic distinguished-name wildcard OU=SLT
set security ike gateway IKE_GWA_1 dead-peer-detection always-send
set security ike gateway IKE_GWA_1 dead-peer-detection interval 10
set security ike gateway IKE_GWA_1 dead-peer-detection threshold 3
set security ike gateway IKE_GWA_1 local-identity distinguished-name
set security ike gateway IKE_GWA_1 external-interface ge-0/0/0
set security ike gateway IKE_GWA_1 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPNA_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPNA_1 ike gateway IKE_GWA_1
set security ipsec vpn IPSEC_VPNA_1 ike ipsec-policy IPSEC_POL
set security policies default-policy permit-all
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/0.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:2000::1/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:1000::2/64
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::1/64
set routing-options rib inet6.0 static route 2001:db8:3000::/64 next-hop 2001:db8:2000::2
set routing-options rib inet6.0 static route 2001:db8:5000::/64 next-hop 2001:db8:2000::2
set routing-options autonomous-system 100
```



```

set routing-options forwarding-table export load_balance
set protocols bgp traceoptions file bgp
set protocols bgp traceoptions flag all
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 2001:db8:9000::1
set protocols bgp group ibgp export ibgp
set protocols bgp group ibgp cluster 1.2.3.4
set protocols bgp group ibgp peer-as 100
set protocols bgp group ibgp multipath
set protocols bgp group ibgp allow 2001:db8:9000::/64
set policy-options policy-statement ibgp from interface ge-0/0/1.0
set policy-options policy-statement ibgp then accept
set policy-options policy-statement load_balance then load-balance per-packet

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:2000::1/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:1000::2/64
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::1/64

```

2. Configure routing protocol.

```

[edit policy-options]
user@host# set policy-statement ibgp from interface ge-0/0/1.0
user@host# set policy-statement ibgp then accept
user@host# set policy-statement load_balance then load-balance per-packet

```

```

[edit protocols bgp]
user@host# set traceoptions file bgp
user@host# set traceoptions flag all
user@host# set group ibgp type internal
user@host# set group ibgp local-address 2001:db8:9000::1
user@host# set group ibgp export ibgp
user@host# set group ibgp cluster 1.2.3.4
user@host# set group ibgp peer-as 100
user@host# set group ibgp multipath
user@host# set group ibgp allow 2001:db8:9000::/64

```

```

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:3000::/64 next-hop
2001:db8:2000::2
user@host# set rib inet6.0 static route 2001:db8:5000::/64 next-hop
2001:db8:2000::2
user@host# set autonomous-system 100

```

```
user@host# set forwarding-table export load_balance
```

3. Configure Phase 1 options.

```
[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike proposal ike-proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate HUB

[edit security ike gateway IKE_GWA_1]
user@host# set ike-policy IKE_POL
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/0
user@host# set version v1-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPNA_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GWA_1
user@host# set ike ipsec-policy IPSEC_POL
```

5. Configure zones.

```
[edit security zones security-zone untrust]
```

```

user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.1

```

```

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet6 {
            address 2001:db8:2000::1/64;
        }
    }
}
ge-0/0/1 {
    unit 0 {
        family inet6 {
            address 2001:db8:1000::2/64;
        }
    }
}
st0 {
    unit 1{

```

```
        multipoint;
        family inet6 {
            address 2001:db8:7000::1/64;
        }
    }
}
[edit]
user@host# show policy-options
policy-statement ibgp {
    from interface ge-0/0/1.0;
    then accept;
}
policy-statement load_balance {
    then {
        load-balance per-packet;
    }
}
[edit]
user@host# show protocols
bgp {
    traceoptions {
        file bgp;
        flag all;
    }
    group ibgp {
        type internal;
        local-address 2001:db8:9000::1;
        export ibgp;
        cluster 1.2.3.4;
        peer-as 100;
        multipath;
        allow 2001:db8:9000::/64;
    }
}
[edit]
user@host# show routing-options
rib inet6.0 {
    static {
        route route 2001:db8:3000::/64 next-hop 2001:db8:2000::2;
        route 2001:db8:5000::/64 next-hop 2001:db8:2000::2;
    }
}
[edit]
user@host# show security ike
traceoptions {
    file ik;
    flag all;
}
proposal IKE_PROP {
    authentication-method rsa-signatures;
    dh-group group19;
    authentication-algorithm sha-384;
    encryption-algorithm aes-256-cbc;
    lifetime-seconds 6000;
}
```

```

policy IKE_POL {
    mode main;
    proposals IKE_PROP;
    certificate {
        local-certificate HUB;
    }
}
gateway IKE_GWA_1 {
    ike-policy IKE_POL;
    dynamic {
        distinguished-name {
            wildcard OU=SLT;
        }
    }
    dead-peer-detection {
        always-send;
        interval 10;
        threshold 3;
    }
    local-identity distinguished-name;
    external-interface ge-0/0/0;
    version v1-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    encryption-algorithm aes-256-gcm;
    lifetime-seconds 3000;
}
policy IPSEC_POL {
    perfect-forward-secrecy {
        keys group19;
    }
    proposals IPSEC_PROP;
}
vpn IPSEC_VPNA_1 {
    bind-interface st0.1;
    ike {
        gateway IKE_GWA_1;
        ipsec-policy IPSEC_POL;
    }
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {

```

```

    ge-0/0/1.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
  ca-identity ROOT-CA;
  enrollment {
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
    retry 5;
    retry-interval 0;
  }
  revocation-check {
    disable;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all

```

```

set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE1
set security ike gateway IKE_GW_SPOKE_1 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_1 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_1 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_1 remote-identity distinguished-name container
    OU=SLT
set security ike gateway IKE_GW_SPOKE_1 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_1 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike gateway IKE_GW_SPOKE_1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_1 establish-tunnels on-traffic
set security policies default-policy permit-all
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::2/64
set routing-options rib inet6.0 static route 2001:db8:2000::/64 next-hop 2001:db8:3000::1
set routing-options autonomous-system 100
set protocols bgp traceoptions file bgp
set protocols bgp traceoptions flag all
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 2001:db8:9000::2
set protocols bgp group ibgp export ibgp
set protocols bgp group ibgp peer-as 100
set protocols bgp group ibgp neighbor 2001:db8:9000::1
set policy-options policy-statement ibgp from interface ge-0/0/1.0
set policy-options policy-statement ibgp then accept

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::2/64
```

2. Configure routing protocol.

```
[edit policy-options]
user@host# set policy-statement ibgp from interface ge-0/0/1.0
user@host# set policy-statement ibgp then accept

[edit protocols bgp]
user@host# set traceoptions file bgp
user@host# set traceoptions flag all
user@host# set group ibgp type internal
user@host# set group ibgp local-address 2001:db8:9000::2
user@host# set group ibgp export ibgp
user@host# set group ibgp peer-as 100
user@host# set group ibgp neighbor 2001:db8:9000::1

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
    2001:db8:3000::1
user@host# set autonomous-system 100
```

3. Configure Phase 1 options.

```
[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike proposal ike-proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE1
```



```
[edit security ike gateway IKE_GW_SPOKE_1]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
user@host# set external-interface ge-0/0/0
user@host# set version v1-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPNA_SPOKE_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GWA_SPOKE_1
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels on-traffic
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
```

```

user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:3000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:4000::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:7000::2/64;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement ibgp {
  from interface ge-0/0/1.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  traceoptions {
    file bgp;
    flag all;
  }
  group ibgp {
    type internal;
    local-address 2001:db8:9000::2;
  }
}

```

```
export ibgp;
peer-as 100;
neighbor 2001:db8:9000::1;
}
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route route 2001:db8:2000::/64 next-hop 2001:db8:3000::1;
  }
}
[edit]
user@host# show security ike
traceoptions {
  file ik;
  flag all;
}
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate SPOKE1;
  }
}
gateway IKE_GWA_SPOKE1 {
  ike-policy IKE_POL;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
  }
  dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/0;
  version v1-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  encryption-algorithm aes-256-gcm;
  lifetime-seconds 3000;
}
```

```
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group19;
  }
  proposals IPSEC_PROP;
}
vpn IPSEC_VPNA_SPOKE_1 {
  bind-interface st0.1;
  ike {
    gateway IKE_GWA_SPOKE_1;
    ipsec-policy IPSEC_POL;
  }
}
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/1.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
  ca-identity ROOT-CA;
  enrollment {
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
    retry 5;
    retry-interval 0;
  }
}
```

```

    }
    revocation-check {
        disable;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 2

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE2
set security ike gateway IKE_GW_SPOKE_2 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_2 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_2 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_2 remote-identity distinguished-name container
    OU=SLT
set security ike gateway IKE_GW_SPOKE_2 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_2 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_2 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike gateway IKE_GW_SPOKE_2
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_2 establish-tunnels on-traffic
set security policies default-policy permit-all
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3

```

```

set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::3/64
set routing-options rib inet6.0 static route 2001:db8:2000::/64 next-hop 2001:db8:5000::1
set routing-options autonomous-system 100
set protocols bgp traceoptions file bgp
set protocols bgp traceoptions flag all
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 2001:db8:9000::3
set protocols bgp group ibgp export ibgp
set protocols bgp group ibgp peer-as 100
set protocols bgp group ibgp neighbor 2001:db8:9000::1
set policy-options policy-statement ibgp from interface ge-0/0/1.0
set policy-options policy-statement ibgp then accept

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 2:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::3/64

```

2. Configure routing protocol.

```

[edit policy-options]
user@host# set policy-statement ibgp from interface ge-0/0/1.0
user@host# set policy-statement ibgp then accept

[edit protocols bgp]
user@host# set traceoptions file bgp
user@host# set traceoptions flag all
user@host# set group ibgp type internal
user@host# set group ibgp local-address 2001:db8:9000::3
user@host# set group ibgp export ibgp
user@host# set group ibgp peer-as 100
user@host# set group ibgp neighbor 2001:db8:9000::1

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
2001:db8:5000::1
user@host# set autonomous-system 100

```

3. Configure Phase 1 options.

```
[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike proposal ike-proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE2

[edit security ike gateway IKE_GW_SPOKE_2]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
user@host# set external-interface ge-0/0/0
user@host# set version v1-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPNA_SPOKE_2]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GWA_SPOKE_2
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels on-traffic
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
```

```

user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:5000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:6000::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:7000::3/64;
    }
  }
}

```



```

    }
  }
}
[edit]
user@host# show policy-options
policy-statement ibgp {
  from interface ge-0/0/1.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  traceoptions {
    file bgp;
    flag all;
  }
  group ibgp {
    type internal;
    local-address 2001:db8:9000::3;
    export ibgp;
    peer-as 100;
    neighbor 2001:db8:9000::1;
  }
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route route 2001:db8:2000::/64 next-hop 2001:db8:5000::1;
  }
}
[edit]
user@host# show security ike
traceoptions {
  file ik;
  flag all;
}
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate SPOKE2;
  }
}
gateway IKE_GWA_SPOKE2 {
  ike-policy IKE_POL;
  dynamic {
    distinguished-name {

```

```
        wildcard OU=SLT;
    }
}
dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
}
local-identity distinguished-name;
external-interface ge-0/0/0;
version v1-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    encryption-algorithm aes-256-gcm;
    lifetime-seconds 3000;
}
policy IPSEC_POL {
    perfect-forward-secrecy {
        keys group19;
    }
    proposals IPSEC_PROP;
}
vpn IPSEC_VPNA_SPOKE_2 {
    bind-interface st0.1;
    ike {
        gateway IKE_GWA_SPOKE_2;
        ipsec-policy IPSEC_POL;
    }
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        ge-0/0/1.0;
        st0.1;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
}
```

```
    }  
  }  
  interfaces {  
    ge-0/0/0.0;  
  }  
}  
[edit]  
user@host# show security policies  
default-policy {  
  permit-all;  
}  
[edit]  
user@host# show security pki  
ca-profile ROOT-CA {  
  ca-identity ROOT-CA;  
  enrollment {  
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;  
    retry 5;  
    retry-interval 0;  
  }  
  revocation-check {  
    disable;  
  }  
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Status on page 287](#)
- [Verifying IPsec Status on page 288](#)
- [Verifying IPsec Next-Hop Tunnels on page 288](#)
- [Verifying BGP on page 289](#)

Verifying IKE Status

Purpose Verify the IKE status.

Action From operational mode, enter the **show security ike sa** command.

```
user@host> show security ike sa
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
493333	UP	2001:db8:88b49d915e684c93	2001:db8:fe890b1cac8522b5	Main	2001:db8:3000::2
493334	UP	2001:db8:26e40244ad3d722d	2001:db8:68b4d9f94097d32e	Main	2001:db8:5000::2

Meaning The **show security ike sa** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

Verifying IPsec Status

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec sa** command.

```
user@host> show security ipsec sa
```

Total active tunnels: 2

ID	Algorithm	SPI	Life:sec/kb	Mon	lsys	Port	Gateway
>67108885	ESP:aes-gcm-256/None	fdef4dab	2918/	unlim	- root	500	2001:db8:3000::2
>67108885	ESP:aes-gcm-256/None	e785dad	2918/	unlim	- root	500	2001:db8:3000::2
>67108887	ESP:aes-gcm-256/None	34a787af	2971/	unlim	- root	500	2001:db8:5000::2
>67108887	ESP:aes-gcm-256/None	cf57007f	2971/	unlim	- root	500	2001:db8:5000::2

Meaning The **show security ipsec sa** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface XAUTH username	IPSec VPN name	Flag	IKE-ID
2001:db8:9000::2	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available
2001:db8:9000::3	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available
2001:db8::5668:ad10:fcd8:163c	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available
2001:db8::5668:ad10:fcd8:18a1	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying BGP

Purpose Verify that BGP references the IP addresses for the **st0** interfaces of the spokes.

Action From operational mode, enter the **show bgp summary** command.

```
user@host> show bgp summary
```

Groups: 1 Peers: 2 Down peers: 0							
Unconfigured peers: 2							
Table	Tot Paths	Act Paths	Suppressed	History	Damp	State	Pending
inet6.0	2	2	0	0	0	0	0
Peer	AS	InPkt	OutPkt	OutQ	Flaps	Last Up/Dwn	State
2001:db8:9000::2	100	4	4	0	0	32	Establ
inet6.0: 1/1/1/0							
2001:db8:9000::3	100	4	4	0	0	8	Establ
inet6.0: 1/1/1/0							

See Also

- [Example: Configuring a Route-Based VPN on page 112](#)
- *Routing Protocols Overview*

Example: Configuring AutoVPN with iBGP and ECMP

This example shows how to configure two IPsec VPN tunnels between an AutoVPN hub and spoke. This example configures iBGP with equal-cost multipath (ECMP) to forward packets through the VPN tunnels.

- [Requirements on page 290](#)
- [Overview on page 290](#)
- [Configuration on page 293](#)
- [Verification on page 313](#)

Requirements

This example uses the following hardware and software components:

- Two supported SRX Series devices as AutoVPN hub and spoke
- Junos OS Release 12.1X44-D10 and later that support AutoVPN

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configuration of an AutoVPN hub and a spoke with two IPsec VPN tunnels.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). Certificates are enrolled in the hub and in the spoke for each IPsec VPN tunnel. One of the certificates for the spoke contains the organizational unit (OU) value “SLT” in the distinguished name (DN); the hub is configured with a group IKE ID to match the value “SLT” in the OU field. The other certificate for the spoke contains the OU value “SBU” in the DN; the hub is configured with a group IKE ID to match the value “SBU” in the OU field.

The spoke establishes IPsec VPN connections to the hub, which allows it to access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and the spoke must have the same values. [Table 34 on page 290](#) shows the options used in this example.

Table 34: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke iBGP ECMP Configurations

Option	Value
<i>IKE proposal:</i>	

Table 34: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke iBGP ECMP Configurations (continued)

Option	Value
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	2
Authentication algorithm	SHA-1
Encryption algorithm	AES 128 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Authentication algorithm	HMAC MD5 96
Encryption algorithm	DES CBC
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	14

The same certificate authority (CA) is configured on all devices.



NOTE: Junos OS only supports a single level of certificate hierarchy.

Table 35 on page 291 shows the options configured on the hub and on the spoke.

Table 35: AutoVPN iBGP ECMP Configuration for Hub and Spoke 1

Option	Hub	Spoke 1
<i>IKE gateway:</i>		
Remote IP address	hub-to-spoke-gw-1: Dynamic	spoke-to-hub-gw-1: 1.1.1.1
	hub-to-spoke-gw-2: Dynamic	spoke-to-hub-gw-2: 1.1.2.1
Remote IKE ID	hub-to-spoke-gw-1: DN on the spoke's certificate with the string SLT in the OU field	spoke-to-hub-gw-1: DN on the hub's certificate
	hub-to-spoke-gw-2: DN on the spoke's certificate with the string SBU in the OU field	spoke-to-hub-gw-2: DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate

Table 35: AutoVPN iBGP ECMP Configuration for Hub and Spoke 1 (continued)

Option	Hub	Spoke 1
External interface	hub-to-spoke-gw-1: ge-0/0/1.0	spoke-to-hub-gw-1: fe-0/0/1.0
	hub-to-spoke-gw-2: ge-0/0/2.0	spoke-to-hub-gw-2: fe-0/0/2.0
<i>VPN:</i>		
Bind interface	hub-to-spoke-vpn-1: st0.0	spoke-to-hub-1: st0.0
	hub-to-spoke-vpn-2: st0.1	spoke-to-hub-2: st0.1
Establish tunnels	(not configured)	Immediately on configuration commit

Routing information for all devices is exchanged through the VPN tunnels.

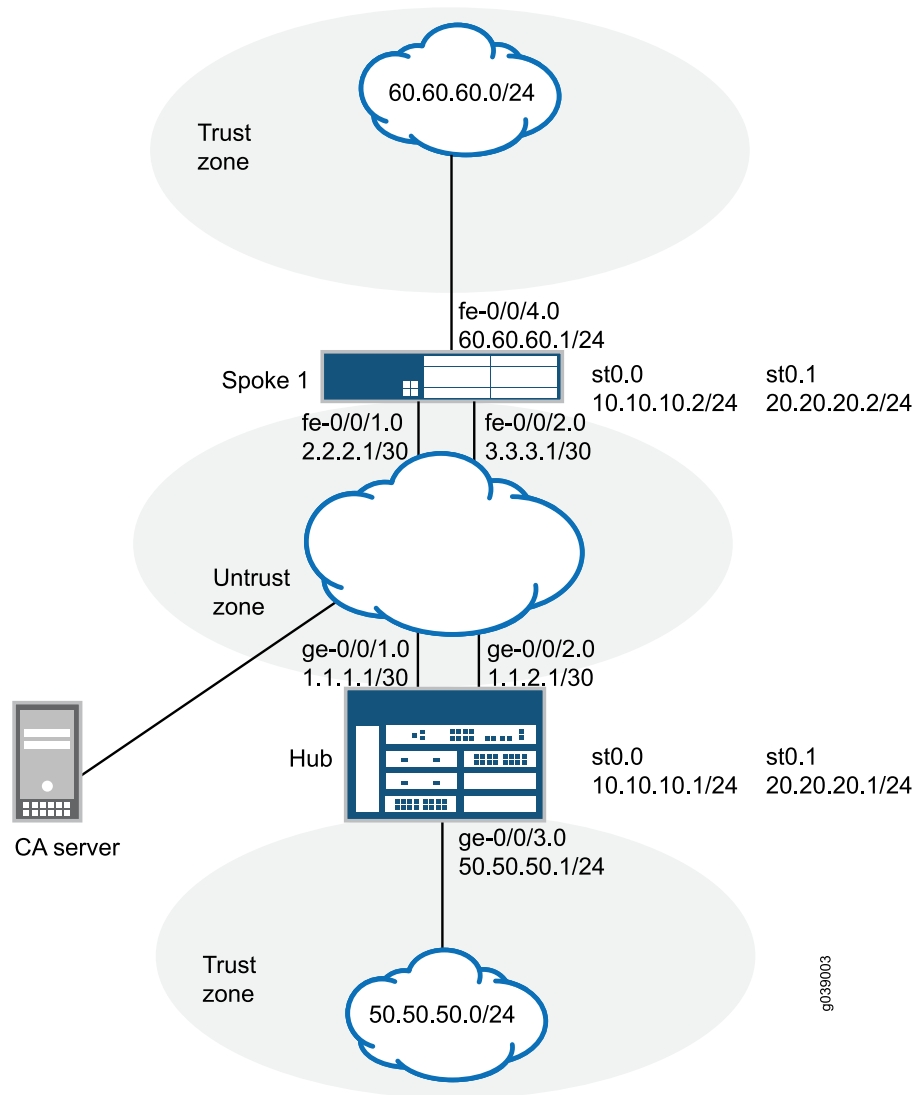


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

[Figure 20 on page 293](#) shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 20: AutoVPN Deployment with iBGP and ECMP



Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 294](#)
- [Configuring the Hub on page 298](#)
- [Configuring Spoke 1 on page 306](#)

*Enroll Device Certificates with SCEP***Step-by-Step Procedure**

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair for each certificate.

```
user@host> request security pki generate-key-pair certificate-id Local1
user@host> request security pki generate-key-pair certificate-id Local2
```

4. Enroll the local certificates.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local2 domain-name example.net email hub_backup@example.net
ip-address 1.1.2.1 subject
DC=example.net,CN=hub_backup,OU=SBU,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificates.

```
user@host> show security pki local-certificate certificate-id Local1 detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal
Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,
  Locality: Bangalore, Common name: hub, Domain component: example.net
```

```

Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
  01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
  2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
  34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
  90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
  ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
  6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

```
user@host> show security pki local-certificate certificate-id Local2 detail
```

```

Certificate identifier: Local2
Certificate version: 3
Serial number: 505efdf900000000259a
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SBU, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub_backup, Domain component:
example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SBU, CN=hub_backup

Alternate subject: "hub_backup@example.net", example.net, 1.1.2.1
Validity:
  Not before: 11- 9-2012 10:55
  Not after: 11- 9-2013 11:05
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d5:44:08:96:f6:77:05:e6:91:50:8a:8a:2a
  4e:95:43:1e:88:ea:43:7c:c5:ac:88:d7:a0:8d:b5:d9:3f:41:db:db
  44:34:1f:56:a5:38:4b:b2:c5:85:f9:f1:bf:b2:7b:d4:b2:af:98:a0
  95:50:02:ad:f5:dd:4d:dc:67:85:dd:84:09:df:9c:68:a5:58:65:e7
  2c:72:cc:47:4b:d0:cc:4a:28:ca:09:db:ad:6e:5a:13:6c:e6:cc:f0
  29:ed:2b:2d:d1:38:38:bc:68:84:de:ae:86:39:c9:dd:06:d5:36:f0
  e6:2a:7b:46:4c:cd:a5:24:1c:e0:92:8d:ad:35:29:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  98:96:2f:ff:ca:af:33:ee:d7:4c:c8:4f:f7:71:53:c0:5d:5f:c5:59 (sha1)

```

```
c9:87:e3:a4:5c:47:b5:aa:90:22:e3:06:b2:0b:e1:ea (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started
```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair for each certificate.

```
user@host> request security pki generate-key-pair certificate-id Local1
user@host> request security pki generate-key-pair certificate-id Local2
```

4. Enroll the local certificates.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local2 domain-name example.net email
spoke1_backup@example.net ip-address 3.3.3.1 subject
DC=example.net,CN=spoke1_backup,OU=SBU,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificates.

```
user@host> show security pki local-certificate certificate-id Local1 detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
Common name: CASERVER1, Domain component: net, Domain component: internal
```

```

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

```
user@host> show security pki local-certificate certificate-id Local2 detail
```

```

Certificate identifier: Local2
Certificate version: 3
Serial number: 506c3d0600000000259b
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SBU, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1_backup, Domain component:
example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SBU, CN=spoke1_backup

Alternate subject: "spoke1_backup@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 9-2012 11:09
  Not after: 11- 9-2013 11:19
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:a7:02:b5:e2:cd:79:24:f8:97:a3:8d:4d:27
  8c:2b:dd:f1:57:72:4d:2b:6d:d5:95:0d:9c:1b:5c:e2:a4:b0:84:2e
  31:82:3c:91:08:a2:58:b9:30:4c:5f:a3:6b:e6:2b:9c:b1:42:dd:1c
  cd:a2:7a:84:ea:7b:a6:b7:9a:13:33:c6:27:2b:79:2a:b1:0c:fe:08
  4c:a7:35:fc:da:4f:df:1f:cf:f4:ba:bc:5a:05:06:63:92:41:b4:f2
  54:00:3f:ef:ff:41:e6:ca:74:10:56:f7:2b:5f:d3:1a:33:7e:49:74
  1c:42:cf:c2:23:ea:4b:8f:50:2c:eb:1c:a6:37:89:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:

```

```

http://ca-server1/CertEnroll/CASERVER1.cr1
file://\\ca-server1\CertEnroll\CASERVER1.cr1
Fingerprint:
d6:7f:52:a3:b6:f8:ae:cb:70:3f:a9:79:ea:8a:da:9e:ba:83:e4:5f (sha1)
76:0b:72:73:cf:51:ee:58:81:2d:f7:b4:e2:5c:f4:5c (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT for Local1 and SBU for Local2. The IKE configurations on the hub include OU=SLT and OU=SBU to identify the spoke.

Configuring the Hub

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 1.1.1/30
set interfaces ge-0/0/2 unit 0 family inet address 1.1.2/30
set interfaces ge-0/0/3 unit 0 family inet address 50.50.50.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.1/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 20.20.20.1/24
set policy-options policy-statement lan_nw from interface ge-0/0/3.0
set policy-options policy-statement lan_nw then accept
set policy-options policy-statement load_balance then load-balance per-packet
set protocols bgp group ibgp-1 type internal
set protocols bgp group ibgp-1 local-address 10.10.10.1
set protocols bgp group ibgp-1 export lan_nw
set protocols bgp group ibgp-1 cluster 1.2.3.4
set protocols bgp group ibgp-1 multipath
set protocols bgp group ibgp-1 allow 10.10.10.0/24
set protocols bgp group ibgp-2 type internal
set protocols bgp group ibgp-2 local-address 20.20.20.1
set protocols bgp group ibgp-2 export lan_nw
set protocols bgp group ibgp-2 cluster 1.2.3.5
set protocols bgp group ibgp-2 multipath
set protocols bgp group ibgp-2 allow 20.20.20.0/24
set routing-options static route 2.2.2.0/30 next-hop 1.1.1.2
set routing-options static route 3.3.3.0/30 next-hop 1.1.2.2
set routing-options autonomous-system 10
set routing-options forwarding-table export load_balance
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1

```

```

set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy-1 mode main
set security ike policy ike-policy-1 proposals ike-proposal
set security ike policy ike-policy-1 certificate local-certificate Local1
set security ike policy ike-policy-2 mode main
set security ike policy ike-policy-2 proposals ike-proposal
set security ike policy ike-policy-2 certificate local-certificate Local2
set security ike gateway hub-to-spoke-gw-1 ike-policy ike-policy-1
set security ike gateway hub-to-spoke-gw-1 dynamic distinguished-name wildcard OU=SLT
set security ike gateway hub-to-spoke-gw-1 dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw-1 local-identity distinguished-name
set security ike gateway hub-to-spoke-gw-1 external-interface ge-0/0/1.0
set security ike gateway hub-to-spoke-gw-2 ike-policy ike-policy-2
set security ike gateway hub-to-spoke-gw-2 dynamic distinguished-name wildcard
  OU=SBU
set security ike gateway hub-to-spoke-gw-2 dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw-2 local-identity distinguished-name
set security ike gateway hub-to-spoke-gw-2 external-interface ge-0/0/2.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy proposals ipsec-proposal
set security ipsec vpn hub-to-spoke-vpn-1 bind-interface st0.0
set security ipsec vpn hub-to-spoke-vpn-1 ike gateway hub-to-spoke-gw-1
set security ipsec vpn hub-to-spoke-vpn-1 ike ipsec-policy vpn-policy
set security ipsec vpn hub-to-spoke-vpn-2 bind-interface st0.1
set security ipsec vpn hub-to-spoke-vpn-2 ike gateway hub-to-spoke-gw-2
set security ipsec vpn hub-to-spoke-vpn-2 ike ipsec-policy vpn-policy
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces ge-0/0/2.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 1.1.1/30

```

```
user@host# set ge-0/0/2 unit 0 family inet address 1.1.2.1/30
user@host# set ge-0/0/3 unit 0 family inet address 50.50.50.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.1/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 20.20.20.1/24
```

2. Configure routing protocol.

```
[edit policy-options]
user@host# set policy-statement lan_nw from interface ge-0/0/3.0
user@host# set policy-statement lan_nw then accept
user@host# set policy-statement load_balance then load-balance per-packet

[edit protocols bgp]
user@host# set group ibgp-1 type internal
user@host# set group ibgp-1 local-address 10.10.10.1
user@host# set group ibgp-1 export lan_nw
user@host# set group ibgp-1 cluster 1.2.3.4
user@host# set group ibgp-1 multipath
user@host# set group ibgp-1 allow 10.10.10.0/24

user@host# set group ibgp-2 type internal
user@host# set group ibgp-2 local-address 20.20.20.1
user@host# set group ibgp-2 export lan_nw
user@host# set group ibgp-2 cluster 1.2.3.5
user@host# set group ibgp-2 multipath
user@host# set group ibgp-2 allow 20.20.20.0/24

[edit routing-options]
user@host# set static route 2.2.2.0/30 next-hop 1.1.1.2
user@host# set static route 3.3.3.0/30 next-hop 1.1.2.2
user@host# set autonomous-system 10
user@host# set forwarding-table export load_balance
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy-1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike policy ike-policy-2]
user@host# set mode main
user@host# set proposals ike-proposal
```



```

user@host# set certificate local-certificate Local2

[edit security ike gateway hub-to-spoke-gw-1]
user@host# set ike-policy ike-policy-1
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/1.0

[edit security ike gateway hub-to-spoke-gw-2]
user@host# set ike-policy ike-policy-2
user@host# set dynamic distinguished-name wildcard OU=SBU
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/2.0

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn hub-to-spoke-vpn-1]
user@host# set bind-interface st0.0
user@host# set ike gateway hub-to-spoke-gw-1
user@host# set ike ipsec-policy vpn-policy

[edit security ipsec vpn hub-to-spoke-vpn-2]
user@host# set bind-interface st0.1
user@host# set ike gateway hub-to-spoke-gw-2
user@host# set ike ipsec-policy vpn-policy

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.0
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces ge-0/0/2.0
user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all

```

```
user@host# set interfaces ge-0/0/3.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 1.1.1.1/30;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 1.1.2.1/30;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 50.50.50.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.1/24;
    }
  }
}
```

```
}
}
unit 1 {
    multipoint;
    family inet {
        address 20.20.20.1/24;
    }
}
}
[edit]
user@host# show policy-options
policy-statement lan_nw {
    from interface ge-0/0/3.0;
    then accept;
}
policy-statement load_balance {
    then {
        load-balance per-packet;
    }
}
[edit]
user@host# show protocols
bgp {
    group ibgp-1 {
        type internal;
        local-address 10.10.10.1;
        export lan_nw;
        cluster 1.2.3.4;
        multipath;
        allow 10.10.10.0/24;
    }
    group ibgp-2 {
        type internal;
        local-address 20.20.20.1;
        export lan_nw;
        cluster 1.2.3.5;
        multipath;
        allow 20.20.20.0/24;
    }
}
[edit]
user@host# show routing-options
static {
    route 2.2.2.0/30 next-hop 1.1.1.2;
    route 3.3.3.0/30 next-hop 1.1.2.2;
}
autonomous-system 10;
forwarding-table {
    export load_balance;
}
[edit]
user@host# show security ike
proposal ike-proposal {
    authentication-method rsa-signatures;
    dh-group group2;
```

```

authentication-algorithm sha1;
encryption-algorithm aes-128-cbc;
}
policy ike-policy-1 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local1;
  }
}
policy ike-policy-2 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local2;
  }
}
gateway hub-to-spoke-gw-1 {
  ike-policy ike-policy-1;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/1.0;
}
gateway hub-to-spoke-gw-2 {
  ike-policy ike-policy-2;
  dynamic {
    distinguished-name {
      wildcard OU=SBU;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/2.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy {
  perfect-forward-secrecy {
    keys group14;
  }
  proposals ipsec-proposal;
}
vpn hub-to-spoke-vpn-1 {
  bind-interface st0.0;
  ike {

```

```

        gateway hub-to-spoke-gw-1;
        ipsec-policy vpn-policy;
    }
}
vpn hub-to-spoke-vpn-2 {
    bind-interface st0.1;
    ike {
        gateway hub-to-spoke-gw-2;
        ipsec-policy vpn-policy;
    }
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        st0.0;
        ge-0/0/1.0;
        ge-0/0/2.0;
        st0.1;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-0/0/3.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {

```

```

    disable;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces fe-0/0/1 unit 0 family inet address 2.2.2.1/30
set interfaces fe-0/0/2 unit 0 family inet address 3.3.3.1/30
set interfaces fe-0/0/4 unit 0 family inet address 60.60.60.1/24
set interfaces st0 unit 0 family inet address 10.10.10.2/24
set interfaces st0 unit 1 family inet address 20.20.20.2/24
set policy-options policy-statement lan_nw from interface fe-0/0/4.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp-1 type internal
set protocols bgp group ibgp-1 local-address 10.10.10.2
set protocols bgp group ibgp-1 export lan_nw
set protocols bgp group ibgp-1 neighbor 10.10.10.1
set protocols bgp group ibgp-2 type internal
set protocols bgp group ibgp-2 local-address 20.20.20.2
set protocols bgp group ibgp-2 export lan_nw
set protocols bgp group ibgp-2 neighbor 20.20.20.1
set routing-options static route 1.1.1.0/30 next-hop 2.2.2.2
set routing-options static route 1.1.2.0/30 next-hop 3.3.3.2
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy-1 mode main
set security ike policy ike-policy-1 proposals ike-proposal
set security ike policy ike-policy-1 certificate local-certificate Local1
set security ike policy ike-policy-2 mode main
set security ike policy ike-policy-2 proposals ike-proposal
set security ike policy ike-policy-2 certificate local-certificate Local2
set security ike gateway spoke-to-hub-gw-1 ike-policy ike-policy-1
set security ike gateway spoke-to-hub-gw-1 address 1.1.1.1
set security ike gateway spoke-to-hub-gw-1 local-identity distinguished-name
set security ike gateway spoke-to-hub-gw-1 remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw-1 external-interface fe-0/0/1.0
set security ike gateway spoke-to-hub-gw-2 ike-policy ike-policy-2
set security ike gateway spoke-to-hub-gw-2 address 1.1.2.1
set security ike gateway spoke-to-hub-gw-2 local-identity distinguished-name
set security ike gateway spoke-to-hub-gw-2 remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw-2 external-interface fe-0/0/2.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96

```

```

set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy proposals ipsec-proposal
set security ipsec vpn spoke-to-hub-1 bind-interface st0.0
set security ipsec vpn spoke-to-hub-1 ike gateway spoke-to-hub-gw-1
set security ipsec vpn spoke-to-hub-1 ike ipsec-policy vpn-policy
set security ipsec vpn spoke-to-hub-1 establish-tunnels immediately
set security ipsec vpn spoke-to-hub-2 bind-interface st0.1
set security ipsec vpn spoke-to-hub-2 ike gateway spoke-to-hub-gw-2
set security ipsec vpn spoke-to-hub-2 ike ipsec-policy vpn-policy
set security ipsec vpn spoke-to-hub-2 establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces fe-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces fe-0/0/2.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```

[edit interfaces]
user@host# set fe-0/0/1 unit 0 family inet address 2.2.2.1/30
user@host# set fe-0/0/2 unit 0 family inet address 3.3.3.1/30
user@host# set fe-0/0/4 unit 0 family inet address 60.60.60.1/24
user@host# set st0 unit 0 family inet address 10.10.10.2/24
user@host# set st0 unit 1 family inet address 20.20.20.2/24

```

2. Configure routing protocol.

```

[edit policy-options]
user@host# set policy-statement lan_nw from interface fe-0/0/4.0
user@host# set policy-statement lan_nw then accept

[edit protocols bgp]
user@host# set group ibgp-1 type internal
user@host# set group ibgp-1 local-address 10.10.10.2
user@host# set group ibgp-1 export lan_nw
user@host# set group ibgp-1 neighbor 10.10.10.1

```

```
user@host# set group ibgp-2 type internal
user@host# set group ibgp-2 local-address 20.20.20.2
user@host# set group ibgp-2 export lan_nw
user@host# set group ibgp-2 neighbor 20.20.20.1

[edit routing-options]
user@host# set static route 1.1.1.0/30 next-hop 2.2.2.2
user@host# set static route 1.1.2.0/30 next-hop 3.3.3.2
user@host# set autonomous-system 10
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy-1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike policy ike-policy-2]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local2

[edit security ike gateway spoke-to-hub-gw-1]
user@host# set ike-policy ike-policy-1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/1.0

[edit security ike gateway spoke-to-hub-gw-2]
user@host# set ike-policy ike-policy-2
user@host# set address 1.1.2.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/2.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy]
```



```
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal
```

```
[edit security ipsec vpn spoke-to-hub-1]
user@host# set bind-interface st0.0
user@host# set ike gateway spoke-to-hub-gw-1
user@host# set ike ipsec-policy vpn-policy
user@host# set establish-tunnels immediately
```

```
[edit security ipsec vpn spoke-to-hub-2]
user@host# set bind-interface st0.1
user@host# set ike gateway spoke-to-hub-gw-2
user@host# set ike ipsec-policy vpn-policy
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/1.0
user@host# set interfaces st0.0
user@host# set interfaces fe-0/0/2.0
user@host# set interfaces st0.1
```

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
fe-0/0/1 {
  unit 0 {
    family inet {
      address 2.2.2.1/30;
    }
  }
}
fe-0/0/2 {
  unit 0 {
    family inet {
      address 3.3.3.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 60.60.60.1/24;
    }
  }
}
st0 {
  unit 0 {
    family inet {
      address 10.10.10.2/24;
    }
  }
  unit 1 {
    family inet {
      address 20.20.20.2/24;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement lan_nw {
  from interface fe-0/0/4.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  group ibgp-1 {
    type internal;
    local-address 10.10.10.2;
    export lan_nw;
    neighbor 10.10.10.1;
  }
  group ibgp-2 {
    type internal;
    local-address 20.20.20.2;
    export lan_nw;
    neighbor 20.20.20.1;
  }
}
```

```

    }
  }
[edit]
user@host# show routing-options
static {
    route 1.1.1.0/30 next-hop 2.2.2.2;
    route 1.1.2.0/30 next-hop 3.3.3.2;
}
autonomous-system 10;
[edit]
user@host# show security ike
proposal ike-proposal {
    authentication-method rsa-signatures;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm aes-128-cbc;
}
policy ike-policy-1 {
    mode main;
    proposals ike-proposal;
    certificate {
        local-certificate Local1;
    }
}
policy ike-policy-2 {
    mode main;
    proposals ike-proposal;
    certificate {
        local-certificate Local2;
    }
}
gateway spoke-to-hub-gw-1 {
    ike-policy ike-policy-1;
    address 1.1.1.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/1.0;
}
gateway spoke-to-hub-gw-2 {
    ike-policy ike-policy-2;
    address 1.1.2.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/2.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
    protocol esp;
    authentication-algorithm hmac-md5-96;
    encryption-algorithm des-cbc;
}
policy vpn-policy {
    perfect-forward-secrecy {
        keys group14;
    }
}

```

```
    }
    proposals ipsec-proposal;
  }
  vpn spoke-to-hub-1 {
    bind-interface st0.0;
    ike {
      gateway spoke-to-hub-gw-1;
      ipsec-policy vpn-policy;
    }
    establish-tunnels immediately;
  }
  vpn spoke-to-hub-2 {
    bind-interface st0.1;
    ike {
      gateway spoke-to-hub-gw-2;
      ipsec-policy vpn-policy;
    }
    establish-tunnels immediately;
  }
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    fe-0/0/1.0;
    st0.0;
    fe-0/0/2.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    fe-0/0/4.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
```

```
[edit]
user@host# show security pki
ca-profile ca-profile1 {
  ca-identity ca-profile1;
  enrollment {
    url http://pc4/certsrv/mscep/mscep.dll;
  }
  revocation-check {
    disable;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Phase 1 Status on page 313](#)
- [Verifying IPsec Phase 2 Status on page 313](#)
- [Verifying IPsec Next-Hop Tunnels on page 314](#)
- [Verifying BGP on page 314](#)
- [Verifying Learned Routes on page 315](#)
- [Verifying Route Installation in Forwarding Table on page 316](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
3733049	UP	bc9686796c2e52e9	1fbe46eee168f24e	Main	2.2.2.1
3733048	UP	a88db7ed23ec5f6b	c88b81dff52617a5	Main	3.3.3.1

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spoke.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **security ipsec security-associations** command.

```
user@host> security ipsec security-associations
```

```
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<268173315 ESP:des/ md5 93cfb417 1152/ unlim -   root 500  2.2.2.1
>268173315 ESP:des/ md5 101de6f7 1152/ unlim -   root 500  2.2.2.1
<268173313 ESP:des/ md5 272e29c0 1320/ unlim -   root 500  3.3.3.1
>268173313 ESP:des/ md5 a3bf8fad 1320/ unlim -   root 500  3.3.3.1
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spoke.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
		XAUTH username		
10.10.10.2	st0.0	hub-to-spoke-vpn-1	Auto	C=IN,
		DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1		
20.20.20.2	st0.1	hub-to-spoke-vpn-2	Auto	C=IN,
		DC=example.net, ST=KA, L=Mysore, O=example, OU=SBU, CN=spoke1_backup		

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying BGP

Purpose Verify that BGP references the IP addresses for the **st0** interfaces of the spoke.

Action From operational mode, enter the **show bgp summary** command.

```
user@host> show bgp summary
```

Table	Tot Paths	Act Paths	Suppressed	History	Damp	State	Pending
inet.0	2	2	0	0	0	0	0
Peer	AS	InPkt	OutPkt	OutQ	Flaps	Last Up/Dwn	
State #Active/Received/Accepted/Damped...							
10.10.10.2	10	4819	4820	0	2	1d 12:15:14	
1/1/1/0	0/0/0/0						
20.20.20.2	10	4926	4928	0	0	1d 13:03:03	
1/1/1/0	0/0/0/0						

Verifying Learned Routes

Purpose Verify that routes to the spoke have been learned.

Action From operational mode, enter the **show route 60.60.60.0 detail** command.

```

user@host> show route 60.60.60.0 detail
inet.0: 47 destinations, 48 routes (46 active, 0 holddown, 1 hidden)
60.60.60.0/24 (2 entries, 1 announced)
    *BGP      Preference: 170/-101
              Next hop type: Indirect
              Address: 0x167407c
              Next-hop reference count: 3
              Source: 10.10.10.2
              Next hop type: Router
              Next hop: 10.10.10.2 via st0.0
              Next hop type: Router
              Next hop: 20.20.20.2 via st0.1, selected
              Protocol next hop: 10.10.10.2
              Indirect next hop: 15c8000 262142
              Protocol next hop: 20.20.20.2
              Indirect next hop: 15c80e8 262143
              State: <Act Int Ext>
              Local AS: 10 Peer AS: 10
              Age: 1d 12:16:25 Metric2: 0
              Task: BGP_10.10.10.10.2+53120
              Announcement bits (2): 0-KRT 3-Resolve tree 1
              AS path: I
              Accepted Multipath
              Localpref: 100
              Router ID: 10.207.36.182
    BGP      Preference: 170/-101
              Next hop type: Indirect
              Address: 0x15b8ac0
              Next-hop reference count: 1
              Source: 20.20.20.2
              Next hop type: Router
              Next hop: 20.20.20.2 via st0.1, selected
              Protocol next hop: 20.20.20.2
              Indirect next hop: 15c80e8 262143
              State: <NotBest Int Ext>
              Inactive reason: Not Best in its group - Update source
              Local AS: 10 Peer AS: 10
              Age: 1d 13:04:14 Metric2: 0
              Task: BGP_10.20.20.20.2+50733
              AS path: I
              Accepted MultipathContrib
              Localpref: 100
              Router ID: 10.207.36.182

```

Verifying Route Installation in Forwarding Table

Purpose Verify that routes to the spoke have been installed in the forwarding table.

Action From operational mode, enter the **show route forwarding-table matching 60.60.60.0** command.

```
user@host> show route forwarding-table matching 60.60.60.0
```

```
Routing table: default.inet
Internet:
Destination      Type RtRef Next hop          Type Index NhRef Netif
60.60.60.0/24    user   0                ulst 262144 1
                  10.10.10.2      indr 262142 2
                  20.20.20.2      ucst 572   3 st0.0
                  indr 262143 2
                  ucst 573   3 st0.1
```

See Also • [Example: Configuring a Route-Based VPN on page 112](#)

Example: Configuring AutoVPN with iBGP and Active-Backup Tunnels

This example shows how to configure active and backup IPsec VPN tunnels between an AutoVPN hub and spoke. This example configures iBGP to forward traffic through the VPN tunnels.

- [Requirements on page 317](#)
- [Overview on page 317](#)
- [Configuration on page 320](#)
- [Verification on page 341](#)

Requirements

This example uses the following hardware and software components:

- Two supported SRX Series devices as AutoVPN hub and spoke
- Junos OS Release 12.1X44-D10 and later that support AutoVPN

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configuration of an AutoVPN hub and a spoke with two IPsec VPN tunnels.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). Certificates are enrolled in the hub and in the spoke for each IPsec VPN tunnel. One of the certificates for the spoke contains the organizational unit (OU) value “SLT” in the distinguished name (DN); the hub is configured with a group IKE ID to match the value “SLT” in the OU field. The other certificate for the spoke contains the OU value “SBU” in the DN; the hub is configured with a group IKE ID to match the value “SBU” in the OU field.

The spoke establishes IPsec VPN connections to the hub, which allows it to access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and the spoke must have the same values. [Table 36 on page 318](#) shows the options used in this example.

Table 36: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke iBGP Active-Backup Tunnel Configurations

Option	Value
<i>IKE proposal:</i>	
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	2
Authentication algorithm	SHA-1
Encryption algorithm	AES 128 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Authentication algorithm	HMAC MD5 96
Encryption algorithm	DES CBC
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	14

The same certificate authority (CA) is configured on all devices.



NOTE: Junos OS only supports a single level of certificate hierarchy.

[Table 37 on page 319](#) shows the options configured on the hub and on the spoke.

Table 37: AutoVPN IBGP Active-Backup Tunnel Configuration for Hub and Spoke 1

Option	Hub	Spoke 1
<i>IKE gateway:</i>		
Remote IP address	hub-to-spoke-gw-1: Dynamic	spoke-to-hub-gw-1: 1.1.1.1
	hub-to-spoke-gw-2: Dynamic	spoke-to-hub-gw-2: 1.1.2.1
Remote IKE ID	hub-to-spoke-gw-1: DN on the spoke's certificate with the string SLT in the OU field	spoke-to-hub-gw-1: DN on the hub's certificate
	hub-to-spoke-gw-2: DN on the spoke's certificate with the string SBU in the OU field	spoke-to-hub-gw-2: DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	hub-to-spoke-gw-1: ge-0/0/1.0	spoke-to-hub-gw-1: fe-0/0/1.0
	hub-to-spoke-gw-2: ge-0/0/2.0	spoke-to-hub-gw-2: fe-0/0/2.0
<i>VPN:</i>		
Bind interface	hub-to-spoke-vpn-1: st0.0	spoke-to-hub-1: st0.0
	hub-to-spoke-vpn-2: st0.1	spoke-to-hub-2: st0.1
VPN monitor	hub-to-spoke-vpn-1: ge-0/0/1.0 (source interface)	spoke-to-hub-1: 1.1.1.1 (destination IP)
	hub-to-spoke-vpn-2: ge-0/0/2.0 (source interface)	spoke-to-hub-2: 1.1.2.1 (destination IP)
Establish tunnels	(not configured)	Immediately on configuration commit

Routing information for all devices is exchanged through the VPN tunnels.

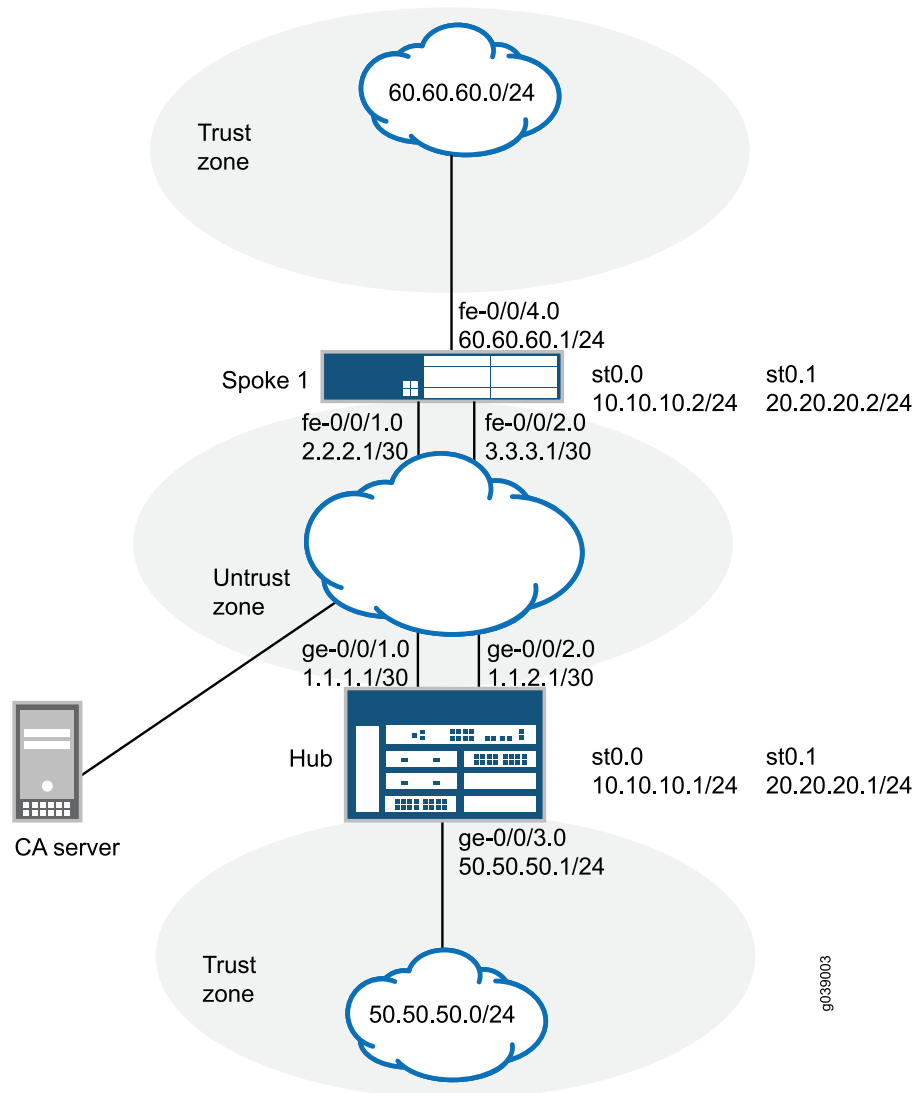


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

Figure 21 on page 320 shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 21: AutoVPN Deployment with iBGP and Active-Backup Tunnels



In this example, two IPsec VPN tunnels are established between the hub and spoke 1. Routing information is exchanged through iBGP sessions in each tunnel. The longest prefix match for the route to 60.60.60.0/24 is through the `st0.0` interface on the hub. Thus, the primary tunnel for the route is through the `st0.0` interfaces on the hub and spoke 1. The default route is through the backup tunnel on the `st0.1` interfaces on the hub and spoke 1.

VPN monitoring checks the status of the tunnels. If there is a problem with the primary tunnel (for example, the remote tunnel gateway is not reachable), the tunnel status changes to down and data destined for 60.60.60.0/24 is rerouted through the backup tunnel.

Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 321](#)
- [Configuring the Hub on page 325](#)
- [Configuring Spoke 1 on page 333](#)

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair for each certificate.

```
user@host> request security pki generate-key-pair certificate-id Local1
user@host> request security pki generate-key-pair certificate-id Local2
```

4. Enroll the local certificates.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local2 domain-name example.net email hub_backup@example.net
ip-address 1.1.2.1 subject
DC=example.net,CN=hub_backup,OU=SBU,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificates.

```
user@host> show security pki local-certificate certificate-id Local1 detail
```

```

Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
  01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
  2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
  34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
  90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
  ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
  6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

```
user@host> show security pki local-certificate certificate-id Local2 detail
```

```

Certificate identifier: Local2
Certificate version: 3
Serial number: 505efdf900000000259a
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SBU, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub_backup, Domain component:
example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SBU, CN=hub_backup

Alternate subject: "hub_backup@example.net", example.net, 1.1.2.1
Validity:
  Not before: 11- 9-2012 10:55
  Not after: 11- 9-2013 11:05
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d5:44:08:96:f6:77:05:e6:91:50:8a:8a:2a
  4e:95:43:1e:88:ea:43:7c:c5:ac:88:d7:a0:8d:b5:d9:3f:41:db:db

```

```

44:34:1f:56:a5:38:4b:b2:c5:85:f9:f1:bf:b2:7b:d4:b2:af:98:a0
95:50:02:ad:f5:dd:4d:dc:67:85:dd:84:09:df:9c:68:a5:58:65:e7
2c:72:cc:47:4b:d0:cc:4a:28:ca:09:db:ad:6e:5a:13:6c:e6:cc:f0
29:ed:2b:2d:d1:38:38:bc:68:84:de:ae:86:39:c9:dd:06:d5:36:f0
e6:2a:7b:46:4c:cd:a5:24:1c:e0:92:8d:ad:35:29:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  98:96:2f:ff:ca:af:33:ee:d7:4c:c8:4f:f7:71:53:c0:5d:5f:c5:59 (sha1)
  c9:87:e3:a4:5c:47:b5:aa:90:22:e3:06:b2:0b:e1:ea (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair for each certificate.

```

user@host> rrequest security pki generate-key-pair certificate-id Local1
user@host> request security pki generate-key-pair certificate-id Local2

```

4. Enroll the local certificates.

```

user@host> request security pki local-certificate enroll ca-profile ca-profile1
  certificate-id Local1 domain-name example.net email spoke1@example.net
  ip-address 2.2.2.1 subject
  DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
  challenge-password <password>
user@host> request security pki local-certificate enroll ca-profile ca-profile1
  certificate-id Local2 domain-name example.net email
  spoke1_backup@example.net ip-address 3.3.3.1 subject

```

```
DC=example.net,CN=spoke1_backup,OU=SBU,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificates.

```
user@host> show security pki local-certificate certificate-id Local1 detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```

```
user@host> show security pki local-certificate certificate-id Local2 detail
```

```
Certificate identifier: Local2
Certificate version: 3
Serial number: 506c3d0600000000259b
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SBU, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1_backup, Domain component:
example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SBU, CN=spoke1_backup
```



```

Alternate subject: "spoke1_backup@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 9-2012 11:09
  Not after: 11- 9-2013 11:19
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:a7:02:b5:e2:cd:79:24:f8:97:a3:8d:4d:27
8c:2b:dd:f1:57:72:4d:2b:6d:d5:95:0d:9c:1b:5c:e2:a4:b0:84:2e
31:82:3c:91:08:a2:58:b9:30:4c:5f:a3:6b:e6:2b:9c:b1:42:dd:1c
cd:a2:7a:84:ea:7b:a6:b7:9a:13:33:c6:27:2b:79:2a:b1:0c:fe:08
4c:a7:35:fc:da:4f:df:1f:cf:f4:ba:bc:5a:05:06:63:92:41:b4:f2
54:00:3f:ef:ff:41:e6:ca:74:10:56:f7:2b:5f:d3:1a:33:7e:49:74
1c:42:cf:c2:23:ea:4b:8f:50:2c:eb:1c:a6:37:89:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  d6:7f:52:a3:b6:f8:ae:cb:70:3f:a9:79:ea:8a:da:9e:ba:83:e4:5f (sha1)
  76:0b:72:73:cf:51:ee:58:81:2d:f7:b4:e2:5c:f4:5c (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT for Local1 and SBU for Local2. The IKE configurations on the hub include OU=SLT and OU=SBU to identify the spoke.

Configuring the Hub

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 1.1.1/30
set interfaces ge-0/0/2 unit 0 family inet address 1.1.2/30
set interfaces ge-0/0/3 unit 0 family inet address 50.50.50.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.1/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 20.20.20.1/24
set policy-options policy-statement lan_nw from interface ge-0/0/3.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp-1 type internal
set protocols bgp group ibgp-1 local-address 10.10.10.1
set protocols bgp group ibgp-1 export lan_nw
set protocols bgp group ibgp-1 cluster 1.2.3.4
set protocols bgp group ibgp-1 allow 10.10.10.0/24
set protocols bgp group ibgp-2 type internal

```

```
set protocols bgp group ibgp-2 local-address 20.20.20.1
set protocols bgp group ibgp-2 export lan_nw
set protocols bgp group ibgp-2 cluster 1.2.3.5
set protocols bgp group ibgp-2 allow 20.20.20.0/24
set routing-options static route 2.2.2.0/30 next-hop 1.1.1.2
set routing-options static route 3.3.3.0/30 next-hop 1.1.2.2
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy-1 mode main
set security ike policy ike-policy-1 proposals ike-proposal
set security ike policy ike-policy-1 certificate local-certificate Local1
set security ike policy ike-policy-2 mode main
set security ike policy ike-policy-2 proposals ike-proposal
set security ike policy ike-policy-2 certificate local-certificate Local2
set security ike gateway hub-to-spoke-gw-1 ike-policy ike-policy-1
set security ike gateway hub-to-spoke-gw-1 dynamic distinguished-name wildcard OU=SLT
set security ike gateway hub-to-spoke-gw-1 dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw-1 local-identity distinguished-name
set security ike gateway hub-to-spoke-gw-1 external-interface ge-0/0/1.0
set security ike gateway hub-to-spoke-gw-2 ike-policy ike-policy-2
set security ike gateway hub-to-spoke-gw-2 dynamic distinguished-name wildcard
    OU=SBU
set security ike gateway hub-to-spoke-gw-2 dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw-2 local-identity distinguished-name
set security ike gateway hub-to-spoke-gw-2 external-interface ge-0/0/2.0
set security ipsec vpn-monitor-options interval 5
set security ipsec vpn-monitor-options threshold 2
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy proposals ipsec-proposal
set security ipsec vpn hub-to-spoke-vpn-1 bind-interface st0.0
set security ipsec vpn hub-to-spoke-vpn-1 vpn-monitor source-interface ge-0/0/1.0
set security ipsec vpn hub-to-spoke-vpn-1 ike gateway hub-to-spoke-gw-1
set security ipsec vpn hub-to-spoke-vpn-1 ike ipsec-policy vpn-policy
set security ipsec vpn hub-to-spoke-vpn-2 bind-interface st0.1
set security ipsec vpn hub-to-spoke-vpn-2 vpn-monitor source-interface ge-0/0/2.0
set security ipsec vpn hub-to-spoke-vpn-2 ike gateway hub-to-spoke-gw-2
set security ipsec vpn hub-to-spoke-vpn-2 ike ipsec-policy vpn-policy
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces ge-0/0/2.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
```

```
set security pki ca-profile ca-profile1 revocation-check disable
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 1.1.1.1/30
user@host# set ge-0/0/2 unit 0 family inet address 1.1.2.1/30
user@host# set ge-0/0/3 unit 0 family inet address 50.50.50.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.1/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 20.20.20.1/24
```

2. Configure routing protocol.

```
[edit policy-options]
user@host# set policy-statement lan_nw from interface ge-0/0/3.0
user@host# set policy-statement lan_nw then accept

[edit protocols bgp]
user@host# set group ibgp-1 type internal
user@host# set group ibgp-1 local-address 10.10.10.1
user@host# set group ibgp-1 export lan_nw
user@host# set group ibgp-1 cluster 1.2.3.4
user@host# set group ibgp-1 allow 10.10.10.0/24

user@host# set group ibgp-2 type internal
user@host# set group ibgp-2 local-address 20.20.20.1
user@host# set group ibgp-2 export lan_nw
user@host# set group ibgp-2 cluster 1.2.3.5
user@host# set group ibgp-2 allow 20.20.20.0/24

[edit routing-options]
user@host# set static route 2.2.2.0/30 next-hop 1.1.1.2
user@host# set static route 3.3.3.0/30 next-hop 1.1.2.2
user@host# set autonomous-system 10
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc
```

```
[edit security ike policy ike-policy-1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike policy ike-policy-2]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local2

[edit security ike gateway hub-to-spoke-gw-1]
user@host# set ike-policy ike-policy-1
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/1.0

[edit security ike gateway hub-to-spoke-gw-2]
user@host# set ike-policy ike-policy-2
user@host# set dynamic distinguished-name wildcard OU=SBU
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/2.0
```

4. Configure Phase 2 options.

```
[edit security ipsec vpn-monitor]
user@host# set options interval 5
user@host# set options threshold 2

[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn hub-to-spoke-vpn-1]
user@host# set bind-interface st0.0
user@host# set vpn-monitor source-interface ge-0/0/1.0
user@host# set ike gateway hub-to-spoke-gw-1
user@host# set ike ipsec-policy vpn-policy

[edit security ipsec vpn hub-to-spoke-vpn-2]
user@host# set bind-interface st0.1
user@host# set vpn-monitor source-interface ge-0/0/2.0
user@host# set ike gateway hub-to-spoke-gw-2
user@host# set ike ipsec-policy vpn-policy
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.0
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces ge-0/0/2.0
user@host# set interfaces st0.1
```

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/3.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 1.1.1.1/30;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 1.1.2.1/30;
    }
  }
}
```

```
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 50.50.50.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.1/24;
    }
  }
  unit 1 {
    multipoint;
    family inet {
      address 20.20.20.1/24;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement lan_nw {
  from interface ge-0/0/3.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  group ibgp-1 {
    type internal;
    local-address 10.10.10.1;
    export lan_nw;
    cluster 1.2.3.4;
    allow 10.10.10.0/24;
  }
  group ibgp-2 {
    type internal;
    local-address 20.20.20.1;
    export lan_nw;
    cluster 1.2.3.5;
    allow 20.20.20.0/24;
  }
}
[edit]
user@host# show routing-options
static {
  route 2.2.2.0/30 next-hop 1.1.1.2;
  route 3.3.3.0/30 next-hop 1.1.2.2;
}
autonomous-system 10;
[edit]
user@host# show security ike
```

```

proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-policy-1 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local1;
  }
}
policy ike-policy-2 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local2;
  }
}
gateway hub-to-spoke-gw-1 {
  ike-policy ike-policy-1;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/1.0;
}
gateway hub-to-spoke-gw-2 {
  ike-policy ike-policy-2;
  dynamic {
    distinguished-name {
      wildcard OU=SBU;
    }
    ike-user-type group-ike-id;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/2.0;
}
[edit]
user@host# show security ipsec
vpn-monitor-options {
  interval 5;
  threshold 2;
}
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy {
  perfect-forward-secrecy {

```

```
    keys group14;
  }
  proposals ipsec-proposal;
}
vpn hub-to-spoke-vpn-1 {
  bind-interface st0.0;
  vpn-monitor {
    source-interface ge-0/0/1.0;
  }
  ike {
    gateway hub-to-spoke-gw-1;
    ipsec-policy vpn-policy;
  }
}
vpn hub-to-spoke-vpn-2 {
  bind-interface st0.1;
  vpn-monitor {
    source-interface ge-0/0/2.0;
  }
  ike {
    gateway hub-to-spoke-gw-2;
    ipsec-policy vpn-policy;
  }
}
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    st0.0;
    ge-0/0/1.0;
    ge-0/0/2.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
```



```
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {
        disable;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces fe-0/0/1 unit 0 family inet address 2.2.2.1/30
set interfaces fe-0/0/2 unit 0 family inet address 3.3.3.1/30
set interfaces fe-0/0/4 unit 0 family inet address 60.60.60.1/24
set interfaces st0 unit 0 family inet address 10.10.10.2/24
set interfaces st0 unit 1 family inet address 20.20.20.2/24
set policy-options policy-statement default_route from protocol static
set policy-options policy-statement default_route from route-filter 0.0.0.0/0 exact
set policy-options policy-statement default_route then accept
set policy-options policy-statement lan_nw from interface fe-0/0/4.0
set policy-options policy-statement lan_nw then accept
set protocols bgp group ibgp-1 type internal
set protocols bgp group ibgp-1 local-address 10.10.10.2
set protocols bgp group ibgp-1 export lan_nw
set protocols bgp group ibgp-1 neighbor 10.10.10.1
set protocols bgp group ibgp-2 type internal
set protocols bgp group ibgp-2 local-address 20.20.20.2
set protocols bgp group ibgp-2 export default_route
set protocols bgp group ibgp-2 neighbor 20.20.20.1
set routing-options static route 1.1.1.0/30 next-hop 2.2.2.2
set routing-options static route 1.1.2.0/30 next-hop 3.3.3.2
set routing-options static route 0.0.0.0/0 next-hop st0.1
set routing-options autonomous-system 10
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy-1 mode main
```

```

set security ike policy ike-policy-1 proposals ike-proposal
set security ike policy ike-policy-1 certificate local-certificate Local1
set security ike policy ike-policy-2 mode main
set security ike policy ike-policy-2 proposals ike-proposal
set security ike policy ike-policy-2 certificate local-certificate Local2
set security ike gateway spoke-to-hub-gw-1 ike-policy ike-policy-1
set security ike gateway spoke-to-hub-gw-1 address 1.1.1.1
set security ike gateway spoke-to-hub-gw-1 local-identity distinguished-name
set security ike gateway spoke-to-hub-gw-1 remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw-1 external-interface fe-0/0/1.0
set security ike gateway spoke-to-hub-gw-2 ike-policy ike-policy-2
set security ike gateway spoke-to-hub-gw-2 address 1.1.2.1
set security ike gateway spoke-to-hub-gw-2 local-identity distinguished-name
set security ike gateway spoke-to-hub-gw-2 remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw-2 external-interface fe-0/0/2.0
set security ipsec vpn-monitor-options interval 5
set security ipsec vpn-monitor-options threshold 2
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy proposals ipsec-proposal
set security ipsec vpn spoke-to-hub-1 bind-interface st0.0
set security ipsec vpn spoke-to-hub-1 vpn-monitor destination-ip 1.1.1.1
set security ipsec vpn spoke-to-hub-1 ike gateway spoke-to-hub-gw-1
set security ipsec vpn spoke-to-hub-1 ike ipsec-policy vpn-policy
set security ipsec vpn spoke-to-hub-1 establish-tunnels immediately
set security ipsec vpn spoke-to-hub-2 bind-interface st0.1
set security ipsec vpn spoke-to-hub-2 vpn-monitor destination-ip 1.1.2.1
set security ipsec vpn spoke-to-hub-2 ike gateway spoke-to-hub-gw-2
set security ipsec vpn spoke-to-hub-2 ike ipsec-policy vpn-policy
set security ipsec vpn spoke-to-hub-2 establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces fe-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces fe-0/0/2.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```
[edit interfaces]
user@host# set fe-0/0/1 unit 0 family inet address 2.2.2.1/30
user@host# set fe-0/0/2 unit 0 family inet address 3.3.3.1/30
user@host# set fe-0/0/4 unit 0 family inet address 60.60.60.1/24
user@host# set st0 unit 0 family inet address 10.10.10.2/24
user@host# set st0 unit 1 family inet address 20.20.20.2/24
```

2. Configure routing protocol.

```
[edit policy-options]
user@host# set policy-statement default_route from protocol static
user@host# set policy-statement default_route from route-filter 0.0.0.0/0 exact
user@host# set policy-statement default_route then accept
user@host# set policy-statement lan_nw from interface fe-0/0/4.0
user@host# set policy-statement lan_nw then accept
```

```
[edit protocols bgp]
user@host# set group ibgp-1 type internal
user@host# set group ibgp-1 local-address 10.10.10.2
user@host# set group ibgp-1 export lan_nw
user@host# set group ibgp-1 neighbor 10.10.10.1
```

```
user@host# set group ibgp-2 type internal
user@host# set group ibgp-2 local-address 20.20.20.2
user@host# set group ibgp-2 export default_route
user@host# set group ibgp-2 neighbor 20.20.20.1
```

```
[edit routing-options]
user@host# set static route 1.1.1.0/30 next-hop 2.2.2.2
user@host# set static route 1.1.2.0/30 next-hop 3.3.3.2
user@host# set static route 0.0.0.0/0 next-hop st0.1
user@host# set autonomous-system 10
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc
```

```
[edit security ike policy ike-policy-1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1
```

```
[edit security ike policy ike-policy-2]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local2
```

```
[edit security ike gateway spoke-to-hub-gw-1]
user@host# set ike-policy ike-policy-1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/1.0

[edit security ike gateway spoke-to-hub-gw-2]
user@host# set ike-policy ike-policy-2
user@host# set address 1.1.2.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/2.0
```

4. Configure Phase 2 options.

```
[edit security ipsec vpn-monitor]
user@host# set options interval 5
user@host# set options threshold 2

[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn spoke-to-hub-1]
user@host# set bind-interface st0.0
user@host# set vpn-monitor destination-ip 1.1.1.1
user@host# set ike gateway spoke-to-hub-gw-1
user@host# set ike ipsec-policy vpn-policy
user@host# set establish-tunnels immediately

[edit security ipsec vpn spoke-to-hub-2]
user@host# set bind-interface st0.1
user@host# set vpn-monitor destination-ip 1.1.2.1
user@host# set ike gateway spoke-to-hub-gw-2
user@host# set ike ipsec-policy vpn-policy
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/1.0
user@host# set interfaces st0.0
user@host# set interfaces fe-0/0/2.0
```

```

user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
fe-0/0/1 {
  unit 0 {
    family inet {
      address 2.2.2.1/30;
    }
  }
}
fe-0/0/2 {
  unit 0 {
    family inet {
      address 3.3.3.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 60.60.60.1/24;
    }
  }
}

```

```
st0 {
  unit 0 {
    family inet {
      address 10.10.10.2/24;
    }
  }
  unit 1 {
    family inet {
      address 20.20.20.2/24;
    }
  }
}
[edit]
user@host# show policy-options
policy-statement default_route {
  from {
    protocol static;
    route-filter 0.0.0.0/0 exact;
  }
  then accept;
}
policy-statement lan_nw {
  from interface fe-0/0/4.0;
  then accept;
}
[edit]
user@host# show protocols
bgp {
  group ibgp-1 {
    type internal;
    local-address 10.10.10.2;
    export lan_nw;
    neighbor 10.10.10.1;
  }
  group ibgp-2 {
    type internal;
    local-address 20.20.20.2;
    export default_route;
    neighbor 20.20.20.1;
  }
}
[edit]
user@host# show routing-options
static {
  route 1.1.1.0/30 next-hop 2.2.2.2;
  route 1.1.2.0/30 next-hop 3.3.3.2;
  route 0.0.0.0/0 next-hop st0.1;
}
autonomous-system 10;
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
```

```

    encryption-algorithm aes-128-cbc;
  }
  policy ike-policy-1 {
    mode main;
    proposals ike-proposal;
    certificate {
      local-certificate Local1;
    }
  }
  policy ike-policy-2 {
    mode main;
    proposals ike-proposal;
    certificate {
      local-certificate Local2;
    }
  }
  gateway spoke-to-hub-gw-1 {
    ike-policy ike-policy-1;
    address 1.1.1.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/1.0;
  }
  gateway spoke-to-hub-gw-2 {
    ike-policy ike-policy-2;
    address 1.1.2.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/2.0;
  }
[edit]
user@host# show security ipsec
vpn-monitor-options {
  interval 5;
  threshold 2;
}
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy {
  perfect-forward-secrecy {
    keys group14;
  }
  proposals ipsec-proposal;
}
vpn spoke-to-hub-1 {
  bind-interface st0.0;
  vpn-monitor {
    destination-ip 1.1.1.1;
  }
  ike {
    gateway spoke-to-hub-gw-1;
    ipsec-policy vpn-policy;
  }
}

```

```
    }
    establish-tunnels immediately;
}
vpn spoke-to-hub-2 {
    bind-interface st0.1;
    vpn-monitor {
        destination-ip 1.1.2.1;
    }
    ike {
        gateway spoke-to-hub-gw-2;
        ipsec-policy vpn-policy;
    }
    establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        fe-0/0/1.0;
        st0.0;
        fe-0/0/2.0;
        st0.1;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        fe-0/0/4.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
```



```

    url http://pc4/certsrv/mscep/mscep.dll;
  }
  revocation-check {
    disable;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Phase 1 Status \(Both Tunnels Are Up\) on page 341](#)
- [Verifying IPsec Phase 2 Status \(Both Tunnels Are Up\) on page 341](#)
- [Verifying IPsec Next-Hop Tunnels \(Both Tunnels Are Up\) on page 342](#)
- [Verifying BGP \(Both Tunnels Are Up\) on page 342](#)
- [Verifying Learned Routes \(Both Tunnels Are Up\) on page 343](#)
- [Verifying IKE Phase 1 Status \(Primary Tunnel Is Down\) on page 343](#)
- [Verifying IPsec Phase 2 Status \(Primary Tunnel Is Down\) on page 344](#)
- [Verifying IPsec Next-Hop Tunnels \(Primary Tunnel Is Down\) on page 344](#)
- [Verifying BGP \(Primary Tunnel Is Down\) on page 345](#)
- [Verifying Learned Routes \(Primary Tunnel Is Down\) on page 345](#)

Verifying IKE Phase 1 Status (Both Tunnels Are Up)

Purpose Verify the IKE Phase 1 status when both IPSec VPN tunnels are up.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
3733075	UP	d4f51c28c0a82101	05b125993a864d3c	Main	3.3.3.1
3733076	UP	d53c8a0b7d4c319b	c23c5f7a26388247	Main	2.2.2.1

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spoke.

Verifying IPsec Phase 2 Status (Both Tunnels Are Up)

Purpose Verify the IPsec Phase 2 status when both IPsec VPN tunnels are up.

Action From operational mode, enter the **security ipsec security-associations** command.

```
user@host> security ipsec security-associations
```

```
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<268173316 ESP:des/ md5 3cd96946 3555/ unlim U   root 500  2.2.2.1
>268173316 ESP:des/ md5 1c09b9b 3555/ unlim U   root 500  2.2.2.1
<268173313 ESP:des/ md5 7c6ffca3 3340/ unlim U   root 500  3.3.3.1
>268173313 ESP:des/ md5 33bf6f2f 3340/ unlim U   root 500  3.3.3.1
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spoke.

Verifying IPsec Next-Hop Tunnels (Both Tunnels Are Up)

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
		XAUTH username		
10.10.10.2	st0.0	hub-to-spoke-vpn-1	Auto	C=IN,
		DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1		
20.20.20.2	st0.1	hub-to-spoke-vpn-2	Auto	C=IN,
		DC=example.net, ST=KA, L=Mysore, O=example, OU=SBU, CN=spoke1_backup		

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spoke. The next hop should be associated with the correct IPsec VPN name.

Verifying BGP (Both Tunnels Are Up)

Purpose Verify that BGP references the IP addresses for the **st0** interfaces of the spoke when both IPsec VPN tunnels are up.

Action From operational mode, enter the **show bgp summary** command.

```
user@host> show bgp summary
Groups: 2 Peers: 2 Down peers: 0
Unconfigured peers: 2
Table Tot Paths Act Paths Suppressed History Damp State Pending
inet.0 2 2 0 0 0 0 0
Peer AS InPkt OutPkt OutQ Flaps Last Up/Dwn
State|#Active/Received/Accepted/Damped...
10.10.10.2 10 5 6 0 0 54
1/1/1/0 0/0/0/0
20.20.20.2 10 13 16 0 0 4:29
1/1/1/0 0/0/0/0
```

Verifying Learned Routes (Both Tunnels Are Up)

Purpose Verify that routes to the spoke have been learned when both tunnels are up. The route to 60.60.60.0/24 is through the st0.0 interface and the default route is through the st0.1 interface.

Action From operational mode, enter the **show route 60.60.60.0** command.

```
user@host> show route 60.60.60.0
inet.0: 48 destinations, 48 routes (47 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

60.60.60.0/24    *[BGP/170] 00:01:11, localpref 100
                 AS path: I
                 > to 10.10.10.2 via st0.0
```

From operational mode, enter the **show route 0.0.0.0** command.

```
user@host> show route 0.0.0.0
inet.0: 48 destinations, 48 routes (47 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0       *[BGP/170] 00:04:55, localpref 100
                 AS path: I
                 > to 20.20.20.2 via st0.1
```

Verifying IKE Phase 1 Status (Primary Tunnel Is Down)

Purpose Verify the IKE Phase 1 status when the primary tunnel is down.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
3733075	UP	d4f51c28c0a82101	05b125993a864d3c	Main	3.3.3.1
3733076	UP	d53c8a0b7d4c319b	c23c5f7a26388247	Main	2.2.2.1

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spoke.

Verifying IPsec Phase 2 Status (Primary Tunnel Is Down)

Purpose Verify the IPsec Phase 2 status when the primary tunnel is down.

Action From operational mode, enter the **security ipsec security-associations** command.

```
user@host> security ipsec security-associations
```

```

Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<268173313 ESP:des/ md5 7c6ffca3 3156/ unlim U   root 500    3.3.3.1
>268173313 ESP:des/ md5 33bf6f2f 3156/ unlim U   root 500    3.3.3.1
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spoke.

Verifying IPsec Next-Hop Tunnels (Primary Tunnel Is Down)

Purpose Verify the IPsec next-hop tunnel.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
		XAUTH username		
20.20.20.2	st0.1	hub-to-spoke-vpn-2	Auto	C=IN,
DC=example.net, ST=KA, L=Mysore, O=example, OU=SBU, CN=spoke1_backup				

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spoke. The next hop should be associated with the correct IPsec VPN name, in this case the backup VPN tunnel.

Verifying BGP (Primary Tunnel Is Down)

Purpose Verify that BGP references the IP addresses for the **st0** interfaces of the spoke when the primary tunnel is down.

Action From operational mode, enter the **show bgp summary** command.

```
user@host> show bgp summary
```

```
Groups: 2 Peers: 1 Down peers: 0
```

```
Unconfigured peers: 1
```

Table	Tot Paths	Act	Paths	Suppressed	History	Damp	State	Pending
inet.0	1		1	0	0		0	0
Peer		AS	InPkt	OutPkt	OutQ	Flaps	Last	Up/Dwn
State #Active/Received/Accepted/Damped...								
20.20.20.2		10	20	24	0		0	7:24
1/1/1/0		0/0/0/0						

Verifying Learned Routes (Primary Tunnel Is Down)

Purpose Verify that routes to the spoke have been learned when the primary tunnel is down. Both the route to 60.60.60.0/24 and the default route are through the st0.1 interface.

Action From operational mode, enter the **show route 60.60.60.0** command.

```
user@host> show route 60.60.60.0

inet.0: 46 destinations, 46 routes (45 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 00:07:41, localpref 100
                   AS path: I
                   > to 20.20.20.2 via st0.1
```

From operational mode, enter the **show route 0.0.0.0** command.

```
user@host> show route 0.0.0.0

inet.0: 46 destinations, 46 routes (45 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 00:07:47, localpref 100
                   AS path: I
                   > to 20.20.20.2 via st0.1
```

See Also • [Example: Configuring a Route-Based VPN on page 112](#)

Example: Configuring Basic AutoVPN with OSPF

This example shows how to configure an AutoVPN hub to act as a single termination point, and then configure two spokes to act as tunnels to remote sites. This example configures OSPF to forward packets through the VPN tunnels.

- [Requirements on page 346](#)
- [Overview on page 347](#)
- [Configuration on page 349](#)
- [Verification on page 370](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as AutoVPN hub and spokes
- Junos OS Release 12.1X44-D10 and later that support AutoVPN

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configuration of an AutoVPN hub and the subsequent configurations of two spokes.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). The certificates for the spokes contain the organizational unit (OU) value “SLT” in the subject field; the hub is configured with a group IKE ID to match the value “SLT” in the OU field.

The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and all spokes must have the same values. [Table 38 on page 347](#) shows the options used in this example.

Table 38: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke Basic OSPF Configurations

Option	Value
<i>IKE proposal:</i>	
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	2
Authentication algorithm	SHA-1
Encryption algorithm	AES 128 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Authentication algorithm	HMAC MD5 96
Encryption algorithm	DES CBC
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	14

The same certificate authority (CA) is configured on all devices.



NOTE: Junos OS only supports a single level of certificate hierarchy.

Table 39 on page 348 shows the options configured on the hub and on all spokes.

Table 39: AutoVPN Basic OSPF Configuration for Hub and All Spokes

Option	Hub	All Spokes
<i>IKE gateway:</i>		
Remote IP address	Dynamic	1.1.1.1
Remote IKE ID	Distinguished name (DN) on the spoke's certificate with the string SLT in the organizational unit (OU) field	DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	ge-0/0/1.0	Spoke 1: fe-0/0/1.0 Spoke 2: ge-0/0/1.0
<i>VPN:</i>		
Bind interface	st0.0	st0.0
Establish tunnels	(not configured)	Immediately on configuration commit

Table 40 on page 348 shows the configuration options that are different on each spoke.

Table 40: Comparison Between the Basic OSPF Spoke Configurations

Option	Spoke 1	Spoke 2
st0.0 interface	10.10.10.2/24	10.10.10.3/24
Interface to internal network	fe-0.0/4.0: 60.60.60.1/24	fe-0.0/4.0: 70.70.70.1/24
Interface to Internet	fe-0/0/1.0: 2.2.2.1/30	ge-0/0/1.0: 3.3.3.1/30

Routing information for all devices is exchanged through the VPN tunnels.

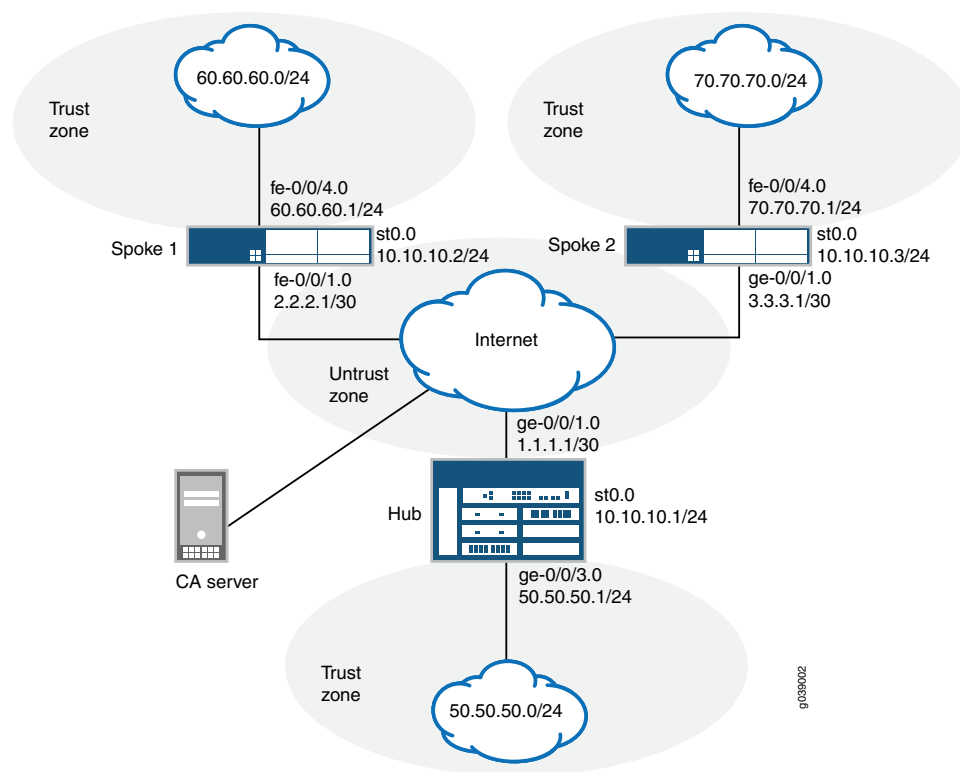


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

Figure 22 on page 349 shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 22: Basic AutoVPN Deployment with OSPF



Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 349](#)
- [Configuring the Hub on page 354](#)
- [Configuring Spoke 1 on page 359](#)
- [Configuring Spoke 2 on page 364](#)

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
```

```
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal
Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,
  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
```

```
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal
Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,
  Locality: Mysore, Common name: spoke1, Domain component: example.net
```

```

Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Step-by-Step Procedure

To enroll digital certificates with SCEP on spoke 2:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://pc4/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```

user@host> request security pki generate-key-pair certificate-id Local1

```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke2@example.net
ip-address 3.3.3.1 subject
DC=example.net,CN=spoke2,OU=SLT,O=example,L=Tumkur,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40bb71d400000000258f
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Tumkur, Common name: spoke2, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2
Alternate subject: "spoke2@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 6-2012 10:02
  Not after: 11- 6-2013 10:12
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b6:2e:e2:da:e6:ac:57:e4:5d:ff:de:f6:89
27:d6:3e:1b:4a:3f:b2:2d:b3:d3:61:ed:ed:6a:07:d9:8a:d2:24:03
77:1a:fe:84:e1:12:8a:2d:63:6e:bf:02:6b:15:96:5a:4f:37:a0:46
44:09:96:c0:fd:bb:ab:79:2c:5d:92:bd:31:f0:3b:29:51:ce:89:8e
7c:2b:02:d0:14:5b:0a:a9:02:93:21:ea:f9:fc:4a:e7:08:bc:b1:6d
7c:f8:3e:53:58:8e:f1:86:13:fe:78:b5:df:0b:8e:53:00:4a:46:11
58:4a:38:e9:82:43:d8:25:47:7d:ef:18:f0:ef:a7:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  1a:6d:77:ac:fd:94:68:ce:cf:8a:85:f0:39:fc:e0:6b:fd:fe:b8:66 (sha1)
  00:b1:32:5f:7b:24:9c:e5:02:e6:72:75:9e:a5:f4:77 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Configuring the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 1.1.1.1/30
set interfaces ge-0/0/3 unit 0 family inet address 50.50.50.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.1/24
set protocols ospf area 0.0.0.0 interface st0.0 interface-type p2mp
set protocols ospf area 0.0.0.0 interface st0.0 dynamic-neighbors
set protocols ospf area 0.0.0.0 interface ge-0/0/3.0
set routing-options static route 2.2.2.0/30 next-hop 1.1.1.2
set routing-options static route 3.3.3.0/30 next-hop 1.1.1.2
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1
set security ike gateway hub-to-spoke-gw ike-policy ike-policy1
set security ike gateway hub-to-spoke-gw dynamic distinguished-name wildcard OU=SLT
set security ike gateway hub-to-spoke-gw dynamic ike-user-type group-ike-id
set security ike gateway hub-to-spoke-gw local-identity distinguished-name
set security ike gateway hub-to-spoke-gw external-interface ge-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn hub-to-spoke-vpn bind-interface st0.0
set security ipsec vpn hub-to-spoke-vpn ike gateway hub-to-spoke-gw
set security ipsec vpn hub-to-spoke-vpn ike ipsec-policy vpn-policy1
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 1.1.1.1/30
user@host# set ge-0/0/3 unit 0 family inet address 50.50.50.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.1/24
```

2. Configure the routing protocol.

```
[edit protocols ospf]
user@host# set area 0.0.0.0 interface st0.0 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.0 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/3.0

[edit routing-options]
user@host# set static route 2.2.2.0/30 next-hop 1.1.1.2
user@host# set static route 3.3.3.0/30 next-hop 1.1.1.2
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway hub-to-spoke-gw]
user@host# set ike-policy ike-policy1
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/1.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
```

```

user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn hub-to-spoke-vpn]
user@host# set bind-interface st0.0
user@host# set ike gateway hub-to-spoke-gw
user@host# set ike ipsec-policy vpn-policy1

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/3.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

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

```



```

    family inet {
        address 1.1.1.1/30;
    }
}
ge-0/0/3 {
    unit 0 {
        family inet {
            address 50.50.50.1/24;
        }
    }
}
st0 {
    unit 0 {
        multipoint;
        family inet {
            address 10.10.10.1/24;
        }
    }
}
[edit]
user@host# show protocols
ospf {
    area 0.0.0.0 {
        interface st0.0 {
            interface-type p2mp;
            dynamic-neighbors;
        }
        interface ge-0/0/3.0;
    }
}
[edit]
user@host# show routing-options
static {
    route 2.2.2.0/30 next-hop 1.1.1.2;
    route 3.3.3.0/30 next-hop 1.1.1.2;
}
[edit]
user@host# show security ike
proposal ike-proposal {
    authentication-method rsa-signatures;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
    mode main;
    proposals ike-proposal;
    certificate {
        local-certificate Local1;
    }
}
gateway hub-to-spoke-gw {
    ike-policy ike-policy1;
    dynamic {

```

```
distinguished-name {
    wildcard OU=SLT;
}
ike-user-type group-ike-id;
}
local-identity distinguished-name;
external-interface ge-0/0/1.0;
}
[edit]
user@host# show security ipsec
traceoptions {
    flag all;
}
proposal ipsec-proposal {
    protocol esp;
    authentication-algorithm hmac-md5-96;
    encryption-algorithm des-cbc;
}
policy vpn-policy1 {
    perfect-forward-secrecy {
        keys group14;
    }
    proposals ipsec-proposal;
}
vpn hub-to-spoke-vpn {
    bind-interface st0.0;
    ike {
        gateway hub-to-spoke-gw;
        ipsec-policy vpn-policy1;
    }
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        st0.0;
        ge-0/0/1.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
}
```

```

    }
    interfaces {
        ge-0/0/3.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {
        disable;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces fe-0/0/1 unit 0 family inet address 2.2.2.1/30
set interfaces fe-0/0/4 unit 0 family inet address 60.60.60.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.2/24
set protocols ospf area 0.0.0.0 interface st0.0 interface-type p2mp
set protocols ospf area 0.0.0.0 interface st0.0 neighbor 10.10.10.1
set protocols ospf area 0.0.0.0 interface fe-0/0/4.0
set routing-options static route 1.1.1.0/30 next-hop 2.2.2.2
set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1
set security ike gateway spoke-to-hub-gw ike-policy ike-policy1
set security ike gateway spoke-to-hub-gw address 1.1.1.1
set security ike gateway spoke-to-hub-gw local-identity distinguished-name
set security ike gateway spoke-to-hub-gw remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw external-interface fe-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96

```

```

set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn spoke-to-hub bind-interface st0.0
set security ipsec vpn spoke-to-hub ike gateway spoke-to-hub-gw
set security ipsec vpn spoke-to-hub ike ipsec-policy vpn-policy1
set security ipsec vpn spoke-to-hub establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces fe-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```

[edit interfaces]
user@host# set fe-0/0/1 unit 0 family inet address 2.2.2.1/30
user@host# set fe-0/0/4 unit 0 family inet address 60.60.60.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.2/24

```

2. Configure the routing protocol.

```

[edit protocols ospf]
user@host# set area 0.0.0.0 interface st0.0 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.0 neighbor 10.10.10.1
user@host# set area 0.0.0.0 interface fe-0/0/4.0

[edit routing-options]
user@host# set static route 1.1.1.0/30 next-hop 2.2.2.2

```

3. Configure Phase 1 options.

```

[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1

```

```

user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway spoke-to-hub-gw]
user@host# set ike-policy ike-policy1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface fe-0/0/1.0

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn spoke-to-hub]
user@host# set bind-interface st0.0
user@host# set ike gateway spoke-to-hub-gw
user@host# set ike ipsec-policy vpn-policy1
user@host# set establish-tunnels immediately

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/1.0
user@host# set interfaces st0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
fe-0/0/1 {
  unit 0 {
    family inet {
      address 2.2.2.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 60.60.60.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.2/24;
    }
  }
}
[edit]
user@host# show protocols
ospf {
  area 0.0.0.0 {
    interface st0.0 {
      interface-type p2mp;
      neighbor 10.10.10.1;
    }
    interface fe-0/0/4.0;
  }
}
[edit]
user@host# show routing-options
static {
```

```

    route 1.1.1.0/30 next-hop 2.2.2.2;
}
[edit]
user@host# show security ike
proposal ike-proposal {
    authentication-method rsa-signatures;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
    mode main;
    proposals ike-proposal;
    certificate {
        local-certificate Local1;
    }
}
gateway spoke-to-hub-gw {
    ike-policy ike-policy1;
    address 1.1.1.1;
    local-identity distinguished-name;
    remote-identity distinguished-name;
    external-interface fe-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
    protocol esp;
    authentication-algorithm hmac-md5-96;
    encryption-algorithm des-cbc;
}
policy vpn-policy1 {
    perfect-forward-secrecy {
        keys group14;
    }
    proposals ipsec-proposal;
}
vpn spoke-to-hub {
    bind-interface st0.0;
    ike {
        gateway spoke-to-hub-gw;
        ipsec-policy vpn-policy1;
    }
    establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
}

```

```

    }
    interfaces {
        fe-0/0/1.0;
        st0.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        fe-0/0/4.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {
        disable;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 2

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 3.3.3.1/30
set interfaces fe-0/0/4 unit 0 family inet address 70.70.70.1/24
set interfaces st0 unit 0 multipoint
set interfaces st0 unit 0 family inet address 10.10.10.3/24
set protocols ospf area 0.0.0.0 interface st0.0 interface-type p2mp
set protocols ospf area 0.0.0.0 interface st0.0 neighbor 10.10.10.1
set protocols ospf area 0.0.0.0 interface fe-0/0/4.0
set routing-options static route 1.1.1.1/32 next-hop 3.3.3.2

```



```

set security ike proposal ike-proposal authentication-method rsa-signatures
set security ike proposal ike-proposal dh-group group2
set security ike proposal ike-proposal authentication-algorithm sha1
set security ike proposal ike-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposals ike-proposal
set security ike policy ike-policy1 certificate local-certificate Local1
set security ike gateway spoke-to-hub-gw ike-policy ike-policy1
set security ike gateway spoke-to-hub-gw address 1.1.1.1
set security ike gateway spoke-to-hub-gw local-identity distinguished-name
set security ike gateway spoke-to-hub-gw remote-identity distinguished-name
set security ike gateway spoke-to-hub-gw external-interface ge-0/0/1.0
set security ipsec proposal ipsec-proposal protocol esp
set security ipsec proposal ipsec-proposal authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec-proposal encryption-algorithm des-cbc
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group14
set security ipsec policy vpn-policy1 proposals ipsec-proposal
set security ipsec vpn spoke-to-hub bind-interface st0.0
set security ipsec vpn spoke-to-hub ike gateway spoke-to-hub-gw
set security ipsec vpn spoke-to-hub ike ipsec-policy vpn-policy1
set security ipsec vpn spoke-to-hub establish-tunnels immediately
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces fe-0/0/4.0
set security policies default-policy permit-all
set security pki ca-profile ca-profile1 ca-identity ca-profile1
set security pki ca-profile ca-profile1 enrollment url http://pc4/certsrv/mscep/mscep.dll
set security pki ca-profile ca-profile1 revocation-check disable

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 2:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 3.3.3.1/30
user@host# set fe-0/0/4 unit 0 family inet address 70.70.70.1/24
user@host# set st0 unit 0 multipoint
user@host# set st0 unit 0 family inet address 10.10.10.3/24

```

2. Configure the routing protocol.

```

[edit protocols ospf]
user@host# set area 0.0.0.0 interface st0.0 interface-type p2mp

```

```

user@host# set area 0.0.0.0 interface st0.0 neighbor 10.10.10.1
user@host# set area 0.0.0.0 interface fe-0/0/4.0

[edit routing-options]
user@host# set static route 1.1.1.1/32 next-hop 3.3.3.2

```

3. Configure Phase 1 options.

```

[edit security ike proposal ike-proposal]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-128-cbc

[edit security ike policy ike-policy1]
user@host# set mode main
user@host# set proposals ike-proposal
user@host# set certificate local-certificate Local1

[edit security ike gateway spoke-to-hub-gw]
user@host# set ike-policy ike-policy1
user@host# set address 1.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name
user@host# set external-interface ge-0/0/1.0

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal ipsec-proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-md5-96
user@host# set encryption-algorithm des-cbc

[edit security ipsec policy vpn-policy1]
user@host# set perfect-forward-secrecy keys group14
user@host# set proposals ipsec-proposal

[edit security ipsec vpn spoke-to-hub]
user@host# set bind-interface st0.0
user@host# set ike gateway spoke-to-hub-gw
user@host# set ike ipsec-policy vpn-policy1
user@host# set establish-tunnels immediately

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0

```

```

user@host# set interfaces st0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/4.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ca-profile1 ca-identity ca-profile1
user@host# set ca-profile ca-profile1 enrollment url
    http://pc4/certsrv/mscep/mscep.dll
user@host# set ca-profile ca-profile1 revocation-check disable

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 3.3.3.1/30;
    }
  }
}
fe-0/0/4 {
  unit 0 {
    family inet {
      address 70.70.70.1/24;
    }
  }
}
st0 {
  unit 0 {
    multipoint;
    family inet {
      address 10.10.10.3/24;
    }
  }
}

```

```
}
[edit]
user@host# show protocols
ospf {
  area 0.0.0.0 {
    interface st0.0 {
      interface-type p2mp;
      neighbor 10.10.10.1;
    }
    interface fe-0/0/4.0;
  }
}
[edit]
user@host# show routing-options
static {
  route 1.1.1.1/32 next-hop 3.3.3.2;
}
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-policy1 {
  mode main;
  proposals ike-proposal;
  certificate {
    local-certificate Local1;
  }
}
gateway spoke-to-hub-gw {
  ike-policy ike-policy1;
  address 1.1.1.1;
  local-identity distinguished-name;
  remote-identity distinguished-name;
  external-interface ge-0/0/1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec-proposal {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm des-cbc;
}
policy vpn-policy1 {
  perfect-forward-secrecy {
    keys group14;
  }
  proposals ipsec-proposal;
}
vpn spoke-to-hub {
  bind-interface st0.0;
  ike {
```

```

        gateway spoke-to-hub-gw;
        ipsec-policy vpn-policy1;
    }
    establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-0/0/1.0;
        st0.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        fe-0/0/4.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ca-profile1 {
    ca-identity ca-profile1;
    enrollment {
        url http://pc4/certsrv/mscep/mscep.dll;
    }
    revocation-check {
        disable;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Phase 1 Status on page 370](#)
- [Verifying IPsec Phase 2 Status on page 370](#)
- [Verifying IPsec Next-Hop Tunnels on page 371](#)
- [Verifying OSPF on page 371](#)
- [Verifying Learned Routes on page 371](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
5480159	UP	22432fb6f7fbc389	412b751f79b45099	Main	2.2.2.1
5480161	UP	d455050707bc3eaf	b3dde111232270d2	Main	3.3.3.1

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **security ipsec security-associations** command.

```
user@host> security ipsec security-associations
```

```
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<268173400 ESP:des/ md5 f38eea12 2954/ unlim -   root 500  2.2.2.1
>268173400 ESP:des/ md5 bb48d228 2954/ unlim -   root 500  2.2.2.1
<268173401 ESP:des/ md5 bcd1390b 3530/ unlim -   root 500  3.3.3.1
>268173401 ESP:des/ md5 77fcf6e2 3530/ unlim -   root 500  3.3.3.1
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy

parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
		XAUTH username		
10.10.10.2	st0.0	hub-to-spoke-vpn	Auto	C=IN,
DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1				
10.10.10.3	st0.0	hub-to-spoke-vpn	Auto	C=IN,
DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2				

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying OSPF

Purpose Verify that OSPF references the IP addresses for the **st0** interfaces of the spokes.

Action From operational mode, enter the **show ospf neighbor** command.

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
10.10.10.3	st0.0	Full	10.255.226.179	128	32
10.10.10.2	st0.0	Full	10.207.36.182	128	38

Verifying Learned Routes

Purpose Verify that routes to the spokes have been learned.

Action From operational mode, enter the **show route 60.60.60.0** command.

```
user@host> show route 60.60.60.0

inet.0: 48 destinations, 48 routes (47 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

60.60.60.0/24      *[OSPF/10] 00:51:13, metric 2
                  > to 10.10.10.2 via st0.0
```

From operational mode, enter the **show route 70.70.70.0** command.

```
user@host> show route 70.70.70.0

inet.0: 48 destinations, 48 routes (47 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

70.70.70.0/24      *[OSPF/10] 00:51:48, metric 2
                  > to 10.10.10.3 via st0.0
```

See Also • [Example: Configuring a Route-Based VPN on page 112](#)

Example: Configuring AutoVPN with OSPFv3 for IPv6 Traffic

This example shows how to configure an AutoVPN hub to act as a single termination point, and then configure two spokes to act as tunnels to remote sites. This example configures AutoVPN for IPv6 environment using OSPFv3 to forward packets through the VPN tunnels.

- [Requirements on page 372](#)
- [Overview on page 373](#)
- [Configuration on page 375](#)
- [Verification on page 398](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as AutoVPN hub and spokes.
- Junos OS Release 18.1R1 and later releases.

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configuration of an AutoVPN with OSPFv3 routing protocol on hub and the subsequent configurations of two spokes.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). The certificates for the spokes contain the organizational unit (OU) value “SLT” in the subject field; the hub is configured with a group IKE ID to match the value “SLT” in the OU field.

The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and all spokes must have the same values. [Table 41 on page 373](#) shows the options used in this example.

Table 41: Phase 1 and Phase 2 Options for AutoVPN Hub and Spoke Basic OSPFv3 Configurations

Option	Value
<i>IKE proposal:</i>	
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	19
Authentication algorithm	SHA-384
Encryption algorithm	AES 256 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Lifetime seconds	3000
Encryption algorithm	AES 256 GCM
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	19

The same certificate authority (CA) is configured on all devices.

[Table 42 on page 374](#) shows the options configured on the hub and on all spokes.

Table 42: AutoVPN OSPFv3 Configuration for Hub and All Spokes

Option	Hub	All Spokes
<i>IKE gateway:</i>		
Remote IP address	Dynamic	2001:db8:2000::1
Remote IKE ID	Distinguished name (DN) on the spoke's certificate with the string SLT in the organizational unit (OU) field	DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	ge-0/0/0	Spoke 1: ge-0/0/0.0 Spoke 2: ge-0/0/0.0
<i>VPN:</i>		
Bind interface	st0.1	st0.1
Establish tunnels	(not configured)	Immediately on configuration commit

Table 43 on page 374 shows the configuration options that are different on each spoke.

Table 43: Comparison Between the OSPFv3 Spoke Configurations

Option	Spoke 1	Spoke 2
st0.1 interface	2001:db8:7000::2/64	2001:db8:7000::3/64
Interface to internal network	(ge-0/0/1.0) 2001:db8:4000::1/64	(ge-0/0/1.0) 2001:db8:6000::1/64
Interface to Internet	(ge-0/0/0.0) 2001:db8:3000::2/64	(ge-0/0/0.0) 2001:db8:5000::2/64

Routing information for all devices is exchanged through the VPN tunnels.

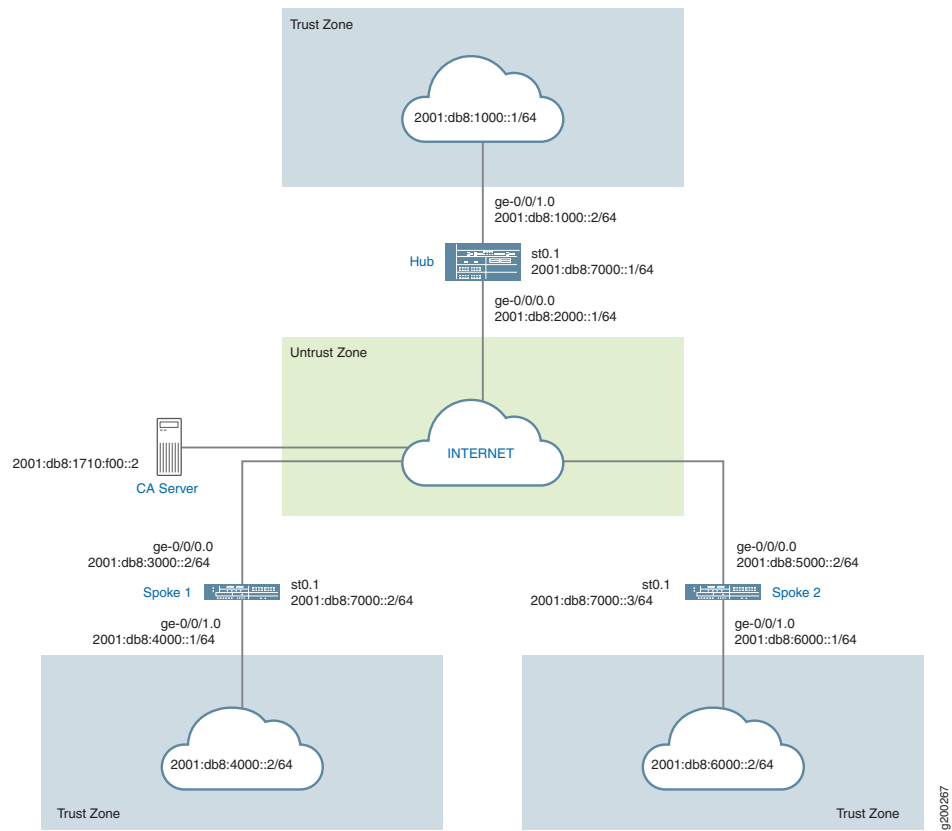


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

Figure 23 on page 375 shows the SRX Series devices to be configured for AutoVPN in this example.

Figure 23: Basic AutoVPN Deployment with OSPFv3



Configuration

To configure AutoVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 375](#)
- [Configuring the Hub on page 380](#)
- [Configuring Spoke 1 on page 386](#)
- [Configuring Spoke 2 on page 392](#)

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
```

```

6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```

user@host> request security pki generate-key-pair certificate-id Local1

```

4. Enroll the local certificate.

```

user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>

```

5. Verify the local certificate.

```

user@host> show security pki local-certificate detail

```

```

Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

```

```

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 2:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke2@example.net
ip-address 3.3.3.1 subject
DC=example.net,CN=spoke2,OU=SLT,O=example,L=Tumkur,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40bb71d400000000258f
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Tumkur, Common name: spoke2, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2
Alternate subject: "spoke2@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 6-2012 10:02
  Not after: 11- 6-2013 10:12
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b6:2e:e2:da:e6:ac:57:e4:5d:ff:de:f6:89
27:d6:3e:1b:4a:3f:b2:2d:b3:d3:61:ed:ed:6a:07:d9:8a:d2:24:03
77:1a:fe:84:e1:12:8a:2d:63:6e:bf:02:6b:15:96:5a:4f:37:a0:46
44:09:96:c0:fd:bb:ab:79:2c:5d:92:bd:31:f0:3b:29:51:ce:89:8e
7c:2b:02:d0:14:5b:0a:a9:02:93:21:ea:f9:fc:4a:e7:08:bc:b1:6d
7c:f8:3e:53:58:8e:f1:86:13:fe:78:b5:df:0b:8e:53:00:4a:46:11
58:4a:38:e9:82:43:d8:25:47:7d:ef:18:f0:ef:a7:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  1a:6d:77:ac:fd:94:68:ce:cf:8a:85:f0:39:fc:e0:6b:fd:fe:b8:66 (sha1)
  00:b1:32:5f:7b:24:9c:e5:02:e6:72:75:9e:a5:f4:77 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Configuring the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate HUB
set security ike gateway IKE_GWA_1 ike-policy IKE_POL
set security ike gateway IKE_GWA_1 dynamic distinguished-name wildcard OU=SLT
set security ike gateway IKE_GWA_1 dead-peer-detection always-send
set security ike gateway IKE_GWA_1 dead-peer-detection interval 10
set security ike gateway IKE_GWA_1 dead-peer-detection threshold 3
set security ike gateway IKE_GWA_1 local-identity distinguished-name
set security ike gateway IKE_GWA_1 external-interface ge-0/0/0
set security ike gateway IKE_GWA_1 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPNA_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPNA_1 ike gateway IKE_GWA_1
set security ipsec vpn IPSEC_VPNA_1 ike ipsec-policy IPSEC_POL
set security policies default-policy permit-all
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/0.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:2000::1/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:1000::2/64
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::1/64
set routing-options rib inet6.0 static route 2001:db8:3000::/64 next-hop 2001:db8:2000::2
set routing-options rib inet6.0 static route 2001:db8:5000::/64 next-hop 2001:db8:2000::2
set protocols ospf3 traceoptions file ospf
```



```

set protocols ospf3 traceoptions flag all
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:2000::1/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:1000::2/64
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::1/64

```

2. Configure the routing protocol.

```

[edit protocols ospf3]
user@host# set traceoptions file ospf
user@host# set traceoptions flag all
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/1.0

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:3000::/64 next-hop
2001:db8:2000::2
user@host# set rib inet6.0 static route 2001:db8:5000::/64 next-hop
2001:db8:2000::2

```

3. Configure Phase 1 options.

```

[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]

```

```
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate HUB

[edit security ike gateway IKE_GWA_1]
user@host# set ike-policy IKE_POL
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/0
user@host# set version v1-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPNA_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GWA_1
user@host# set ike ipsec-policy IPSEC_POL
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set pki ca-profile ROOT-CA revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:2000::1/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:1000::2/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:7000::1/64;
    }
  }
}
[edit]
user@host# show protocols
ospf3 {
  traceoptions {
    file ospf;
    flag all;
  }
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      demand-circuit;
      dynamic-neighbors;
    }
    interface ge-0/0/1.0;
  }
}
```

```
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route 2001:db8:3000::/64 next-hop 2001:db8::2;
    route 2001:db8:5000::/64 next-hop 2001:db8::2;
  }
}
[edit]
user@host# show security ike
traceoptions {
  file ik;
  flag all;
}
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate HUB;
  }
}
gateway IKE_GWA_1 {
  ike-policy IKE_POL;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
  }
  dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
  }
  local-identity distinguished-name;
  external-interface ge-0/0/0.0;
  version v1-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  authentication-algorithm aes-256-gcm;
  set lifetime-seconds 3000;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group19;
  }
}
```

```
    }
    proposals IPSEC_PROP;
  }
  vpn IPSEC_VPNA_1 {
    bind-interface st0.1;
    ike {
      gateway IKE_GWA_1;
      ipsec-policy IPSEC_POL;
    }
  }
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/1.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
  ca-identity ROOT-CA;
  enrollment {
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
    retry 5;
    retry-interval 0;
  }
  revocation-check {
    disable;
  }
}
```

```
}
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE1
set security ike gateway IKE_GW_SPOKE_1 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_1 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_1 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_1 remote-identity distinguished-name container
  OU=SLT
set security ike gateway IKE_GW_SPOKE_1 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_1 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike gateway IKE_GW_SPOKE_1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_1 establish-tunnels immediately
set security policies default-policy permit-all
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
```

```

set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::2/64
set routing-options rib inet6.0 static route 2001:db8:2000::/64 next-hop 2001:db8:3000::1
set protocols ospf3 traceoptions file ospf
set protocols ospf3 traceoptions flag all
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::2/64

```

2. Configure the routing protocol.

```

[edit protocols ospf3]
user@host# set traceoptions file ospf
user@host# set traceoptions flag all
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/1.0

```

```

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
2001:db8:3000::1

```

3. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

```

```
[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE1

[edit security ike gateway IKE_GW_SPOKE_1]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
user@host# set external-interface ge-0/0/0.0
user@host# set version v1-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROPI]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPN_SPOKE_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GW_SPOKE_1
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/1.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0
```


6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:3000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:4000::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:7000::2/64;
    }
  }
}
[edit]
user@host# show protocols
ospf3 {
  traceoptions {
    file ospf;
    flag all;
  }
}
```

```

area 0.0.0.0 {
    interface st0.1 {
        interface-type p2mp;
        demand-circuit;
        dynamic-neighbors;
    }
    interface ge-0/0/1.0;
}
[edit]
user@host# show routing-options
rib inet6.0 {
    static {
        route 2001:db8:2000::/64 next-hop [ 2001:db8:3000::1 2001:db8:5000::1 ];
    }
}
[edit]
user@host# show security ike
traceoptions {
    file ik;
    flag all;
}
proposal IKE_PROP {
    authentication-method rsa-signatures;
    dh-group group19;
    authentication-algorithm sha-384;
    encryption-algorithm aes-256-cbc;
    lifetime-seconds 6000;
}
policy IKE_POL {
    mode main;
    proposals IKE_PROP;
    certificate {
        local-certificate SPOKE1;
    }
}
gateway IKE_GW_SPOKE_1 {
    ike-policy IKE_POL;
    address 2001:db8:2000::1;
    dead-peer-detection {
        always-send;
        interval 10;
        threshold 3;
    }
    local-identity distinguished-name;
    remote-identity distinguished-name container OU=SLT;
    external-interface ge-0/0/0.0;
    version v1-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    encryption-algorithm aes-256-gcm;
    lifetime-seconds 3000;
}

```

```
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group19;
  }
  proposals IPSEC_PROP;
}
vpn IPSEC_VPN_SPOKE_1 {
  bind-interface st0.1;
  ike {
    gateway IKE_GW_SPOKE_1;
    ipsec-policy IPSEC_POL;
  }
  establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/1.0;
    st0.1;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      ospf3;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
  ca-identity ROOT-CA;
  enrollment {
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
```

```

    retry 5;
    retry-interval 0;
  }
  revocation-check {
    disable;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 2

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike traceoptions file ik
set security ike traceoptions flag all
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE2
set security ike gateway IKE_GW_SPOKE_2 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_2 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_2 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_2 remote-identity distinguished-name container
  OU=SLT
set security ike gateway IKE_GW_SPOKE_2 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_2 version v1-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_2 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike gateway IKE_GW_SPOKE_2
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_2 establish-tunnels on-traffic
set security policies default-policy permit-all

```

```

set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
set interfaces st0 unit 1 family inet6 address 2001:db8:7000::3/64
set routing-options rib inet6.0 static route 2001:db8:2000::/64 next-hop 2001:db8:5000::1
set protocols ospf3 traceoptions file ospf
set protocols ospf3 traceoptions flag all
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 2:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
user@host# set st0 unit 1 family inet6 address 2001:db8:7000::3/64

```

2. Configure the routing protocol.

```

[edit protocols ospf3]
user@host# set traceoptions file ospf
user@host# set traceoptions flag all
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/1.0

```

```

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
2001:db8:5000::1

```

3. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures

```

```

user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike traceoptions]
user@host# set file ik
user@host# set flag all

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE2

[edit security ike gateway IKE_GW_SPOKE_2]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
user@host# set external-interface ge-0/0/0.0
user@host# set version v1-only

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal IPSEC_PROPI]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPN_SPOKE_2]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GW_SPOKE_2
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels on-traffic

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/1.0

```

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/0.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:5000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:6000::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:7000::3/64;
    }
  }
}
```

```
[edit]
user@host# show protocols
ospf3 {
  traceoptions {
    file ospf;
    flag all;
  }
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      demand-circuit;
      dynamic-neighbors;
    }
    interface ge-0/0/1.0;
  }
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route 2001:db8:2000::/64 next-hop [ 2001:db8:3000::1 2001:db8:5000::1 ];
  }
}
[edit]
user@host# show security ike
traceoptions {
  file ik;
  flag all;
}
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate SPOKE2;
  }
}
gateway IKE_GW_SPOKE_2 {
  ike-policy IKE_POL;
  address 2001:db8:2000::1;
  dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
  }
  local-identity distinguished-name;
  remote-identity distinguished-name container OU=SLT;
  external-interface ge-0/0/0.0;
  version v1-only;
```



```
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    encryption-algorithm aes-256-gcm;
    lifetime-seconds 3000;
}
policy IPSEC_POL {
    perfect-forward-secrecy {
        keys group19;
    }
    proposals IPSEC_PROP;
}
vpn IPSEC_VPN_SPOKE_2 {
    bind-interface st0.1;
    ike {
        gateway IKE_GW_SPOKE_2;
        ipsec-policy IPSEC_POL;
    }
    establish-tunnels on-traffic;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        ge-0/0/1.0;
        st0.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        ge-0/0/0.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
```

```

}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
  ca-identity ROOT-CA;
  enrollment {
    url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
    retry 5;
    retry-interval 0;
  }
  revocation-check {
    disable;
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Status on page 398](#)
- [Verifying IPsec Status on page 399](#)
- [Verifying IPsec Next-Hop Tunnels on page 399](#)
- [Verifying OSPFv3 on page 400](#)

Verifying IKE Status

Purpose Verify the IKE status.

Action From operational mode, enter the **show security ike sa** command.

```

user@host> show security ike sa

```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
493333	UP	2001:db8:88b49d915e684c93	2001:db8:fe890b1cac8522b5	Main	2001:db8:3000::2
493334	UP	2001:db8:26e40244ad3d722d	2001:db8:68b4d9f94097d32e	Main	2001:db8:5000::2

Meaning The **show security ike sa** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

Verifying IPsec Status

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec sa** command.

```
user@host> show security ipsec sa
```

```
Total active tunnels: 2
  ID      Algorithm      SPI Life:sec/kb   Mon   lsys Port Gateway
>67108885 ESP:aes-gcm-256/None fdef4dab 2918/ unlim - root 500 2001:db8:3000::2

>67108885 ESP:aes-gcm-256/None e785dad9 2918/ unlim - root 500 2001:db8:3000::2

>67108887 ESP:aes-gcm-256/None 34a787af 2971/ unlim - root 500 2001:db8:5000::2

>67108887 ESP:aes-gcm-256/None cf57007f 2971/ unlim - root 500 2001:db8:5000::2
```

Meaning The **show security ipsec sa** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

```
Next-hop gateway      interface IPSec VPN name  Flag  IKE-ID
                  XAUTH username
2001:db8:9000::2      st0.1      IPSEC_VPNA_1    Auto  C=US,
DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available
2001:db8:9000::3      st0.1      IPSEC_VPNA_1    Auto  C=US,
DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available
2001:db8::5668:ad10:fcd8:163c st0.1      IPSEC_VPNA_1    Auto  C=US,
DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available
2001:db8::5668:ad10:fcd8:18a1 st0.1      IPSEC_VPNA_1    Auto  C=US,
DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available
```

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying OSPFv3

Purpose Verify that OSPFv3 references the IP addresses for the **st0** interfaces of the spokes.

Action From operational mode, enter the **show ospf3 neighbor detail** command.

Hub:

```
user@host> show ospf3 neighbor detail
```

ID	Interface	State	Pri	Dead
2001:db8:128.221.129.22	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:18a1				
Area 0.0.0.0, opt 0x33, OSPF3-Intf-Index 2				
DR-ID 0.0.0.0, BDR-ID 0.0.0.0				
Up 00:01:35, adjacent 00:01:31 Hello suppressed 00:01:31 ago				
2001:db8:128.221.129.124	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:163c				
Area 0.0.0.0, opt 0x33, OSPF3-Intf-Index 2				
DR-ID 0.0.0.0, BDR-ID 0.0.0.0				
Up 00:01:41, adjacent 00:01:37 Hello suppressed 00:01:37 ago				

Spoke 1:

```
user@host> show ospf3 neighbor detail
```

ID	Interface	State	Pri	Dead
2001:db8:128.221.130.33	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:1946				
Area 0.0.0.0, opt 0x33, OSPF3-Intf-Index 2				
DR-ID 0.0.0.0, BDR-ID 0.0.0.0				
Up 00:05:38, adjacent 00:05:38 Hello suppressed 00:05:34 ago				

Spoke 2:

```
user@host> show ospf3 neighbor detail
```

ID	Interface	State	Pri	Dead
2001:db8:128.221.130.33	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:1946				
Area 0.0.0.0, opt 0x33, OSPF3-Intf-Index 2				
DR-ID 0.0.0.0, BDR-ID 0.0.0.0				
Up 00:04:44, adjacent 00:04:44 Hello suppressed 00:04:40 ago				

See Also • [Example: Configuring a Route-Based VPN on page 112](#)

Example: Forwarding Traffic Through an AutoVPN Tunnel with Traffic Selectors

This example shows how to configure traffic selectors, instead of dynamic routing protocols, to forward packets through a VPN tunnel in an AutoVPN deployment. When

traffic selectors are configured, the secure tunnel (st0) interface must be in point-to-point mode. Traffic selectors are configured on both the hub and spoke devices.

- [Requirements on page 401](#)
- [Overview on page 401](#)
- [Configuration on page 403](#)
- [Verification on page 414](#)

Requirements

This example uses the following hardware and software components:

- Two SRX Series devices connected and configured in a chassis cluster. The chassis cluster is the AutoVPN hub.
- An SRX Series device configured as an AutoVPN spoke.
- Junos OS Release 12.3X48-D10 or later.
- Digital certificates enrolled in the hub and the spoke devices that allow the devices to authenticate each other.

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates. See [“Understanding Local Certificate Requests” on page 997](#).
- Enroll the digital certificates in each device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).

Overview

In this example, traffic selectors are configured on the AutoVPN hub and spoke. Only traffic that conforms to the configured traffic selector is forwarded through the tunnel. On the hub, the traffic selector is configured with the local IP address 192.0.0.0/8 and the remote IP address 172.0.0.0/8. On the spoke, the traffic selector is configured with the local IP address 172.0.0.0/8 and the remote IP address 192.0.0.0/8.



NOTE: The traffic selector IP addresses configured on the spoke can be a subset of the traffic selector IP addresses configured on the hub. This is known as traffic selector flexible match.

Certain Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hubs and spokes must have the same values. [Table 44 on page 402](#) shows the values used in this example:

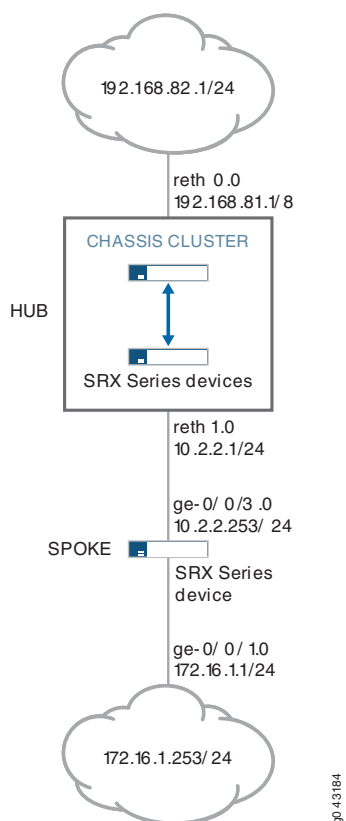
Table 44: Phase 1 and Phase 2 Options for AutoVPN Hubs and Spokes with Traffic Selectors

Option	Value
<i>IKE proposal:</i>	
Authentication method	rsa-signatures
Diffie-Hellman (DH) group	group5
Authentication algorithm	sha-1
Encryption algorithm	aes-256-cbc
<i>IKE policy:</i>	
Mode	main
Certificate	local-certificate
<i>IKE gateway:</i>	
Dynamic	distinguished name wildcard DC=Common_component
IKE user type	group IKE id
Local identity	distinguished name
Version	v1-only
<i>IPsec proposal:</i>	
Protocol	esp
Authentication algorithm	hmac-sha1-96
Encryption algorithm	aes-192-cbc
Lifetime	3600 seconds
	150,000 kilobytes
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	group5

Topology

Figure 24 on page 403 shows the SRX Series devices to be configured for this example.

Figure 24: AutoVPN with Traffic Selectors



Configuration

- [Configuring the Hub on page 403](#)
- [Configuring the Spoke on page 409](#)

Configuring the Hub

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/2 gigether-options redundant-parent reth1
set interfaces ge-0/0/3 gigether-options redundant-parent reth0
set interfaces ge-8/0/2 gigether-options redundant-parent reth1
set interfaces ge-8/0/3 gigether-options redundant-parent reth0
set interfaces lo0 unit 0 family inet address 10.100.1.100/24
set interfaces lo0 redundant-pseudo-interface-options redundancy-group 1
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 192.168.81.1/8
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 10.2.2.1/24
```

```

set interfaces st0 unit 1 family inet
set security ike proposal prop_ike authentication-method rsa-signatures
set security ike proposal prop_ike dh-group group5
set security ike proposal prop_ike authentication-algorithm sha1
set security ike proposal prop_ike encryption-algorithm aes-256-cbc
set security ike policy ikepol1 mode main
set security ike policy ikepol1 proposals prop_ike
set security ike policy ikepol1 certificate local-certificate Hub_ID
set security ike gateway HUB_GW ike-policy ikepol1
set security ike gateway HUB_GW dynamic distinguished-name wildcard
    DC=Domain_component
set security ike gateway HUB_GW dynamic ike-user-type group-ike-id
set security ike gateway HUB_GW local-identity distinguished-name
set security ike gateway HUB_GW external-interface reth1
set security ike gateway HUB_GW version v1-only
set security ipsec proposal prop_ipsec protocol esp
set security ipsec proposal prop_ipsec authentication-algorithm hmac-sha1-96
set security ipsec proposal prop_ipsec encryption-algorithm aes-192-cbc
set security ipsec proposal prop_ipsec lifetime-seconds 3600
set security ipsec proposal prop_ipsec lifetime-kilobytes 150000
set security ipsec policy ipsecpol1 perfect-forward-secrecy keys group5
set security ipsec policy ipsecpol1 proposals prop_ipsec
set security ipsec vpn HUB_VPN bind-interface st0.1
set security ipsec vpn HUB_VPN ike gateway HUB_GW
set security ipsec vpn HUB_VPN ike ipsec-policy ipsecpol1
set security ipsec vpn HUB_VPN traffic-selector ts1 local-ip 192.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts1 remote-ip 172.0.0.0/8
set security pki ca-profile rsa ca-identity rsa
set security pki ca-profile rsa revocation-check disable
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces reth0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces lo0.0
set security zones security-zone untrust interfaces reth1.0
set security policies default-policy permit-all

```

Starting with Junos OS Release 15.1X49-D120, you can configure the CLI option **reject-duplicate-connection** at the [edit security ike gateway *gateway-name* dynamic] hierarchy level to retain an existing tunnel session and reject negotiation requests for a new tunnel with the same IKE ID. By default, an existing tunnel is tear down when a new tunnel with the same IKE ID is established. The **reject-duplicate-connection** option is only supported when **ike-user-type group-ike-id** or **ike-user-type shared-ike-id** is configured for the IKE gateway; the **aaa access-profile *profile-name*** configuration is not supported with this option.



NOTE: Use the CLI option **reject-duplicate-connection** only when you are certain that reestablishment of a new tunnel with the same IKE ID should be rejected.

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the hub:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/2 gigether-options redundant-parent reth1
user@host# set ge-0/0/3 gigether-options redundant-parent reth0
user@host# set ge-8/0/2 gigether-options redundant-parent reth1
user@host# set ge-8/0/3 gigether-options redundant-parent reth0
user@host# set lo0 unit 0 family inet address 10.100.1.100/24
user@host# set lo0 redundant-pseudo-interface-options redundancy-group 1
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet address 192.168.81.1/8
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 10.2.2.1/24
user@host# set st0 unit 1 family inet
```

2. Configure Phase 1 options.

```
[edit security ike proposal prop_ike]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy ikepol1]
user@host# set mode main
user@host# set proposals prop_ike
user@host# set certificate local-certificate Hub_ID

[edit security ike gateway HUB_GW]
user@host# set ike-policy ikepol1
user@host# set dynamic distinguished-name wildcard DC=Domain_component
user@host# set dynamic ike-user-type group-ike-id
user@host# set local-identity distinguished-name
user@host# set external-interface reth1
user@host# set version v1-only
```

3. Configure Phase 2 options.

```
[edit security ipsec proposal prop_ipsec]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-192-cbc
user@host# set lifetime-seconds 3600
user@host# set lifetime-kilobytes 150000
```

```
[edit security ipsec policy ipsecpol1]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals prop_ipsec

[edit security ipsec HUB_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway HUB_GW
user@host# set ike ipsec-policy ipsecpol1
user@host# set traffic-selector ts1 local-ip 192.0.0.0/8
user@host# set traffic-selector ts1 remote-ip 172.0.0.0/8
```

4. Configure certificate information.

```
[edit security pki]
user@host# set ca-profile rsa ca-identity rsa
user@host# set ca-profile rsa revocation-check disable
```

5. Configure security zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces reth0.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces lo0.0
user@host# set interfaces reth1.0

[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/2 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-0/0/3 {
  gigether-options {
```

```
        redundant-parent reth0;
    }
}
lo0 {
    unit 0 {
        family inet {
            address 10.100.1.100/24;
        }
    }
    redundant-pseudo-interface-options {
        redundancy-group 1;
    }
}
reth0 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 192.168.81.1/8;
        }
    }
}
reth1 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 10.2.2.1/24;
        }
    }
}
st0 {
    unit 1 {
        family inet;
    }
}
[edit]
user@host# show security ike
proposal prop_ike {
    authentication-method rsa-signatures;
    dh-group group5;
    authentication-algorithm sha1;
    encryption-algorithm aes-256-cbc;
}
policy ikepol1 {
    mode main;
    proposals prop_ike;
    certificate {
        local-certificate Hub_ID;
    }
}
gateway HUB_GW {
    ike-policy ikepol1;
```

```
dynamic distinguished-name wildcard DC=Domain_component;
dynamic ike-user-type group-ike-id;
local-identity distinguished-name;
external-interface reth1;
version v1-only;
}
[edit]
user@host# show security ipsec
proposal prop_ipsec {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm aes-192-cbc;
    lifetime-seconds 3600;
    lifetime-kilobytes 150000;
}
policy ipsecpol1 {
    perfect-forward-secrecy {
        keys group5;
    }
    proposals prop_ipsec;
}
vpn HUB_VPN {
    bind-interface st0.1;
    ike {
        gateway HUB_GW;
        ipsec-policy ipsecpol1;
    }
    traffic-selector ts1 {
        local-ip 192.0.0.0/8;
        remote-ip 172.0.0.0/8;
    }
}
[edit]
user@host# show security pki
ca-profile rsa {
    ca-identity rsa;
    revocation-check {
        disable;
    }
}
[edit]
user@host# show security zones
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        st0.1;
        reth0.0;
    }
}
```

```

}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    lo0.0;
    reth1.0;
  }
}
[edit]
user@host# show security policies
default-policy {
  permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Spoke

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 172.16.1.1/24
set interfaces ge-0/0/3 unit 0 family inet address 10.2.2.253/24
set interfaces st0 unit 1 family inet
set security ike proposal prop_ike authentication-method rsa-signatures
set security ike proposal prop_ike dh-group group5
set security ike proposal prop_ike authentication-algorithm sha1
set security ike proposal prop_ike encryption-algorithm aes-256-cbc
set security ike policy ikepol1 mode main
set security ike policy ikepol1 proposals prop_ike
set security ike policy ikepol1 certificate local-certificate Spoke1_ID
set security ike gateway SPOKE_GW ike-policy ikepol1
set security ike gateway SPOKE_GW address 10.2.2.1
set security ike gateway SPOKE_GW local-identity distinguished-name
set security ike gateway SPOKE_GW remote-identity distinguished-name container
  DC=Domain_component
set security ike gateway SPOKE_GW external-interface ge-0/0/3.0
set security ike gateway SPOKE_GW version v1-only
set security ipsec proposal prop_ipsec protocol esp
set security ipsec proposal prop_ipsec authentication-algorithm hmac-sha1-96
set security ipsec proposal prop_ipsec encryption-algorithm aes-192-cbc
set security ipsec proposal prop_ipsec lifetime-seconds 3600
set security ipsec proposal prop_ipsec lifetime-kilobytes 150000
set security ipsec policy ipsecpol1 perfect-forward-secrecy keys group5

```

```

set security ipsec policy ipsecpol1 proposals prop_ipsec
set security ipsec vpn SPOKE_VPN bind-interface st0.1
set security ipsec vpn SPOKE_VPN ike gateway SPOKE_GW
set security ipsec vpn SPOKE_VPN ike ipsec-policy ipsecpol1
set security ipsec vpn SPOKE_VPN traffic-selector ts1 local-ip 172.0.0.0/8
set security ipsec vpn SPOKE_VPN traffic-selector ts1 remote-ip 192.0.0.0/8
set security ipsec vpn SPOKE_VPN establish-tunnels immediately
set security pki ca-profile rsa ca-identity rsa
set security pki ca-profile rsa revocation-check disable
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces ge-0/0/3.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0
set security policies default-policy permit-all

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the hub:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 172.16.1.1/24
user@host# set ge-0/0/3 unit 0 family inet address 10.2.2.253/24
user@host# set st0 unit 1 family inet

```

2. Configure Phase 1 options.

```

[edit security ike proposal prop_ike]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy ikepol1]
user@host# set mode main
user@host# set proposals prop_ike
user@host# set certificate local-certificate Spoke1_ID

[edit security ike gateway SPOKE_GW]
user@host# set ike-policy ikepol1
user@host# set address 10.2.2.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container
DC=Domain_component
user@host# set external-interface ge-0/0/3.0
user@host# set version v1-only

```

3. Configure Phase 2 options.

```
[edit security ipsec proposal prop_ipsec]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-192-cbc
user@host# set lifetime-seconds 3600
user@host# set lifetime-kilobytes 150000

[edit security ipsec policy ipsecpol1]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals prop_ipsec

[edit security ipsec SPOKE_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway SPOKE_GW
user@host# set ike ipsec-policy ipsecpol1
user@host# set traffic-selector ts1 local-ip 172.0.0.0/8
user@host# set traffic-selector ts1 remote-ip 192.0.0.0/8
user@host# set establish-tunnels immediately
```

4. Configure certificate information.

```
[edit security pki]
user@host# set ca-profile rsa ca-identity rsa
user@host# set ca-profile rsa revocation-check disable
```

5. Configure security zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/3.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0

[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 172.16.1.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.2.2.253/24;
    }
  }
}
st0 {
  unit 1 {
    family inet;
  }
}
[edit]
user@host# show security ike
proposal prop_ike {
  authentication-method rsa-signatures;
  dh-group group5;
  authentication-algorithm sha1;
  encryption-algorithm aes-256-cbc;
}
policy ikepol1 {
  mode main;
  proposals prop_ike;
  certificate {
    local-certificate Spoke1_ID;
  }
}
gateway SPOKE_GW {
  ike-policy ikepol1;
  address 10.2.2.1;
  local-identity distinguished-name;
  remote-identity distinguished-name container DC=Domain_component;
  external-interface ge-0/0/3.0;
  version v1-only;
}
[edit]
user@host# show security ipsec
proposal prop_ipsec {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-192-cbc;
  lifetime-seconds 3600;
  lifetime-kilobytes 150000;
}
policy ipsecpol1 {
  perfect-forward-secrecy {
```



```
    keys group5;
  }
  proposals prop_ipsec;
}
vpn SPOKE_VPN {
  bind-interface st0.1;
  ike {
    gateway SPOKE_GW;
    ipsec-policy ipsecpol1;
  }
  traffic-selector ts1 {
    local-ip 172.0.0.0/8;
    remote-ip 192.0.0.0/8;
  }
  establish-tunnels immediately;
}
[edit]
user@host# show security pki
ca-profile rsa {
  ca-identity rsa;
  revocation-check {
    disable;
  }
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    st0.1;
    ge-0/0/3.0;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/1.0;
  }
}
[edit]
user@host# show security policies
```

```
default-policy {
    permit-all;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying Tunnels on page 414](#)
- [Verifying Traffic Selectors on page 416](#)

Verifying Tunnels

Purpose Verify that tunnels are established between the AutoVPN hub and spoke.

Action From operational mode, enter the **show security ike security-associations** and **show security ipsec security-associations** commands on the hub.

```
user@host> show security ike security-associations
```

```
node0:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
1350248074	UP	d195bce6ccfcf9af	8f1569c6592c8408	Main	10.2.2.253

```
user@host> show security ipsec security-associations
```

```
node0:
```

```
-----
Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<77594650 ESP:aes-cbc-192/sha1 ac97cb1 2799/  150000 - root 500 10.2.2.253

>77594650 ESP:aes-cbc-192/sha1 828dc013 2798/  150000 - root 500 10.2.2.253
```

```
user@host> show security ipsec security-associations detail
```

```
node0:
```

```
-----
ID: 77594650 Virtual-system: root, VPN Name: HUB_VPN
Local Gateway: 10.2.2.1, Remote Gateway: 10.2.2.253
Traffic Selector Name: ts1
Local Identity: ipv4(192.0.0.0-192.255.255.255)
Remote Identity: ipv4(172.0.0.0-172.255.255.255)
Version: IKEv1
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 2, Fail#: 0, Def-Del#: 0 Flag: 0x24608b29
Tunnel events:
  Tue Dec 30 2014 11:30:21 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Dec 30 2014 11:30:20 -0800: Tunnel is ready. Waiting for trigger event
```

```

or peer to trigger negotiation (1 times)
  Tue Dec 30 2014 11:30:20 -0800: IKE SA negotiation successfully completed (3
times)
  Location: FPC 5, PIC 0, KMD-Instance 1
  Direction: inbound, SPI: ac97cb1, AUX-SPI: 0
  Hard lifetime: Expires in 2796 seconds
  Lifesize Remaining: 150000 kilobytes
  Soft lifetime: Expires in 2211 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (192 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
  Location: FPC 5, PIC 0, KMD-Instance 1
  Direction: outbound, SPI: 828dc013, AUX-SPI: 0
  Hard lifetime: Expires in 2796 seconds
  Lifesize Remaining: 150000 kilobytes
  Soft lifetime: Expires in 2211 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (192 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

```

From operational mode, enter the **show security ike security-associations** and **show security ipsec security-associations** commands on the spoke.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
276505646	UP	d195bce6ccfcf9af	8f1569c6592c8408	Main	10.2.2.1

```
user@host> show security ipsec security-associations
```

```

Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<69206018 ESP:aes-cbc-192/sha1 828dc013 2993/ 150000 - root 500 10.2.2.1
>69206018 ESP:aes-cbc-192/sha1 ac97cb1 2993/ 150000 - root 500 10.2.2.1

```

```
user@host> show security ipsec security-associations detail
```

```

ID: 69206018 Virtual-system: root, VPN Name: SPOKE_VPN
  Local Gateway: 10.2.2.253, Remote Gateway: 10.2.2.1
  Traffic Selector Name: ts1
  Local Identity: ipv4(172.0.0.0-172.255.255.255)
  Remote Identity: ipv4(192.0.0.0-192.255.255.255)
  Version: IKEv1
  DF-bit: clear, Bind-interface: st0.1
  Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x2c608b29
  Tunnel events:
    Tue Dec 30 2014 11:30:20 -0800: IPSec SA negotiation successfully completed
(1 times)
    Tue Dec 30 2014 11:30:20 -0800: IKE SA negotiation successfully completed (1
times)
    Tue Dec 30 2014 11:26:11 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Location: FPC 1, PIC 0, KMD-Instance 1
  Direction: inbound, SPI: 828dc013, AUX-SPI: 0
  Hard lifetime: Expires in 2991 seconds
  Lifesize Remaining: 150000 kilobytes

```

```

Soft lifetime: Expires in 2369 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (192 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Location: FPC 1, PIC 0, KMD-Instance 1
Direction: outbound, SPI: ac97cb1, AUX-SPI: 0
Hard lifetime: Expires in 2991 seconds
Lifesize Remaining: 150000 kilobytes
Soft lifetime: Expires in 2369 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (192 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. The hub shows one active tunnel to the spoke while the spoke shows one active tunnel to the hub.

If no SAs are listed for IKE Phase 1, then there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spoke.

If no SAs are listed for IKE Phase 2, then there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spoke.

Verifying Traffic Selectors

Purpose Verify the traffic selectors.

Action From operational mode, enter the **show security ipsec traffic-selector interface-name st0.1** command on the hub.

```
user@host> show security ipsec traffic-selector interface-name st0.1
```

```
node0:
```

Source IP	Destination IP	Interface
192.0.0.0-192.255.255.255	172.0.0.0-172.255.255.255	st0.1
77594650	DC=Domain_component, CN=Spoke1_ID, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US	

From operational mode, enter the **show security ipsec traffic-selector interface-name st0.1** command on the spoke.

```
user@host> show security ipsec traffic-selector interface-name st0.1
```

Source IP	Destination IP	Interface
172.0.0.0-172.255.255.255	192.0.0.0-192.255.255.255	st0.1

```
69206018      DC=Domain_component, CN=Hub_ID, OU=Sales, O=XYZ, L=Sunnyvale,
ST=CA, C=US
```

Meaning A traffic selector is an agreement between IKE peers to permit traffic through a tunnel if the traffic matches a specified pair of local and remote addresses. Only traffic that conforms to a traffic selector is permitted through an SA. Traffic selectors are negotiated between the initiator and the responder (the SRX Series hub).

See Also • [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)

Example: Ensuring VPN Tunnel Availability with AutoVPN and Traffic Selectors

Georedundancy is the deployment of multiple geographically distant sites so that traffic can continue to flow over a provider network even if there is a power outage, a natural disaster, or other catastrophic event that affects a site. In a mobile provider network, multiple Evolved Node B (eNodeB) devices can be connected to the core network through georedundant IPsec VPN gateways on SRX Series devices. The alternate routes to the eNodeB devices are distributed to the core network using a dynamic routing protocol.

This example configures AutoVPN hubs with multiple traffic selectors on SRX Series devices to ensure that there are georedundant IPsec VPN gateways to eNodeB devices. Auto route insertion (ARI) is used to automatically insert routes toward the eNodeB devices in the routing tables on the hubs. ARI routes are then distributed to the provider's core network through BGP.

- [Requirements on page 417](#)
- [Overview on page 418](#)
- [Configuration on page 420](#)
- [Verification on page 436](#)

Requirements

This example uses the following hardware and software components:

- Two SRX Series devices connected and configured in a chassis cluster. The chassis cluster is AutoVPN hub A.
- An SRX Series device configured as AutoVPN hub B.
- Junos OS Release 12.3X48-D10 or later.
- eNodeB devices that can establish IPsec VPN tunnels with AutoVPN hubs. eNodeB devices are third-party network equipment providers that initiate a VPN tunnel with AutoVPN hubs.
- Digital certificates enrolled in the hubs and the eNodeB devices that allow the devices to authenticate each other.

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates. See [“Understanding Local Certificate Requests” on page 997](#).
- Enroll the digital certificates in each device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).



NOTE: This example uses the BGP dynamic routing protocol to advertise routes toward the eNodeB devices to the core network.

Overview

In this example, two AutoVPN hubs are configured with multiple traffic selectors on SRX Series devices to provide georedundant IPsec VPN gateways to eNodeB devices. ARI automatically inserts routes to the eNodeB devices in the routing tables on the hubs. ARI routes are then distributed to the provider’s core network through BGP.

Certain Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hubs and eNodeB devices must have the same values. [Table 45 on page 418](#) shows the values used in this example:

Table 45: Phase 1 and Phase 2 Options for Georedundant AutoVPN Hubs

Option	Value
<i>IKE proposal:</i>	
Authentication method	rsa-signatures
Diffie-Hellman (DH) group	group5
Authentication algorithm	sha-1
Encryption algorithm	aes-256-cbc
<i>IKE policy:</i>	
Certificate	local-certificate
<i>IKE gateway:</i>	
Dynamic	distinguished name wildcard DC=Common_component
IKE user type	group IKE id
Dead peer detection	probe-idle-tunnel
Local identity	distinguished name

Table 45: Phase 1 and Phase 2 Options for Georedundant AutoVPN Hubs (continued)

Option	Value
Version	v2-only
<i>IPsec proposal:</i>	
Protocol	esp
Authentication algorithm	hmac-sha1-96
Encryption algorithm	aes-256-cbc
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	group5

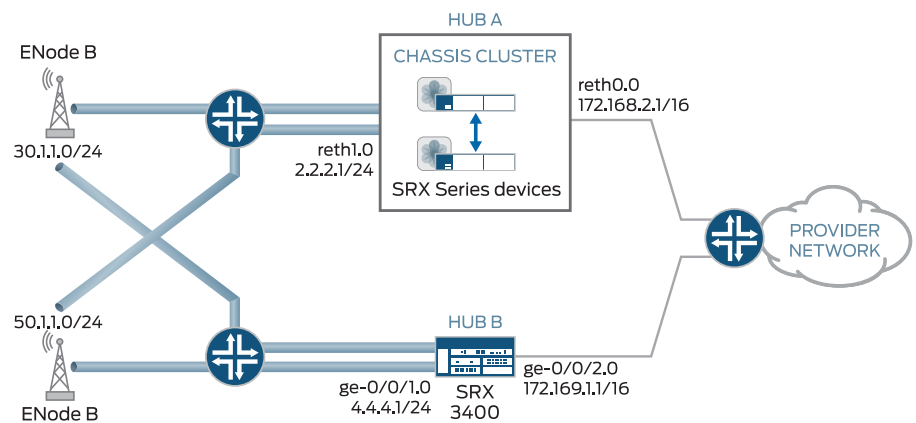


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*. For simplicity, the configuration on the SRX Series devices allows all types of inbound traffic; this configuration is not recommended for production deployments.

Topology

Figure 25 on page 419 shows the SRX Series devices to be configured for this example.

Figure 25: Georedundant IPsec VPN Gateways to eNodeB Devices



g043161

Configuration

- [Configuring Hub A on page 420](#)
- [Configuring Hub B on page 428](#)
- [Configuring the eNodeB \(Sample Configuration\) on page 435](#)

Configuring Hub A

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/2 gigether-options redundant-parent reth1
set interfaces ge-0/0/3 gigether-options redundant-parent reth0
set interfaces ge-8/0/2 gigether-options redundant-parent reth1
set interfaces ge-8/0/3 gigether-options redundant-parent reth0
set interfaces lo0 unit 0 family inet address 100.100.1.100/24
set interfaces lo0 redundant-pseudo-interface-options redundancy-group 1
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 172.168.2.1/16
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 2.2.2.1/24
set interfaces st0 unit 1 family inet
set security ike proposal prop_ike authentication-method rsa-signatures
set security ike proposal prop_ike dh-group group5
set security ike proposal prop_ike authentication-algorithm sha1
set security ike proposal prop_ike encryption-algorithm aes-256-cbc
set security ike policy ph1_ike_policy proposals prop_ike
set security ike policy ph1_ike_policy certificate local-certificate HubA_certificate
set security ike gateway HUB_GW ike-policy ph1_ike_policy
set security ike gateway HUB_GW dynamic distinguished-name wildcard
DC=Common_component
set security ike gateway HUB_GW dynamic ike-user-type group-ike-id
set security ike gateway HUB_GW dead-peer-detection probe-idle-tunnel
set security ike gateway HUB_GW local-identity distinguished-name
set security ike gateway HUB_GW external-interface reth1
set security ike gateway HUB_GW version v2-only
set security ipsec proposal prop_ipsec protocol esp
set security ipsec proposal prop_ipsec authentication-algorithm hmac-sha1-96
set security ipsec proposal prop_ipsec encryption-algorithm aes-256-cbc
set security ipsec policy ph2_ipsec_policy perfect-forward-secrecy keys group5
set security ipsec policy ph2_ipsec_policy proposals prop_ipsec
set security ipsec vpn HUB_VPN bind-interface st0.1
set security ipsec vpn HUB_VPN ike gateway HUB_GW
set security ipsec vpn HUB_VPN ike ipsec-policy ph2_ipsec_policy
set security ipsec vpn HUB_VPN traffic-selector ts1 local-ip 172.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts1 remote-ip 50.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts2 local-ip 172.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts2 remote-ip 30.0.0.0/8
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers local-address 172.168.2.1
set protocols bgp group internal-peers export inject_ts1_routes
```



```

set protocols bgp group internal-peers export inject_ts2_routes
set protocols bgp group internal-peers export inject_up_routes
set protocols bgp group internal-peers neighbor 172.168.2.4
set policy-options policy-statement inject_ts1_routes term cp_allow from protocol static
set policy-options policy-statement inject_ts1_routes term cp_allow from route-filter
  30.1.2.0/24 orlonger
set policy-options policy-statement inject_ts1_routes term cp_allow from route-filter
  30.1.1.0/24 orlonger
set policy-options policy-statement inject_ts1_routes term cp_allow then next-hop self
set policy-options policy-statement inject_ts1_routes term cp_allow then accept
set policy-options policy-statement inject_ts2_routes term mp_allow from protocol static
set policy-options policy-statement inject_ts2_routes term mp_allow from route-filter
  50.1.1.0/24 orlonger
set policy-options policy-statement inject_ts2_routes term mp_net_allow from route-filter
  50.1.2.0/24 orlonger
set policy-options policy-statement inject_ts2_routes term mp_net_allow then next-hop
  self
set policy-options policy-statement inject_ts2_routes term mp_net_allow then accept
set policy-options policy-statement inject_up_routes term up_allow from protocol static
set policy-options policy-statement inject_up_routes term up_allow from route-filter
  172.168.1.0/24 orlonger
set policy-options policy-statement inject_up_routes term up_allow from route-filter
  172.168.2.0/24 orlonger
set policy-options policy-statement inject_up_routes term up_allow then next-hop self
set policy-options policy-statement inject_up_routes term up_allow then accept
set security pki ca-profile csa ca-identity csa
set security pki ca-profile csa revocation-check disable
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces reth0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces lo0.0
set security zones security-zone untrust interfaces reth1.0
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure hub A:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/2 gigether-options redundant-parent reth1
user@host# set ge-0/0/3 gigether-options redundant-parent reth0
user@host# set ge-8/0/2 gigether-options redundant-parent reth1
user@host# set ge-8/0/3 gigether-options redundant-parent reth0
user@host# set lo0 unit 0 family inet address 100.100.1.100/24
user@host# set lo0 redundant-pseudo-interface-options redundancy-group 1
user@host# set reth0 redundant-ether-options redundancy-group 1

```

```
user@host# set reth0 unit 0 family inet address 172.168.2.1/16
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 2.2.2.1/24
user@host# set st0 unit 1 family inet
```

2. Configure Phase 1 options.

```
[edit security ike proposal prop_ike]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy ph1_ike_policy]
user@host# set proposals prop_ike
user@host# set certificate local-certificate HubA_certificate

[edit security ike gateway HUB_GW]
user@host# set ike-policy ph1_ike_policy
user@host# set dynamic distinguished-name wildcard DC=Common_component
user@host# set dynamic ike-user-type group-ike-id
user@host# set dead-peer-detection probe-idle-tunnel
user@host# set local-identity distinguished-name
user@host# set external-interface reth1
user@host# set version v2-only
```

3. Configure Phase 2 options.

```
[edit security ipsec proposal prop_ipsec]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy ph2_ipsec_policy]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals prop_ipsec

[edit security ipsec vpn HUB_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway HUB_GW
user@host# set ike ipsec-policy ph2_ipsec_policy
user@host# set traffic-selector ts1 local-ip 172.0.0.0/8
user@host# set traffic-selector ts1 remote-ip 50.0.0.0/8
user@host# set traffic-selector ts2 local-ip 172.0.0.0/8
user@host# set traffic-selector ts2 remote-ip 30.0.0.0/8
```

4. Configure the BGP routing protocol.

```
[edit protocols bgp group internal-peers]
user@host# set type internal
```

```

user@host# set local-address 172.168.2.1
user@host# set export inject_ts1_routes
user@host# set export inject_ts2_routes
user@host# set export inject_up_routes
user@host# set neighbor 172.168.2.4

```

5. Configure routing options.

```

[edit policy-options policy-statement inject_ts1_routes]
user@host# set term cp_allow from protocol static
user@host# set term cp_allow from route-filter 30.1.2.0/24 orlonger
user@host# set term cp_allow from route-filter 30.1.1.0/24 orlonger
user@host# set term cp_allow then next-hop self
user@host# set term cp_allow then accept

[edit policy-options policy-statement inject_ts2_routes]
user@host# set term mp_allow from protocol static
user@host# set term mp_allow from route-filter 50.1.1.0/24 orlonger
user@host# set term mp_allow from route-filter 50.1.2.0/24 orlonger
user@host# set term mp_allow then next-hop self
user@host# set term mp_allow then accept

[edit policy-options policy-statement inject_up_routes]
user@host# set term up_allow from protocol static
user@host# set term up_allow from route-filter 172.168.1.0/24 orlonger
user@host# set term up_allow from route-filter 172.168.2.0/24 orlonger
user@host# set term up_allow then next-hop self
user@host# set term up_allow then accept

```

6. Configure certificate information.

```

[edit security pki]
user@host# set ca-profile csa ca-identity csa
user@host# set ca-profile csa revocation-check disable

```

7. Configure security zones.

```

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces reth0.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces lo0.0
user@host# set interfaces reth1.0

[edit security policies]

```

```
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show protocols bgp**, **show policy-options**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
  ge-0/0/2 {
    gether-options {
      redundant-parent reth1;
    }
  }
  ge-0/0/3 {
    gether-options {
      redundant-parent reth0;
    }
  }
  ge-8/0/2 {
    gether-options {
      redundant-parent reth1;
    }
  }
  ge-8/0/3 {
    gether-options {
      redundant-parent reth0;
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 100.100.1.100/24;
      }
    }
    redundant-pseudo-interface-options {
      redundancy-group 1;
    }
  }
  reth0 {
    redundant-ether-options {
      redundancy-group 1;
    }
    unit 0 {
      family inet {
        address 172.168.2.1/16;
      }
    }
  }
  reth1 {
    redundant-ether-options {
```

```
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 2.2.2.1/24;
        }
    }
}
st0 {
    unit 1 {
        family inet;
    }
}
[edit]
user@host# show security ike
proposal prop_ike {
    authentication-method rsa-signatures;
    dh-group group5;
    authentication-algorithm sha1;
    encryption-algorithm aes-256-cbc;
}
policy ph1_ike_policy {
    proposals prop_ike;
    certificate {
        local-certificate HubA_certificate;
    }
}
gateway HUB_GW {
    ike-policy ph1_ike_policy;
    dynamic {
        distinguished-name {
            wildcard DC=Common_component;
        }
        ike-user-type group-ike-id;
    }
    dead-peer-detection {
        probe-idle-tunnel;
    }
    local-identity distinguished-name;
    external-interface reth1;
    version v2-only;
}
[edit]
user@host# show security ipsec
proposal prop_ipsec {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm aes-256-cbc;
}
policy ph2_ipsec_policy {
    perfect-forward-secrecy {
        keys group5;
    }
    proposals prop_ipsec;
}
```

```
vpn HUB_VPN {
  bind-interface st0.1;
  ike {
    gateway HUB_GW;
    ipsec-policy ph2_ipsec_policy;
  }
  traffic-selector ts1 {
    local-ip 172.0.0.0/8;
    remote-ip 50.0.0.0/8;
  }
  traffic-selector ts2 {
    local-ip 172.0.0.0/8;
    remote-ip 30.0.0.0/8;
  }
}
[edit]
user@host# show protocols bgp
group internal-peers {
  type internal;
  local-address 172.168.2.1;
  export [ inject_ts1_routes inject_ts2_routes inject_up_routes ];
  neighbor 172.168.2.4;
}
[edit]
user@host# show policy-options
policy-statement inject_ts1_routes {
  term cp_allow {
    from {
      protocol static;
      route-filter 30.1.2.0/24 orlonger;
      route-filter 30.1.1.0/24 orlonger;
    }
    then {
      next-hop self;
      accept;
    }
  }
}
policy-statement inject_ts2_routes {
  term mp_allow {
    from {
      protocol static;
      route-filter 50.1.1.0/24 orlonger;
      route-filter 50.1.2.0/24 orlonger;
    }
    then {
      next-hop self;
      accept;
    }
  }
}
policy-statement inject_up_routes {
  term up_allow {
    from {
      protocol static;
```

```
route-filter 172.168.1.0/24 orlonger;
route-filter 172.168.2.0/24 orlonger;
}
then {
    next-hop self;
    accept;
}
}
}
[edit]
user@host# show security pki
ca-profile csa {
    ca-identity csa;
    revocation-check {
        disable;
    }
}
[edit]
user@host# show security zones
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        st0.1;
        reth0.0;
    }
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        lo0.0;
        reth1.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Hub B

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 4.4.4.1/24
set interfaces ge-0/0/2 unit 0 family inet address 172.169.1.1/16
set interfaces lo0 unit 0 family inet address 100.100.1.101/24
set interfaces st0 unit 1 family inet
set security ike proposal prop_ike authentication-method rsa-signatures
set security ike proposal prop_ike dh-group group5
set security ike proposal prop_ike authentication-algorithm sha1
set security ike proposal prop_ike encryption-algorithm aes-256-cbc
set security ike policy ph1_ike_policy proposals prop_ike
set security ike policy ph1_ike_policy certificate local-certificate HubB_certificate
set security ike gateway HUB_GW ike-policy ph1_ike_policy
set security ike gateway HUB_GW dynamic distinguished-name wildcard
    DC=Common_component
set security ike gateway HUB_GW dynamic ike-user-type group-ike-id
set security ike gateway HUB_GW dead-peer-detection probe-idle-tunnel
set security ike gateway HUB_GW local-identity distinguished-name
set security ike gateway HUB_GW external-interface ge-0/0/1
set security ike gateway HUB_GW version v2-only
set security ipsec proposal prop_ipsec protocol esp
set security ipsec proposal prop_ipsec authentication-algorithm hmac-sha1-96
set security ipsec proposal prop_ipsec encryption-algorithm aes-256-cbc
set security ipsec policy ph2_ipsec_policy perfect-forward-secrecy keys group5
set security ipsec policy ph2_ipsec_policy proposals prop_ipsec
set security ipsec vpn HUB_VPN bind-interface st0.1
set security ipsec vpn HUB_VPN ike gateway HUB_GW
set security ipsec vpn HUB_VPN ike ipsec-policy ph2_ipsec_policy
set security ipsec vpn HUB_VPN traffic-selector ts1 local-ip 172.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts1 remote-ip 50.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts2 local-ip 172.0.0.0/8
set security ipsec vpn HUB_VPN traffic-selector ts2 remote-ip 30.0.0.0/8
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers local-address 172.169.1.1
set protocols bgp group internal-peers export inject_ts1_routes
set protocols bgp group internal-peers export inject_ts2_routes
set protocols bgp group internal-peers export inject_up_routes
set policy-options policy-statement inject_ts1_routes term cp_allow from protocol static
set policy-options policy-statement inject_ts1_routes term cp_allow from route-filter
    30.1.2.0/24 orlonger
set policy-options policy-statement inject_ts1_routes term cp_allow from route-filter
    30.1.1.0/24 orlonger
set policy-options policy-statement inject_ts1_routes term cp_allow then next-hop self
set policy-options policy-statement inject_ts1_routes term cp_allow then accept
set policy-options policy-statement inject_ts2_routes term mp_allow from protocol static
set policy-options policy-statement inject_ts2_routes term mp_allow from route-filter
    50.1.1.0/24 orlonger
set policy-options policy-statement inject_ts2_routes term mp_net_allow from route-filter
    50.1.2.0/24 orlonger

```



```

set policy-options policy-statement inject_ts2_routes term mp_net_allow then next-hop
  self
set policy-options policy-statement inject_ts2_routes term mp_net_allow then accept
set policy-options policy-statement inject_up_routes term up_allow from protocol static
set policy-options policy-statement inject_up_routes term up_allow from route-filter
  172.169.1.0/24 orlonger
set policy-options policy-statement inject_up_routes term up_allow from route-filter
  172.169.2.0/24 orlonger
set policy-options policy-statement inject_up_routes term up_allow then next-hop self
set policy-options policy-statement inject_up_routes term up_allow then accept
set security pki ca-profile csa ca-identity csa
set security pki ca-profile csa revocation-check disable
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces ge-0/0/2.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces lo0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure hub B:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 4.4.4.1/24
user@host# set ge-0/0/2 unit 0 family inet address 172.169.1.1/16
user@host# set lo0 unit 0 family inet address 100.100.1.101/24
user@host# set st0 unit 1 family inet

```

2. Configure Phase 1 options.

```

[edit security ike proposal prop_ike]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy ph1_ike_policy]
user@host# set proposals prop_ike
user@host# set certificate local-certificate HubB_certificate

[edit security ike gateway HUB_GW]
user@host# set ike-policy ph1_ike_policy
user@host# set dynamic distinguished-name wildcard DC=Common_component
user@host# set dynamic ike-user-type group-ike-id

```

```
user@host# set dead-peer-detection probe-idle-tunnel
user@host# set local-identity distinguished-name
user@host# set external-interface ge-0/0/1
user@host# set version v2-only
```

3. Configure Phase 2 options.

```
[edit security ipsec proposal prop_ipsec]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security ipsec policy ph2_ipsec_policy]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals prop_ipsec
```

```
[edit security ipsec vpn HUB_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway HUB_GW
user@host# set ike ipsec-policy ph2_ipsec_policy
user@host# set traffic-selector ts1 local-ip 172.0.0.0/8
user@host# set traffic-selector ts1 remote-ip 50.0.0.0/8
user@host# set traffic-selector ts2 local-ip 172.0.0.0/8
user@host# set traffic-selector ts2 remote-ip 30.0.0.0/8
```

4. Configure the BGP routing protocol.

```
[edit protocols bgp group internal-peers]
user@host# set type internal
user@host# set local-address 172.169.1.1
user@host# set export inject_ts1_routes
user@host# set export inject_ts2_routes
user@host# set export inject_up_routes
user@host# set neighbor 172.169.1.2
```

5. Configure routing options.

```
[edit policy-options policy-statement inject_ts1_routes]
user@host# set term cp_allow from protocol static
user@host# set term cp_allow from route-filter 30.1.2.0/24 orlonger
user@host# set term cp_allow from route-filter 30.1.1.0/24 orlonger
user@host# set term cp_allow then next-hop self
user@host# set term cp_allow then accept
```

```
[edit policy-options policy-statement inject_ts2_routes]
user@host# set term mp_allow from protocol static
user@host# set term mp_allow from route-filter 50.1.1.0/24 orlonger
user@host# set term mp_allow from route-filter 50.1.2.0/24 orlonger
user@host# set term mp_allow then next-hop self
user@host# set term mp_allow then accept
```

```
[edit policy-options policy-statement inject_up_routes]
user@host# set term up_allow from protocol static
user@host# set term up_allow from route-filter 172.169.1.0/24 orlonger
user@host# set term up_allow from route-filter 172.169.2.0/24 orlonger
user@host# set term up_allow then next-hop self
user@host# set term up_allow then accept
```

6. Configure certificate information.

```
[edit security pki]
user@host# set ca-profile csa ca-identity csa
user@host# set ca-profile csa revocation-check disable
```

7. Configure security zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/2.0
```

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces lo0.0
user@host# set interfaces ge-0/0/1.0
```

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show protocols bgp**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 4.4.4.1/24;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 172.169.1.1/16;
    }
  }
}
```

```

    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 100.100.1.101/24;
      }
    }
  }
  st0 {
    unit 1 {
      family inet;
    }
  }
}
[edit]
user@host# show security ike
proposal prop_ike {
  authentication-method rsa-signatures;
  dh-group group5;
  authentication-algorithm sha1;
  encryption-algorithm aes-256-cbc;
}
policy ph1_ike_policy {
  proposals prop_ike;
  certificate {
    local-certificate HubB_certificate;
  }
}
gateway HUB_GW {
  ike-policy ph1_ike_policy;
  dynamic {
    distinguished-name {
      wildcard DC=Common_component;
    }
    ike-user-type group-ike-id;
  }
  dead-peer-detection {
    probe-idle-tunnel;
  }
  local-identity distinguished-name;
  external-interface reth1;
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal prop_ipsec {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-256-cbc;
}
policy ph2_ipsec_policy {
  perfect-forward-secrecy {
    keys group5;
  }
  proposals prop_ipsec;
}

```

```

}
vpn HUB_VPN {
  bind-interface st0.1;
  ike {
    gateway HUB_GW;
    ipsec-policy ph2_ipsec_policy;
  }
  traffic-selector ts1 {
    local-ip 172.0.0.0/8;
    remote-ip 50.0.0.0/8;
  }
  traffic-selector ts2 {
    local-ip 172.0.0.0/8;
    remote-ip 30.0.0.0/8;
  }
}
[edit]
user@host# show protocols bgp
  group internal-peers {
    type internal;
    local-address 172.169.1.1;
    export [ inject_ts1_routes inject_ts2_routes inject_up_routes ];
    neighbor 172.169.1.2;
  }
user@host# show policy-options
policy-statement inject_ts1_routes {
  term cp_allow {
    from {
      protocol static;
      route-filter 30.1.2.0/24 orlonger;
      route-filter 30.1.1.0/24 orlonger;
    }
    then {
      next-hop self;
      accept;
    }
  }
}
policy-statement inject_ts2_routes {
  term mp_allow {
    from {
      protocol static;
      route-filter 50.1.1.0/24 orlonger;
      route-filter 50.1.2.0/24 orlonger;
    }
    then {
      next-hop self;
      accept;
    }
  }
}
policy-statement inject_up_routes {
  term up_allow {
    from {
      protocol static;

```

```
route-filter 172.169.1.0/24 orlonger;
route-filter 172.169.2.0/24 orlonger;
}
then {
    next-hop self;
    accept;
}
}
}
[edit]
user@host# show security pki
ca-profile csa {
    ca-identity csa;
    revocation-check {
        disable;
    }
}
[edit]
user@host# show security zones
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        st0.1;
        ge-0/0/2.0;
    }
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-0/0/1.0;
        lo0.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the eNodeB (Sample Configuration)

Step-by-Step Procedure The eNodeB configuration in this example is provided for reference. Detailed eNodeB configuration information is beyond the scope of this document. The eNodeB configuration must include the following information:

- Local certificate (X.509v3) and IKE identity information
- SRX Series IKE identity information and public IP address
- Phase 1 and Phase 2 proposals that match the configurations on the SRX Series hubs

Results The eNodeB devices in this example use strongSwan open source software for IPsec-based VPN connections:

```
config setup
    plutostart=yes
    plutodebug=all
    charondebug="ike 4, cfg 4, chd 4, enc 1"
    charonstart=yes #ikev2 daemon"
    nat_traversal=yes #<===== need to enable even no nat_t

conn %default
    ikelifetime=60m
    keylife=45m
    rekeymargin=2m
    keyingtries=4
    mobike=no

conn Hub_A
    keyexchange=ikev2
    authby=pubkey
    ike=aes256-sha-modp1536
    esp=aes256-sha1-modp1536
    leftcert=/usr/local/etc/ipsec.d/certs/fight02Req.pem.Email.crt
    left=5.5.5.1 # self if
    leftsubnet=30.1.1.0/24 # left subnet
    leftid="CN=fight02, DC=Common_component, OU=Dept, O=Company, L=City, ST=CA, C=US " # self id
    right=2.2.2.1 # peer if
    rightsubnet=80.1.1.0/24 # peer net for proxy id
    rightid="DC=Domain_component, CN=HubA_certificate, OU=Dept, O=Company, L=City, ST=CA, C=US " # peer id
    auto=add
    leftfirewall=yes
    dpdaction=restart
    dpddelay=10
    dpdtimeout=120
    rekeyfuzz=10%
    reauth=no

conn Hub_B
    keyexchange=ikev2
    authby=pubkey
    ike=aes256-sha-modp1536
    esp=aes192-sha1-modp1536
    leftcert=/usr/local/etc/ipsec.d/certs/fight02Req.pem.Email.crt
```

```

left=5.5.5.1 # self if
leftsubnet=30.1.1.0/24 # self net for proxy id
leftid="CN=fight02, DC=Common_component, OU=Dept, O=Company, L=City,
ST=CA, C=US " # self id
right=4.4.4.1 # peer if
rightsubnet=80.1.1.0/24 # peer net for proxy id
rightid="DC=Domain_component, CN=HubB_certificate, OU=Dept, O=Company,
L=City, ST=CA, C=US " # peer id
auto=add
leftfirewall=yes
dpdaction=restart
dpddelay=10
dpdtimeout=120
rekeyfuzz=10%
reauth=no

```

Verification

Confirm that the configuration is working properly.

- [Verifying Tunnels on the AutoVPN Hubs on page 436](#)
- [Verifying Traffic Selectors on page 437](#)
- [Verifying ARI Routes on page 437](#)

Verifying Tunnels on the AutoVPN Hubs

Purpose Verify that tunnels are established between the AutoVPN hub and eNodeB devices.

Action From operational mode, enter the **show security ike security-associations** and **show security ipsec security-associations** commands on the hub.

```
user@host> show security ike security-associations
```

```
node0:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
276505706	UP	16d6e53f0866b5cc	ccd8ca944da7b63e	IKEv2	5.5.5.1
1350247532	UP	d5f0cb3a3b18cb92	91269f05527217a0	IKEv2	1.1.1.1

```
user@host> show security ipsec security-associations
```

```
node0:
```

```

-----
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<77594626 ESP:aes-cbc-192/sha1 a82bbc3 3600/  64 - root 500 1.1.1.1
>77594626 ESP:aes-cbc-192/sha1 c930a858 3600/  64 - root 500 1.1.1.1
<69206018 ESP:aes-cbc-192/sha1 2b437fc 3600/  64 - root 500 5.5.5.1
>69206018 ESP:aes-cbc-192/sha1 c6e02755 3600/  64 - root 500 5.5.5.1

```


Meaning The `show security ike security-associations` command lists all active IKE Phase 1 SAs. The `show security ipsec security-associations` command lists all active IKE Phase 2 SAs. The hub shows two active tunnels, one to each eNodeB device.

If no SAs are listed for IKE Phase 1, then there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and eNodeB devices.

If no SAs are listed for IKE Phase 2, then there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and eNodeB devices.

Verifying Traffic Selectors

Purpose Verify the traffic selectors.

Action From operational mode, enter the `show security ipsec traffic-selector interface-name st0.1` command.

```
user@host> show security ipsec traffic-selector interface-name st0.1
```

```
node0:
```

Source IP	Destination IP	Interface
Tunnel-id	IKE-ID	
80.1.1.0-80.1.1.255	30.1.1.0-30.1.1.255	st0.1
69206018	DC=Common_component, CN=enodebA, OU=Dept, O=Company, L=City, ST=CA, C=US	
80.1.1.0-80.1.1.255	50.1.1.0-50.1.1.255	st0.1
77594626	DC=Common_component, CN=enodebB, OU=Dept, O=Company, L=City, ST=CA, C=US	

Meaning A traffic selector is an agreement between IKE peers to permit traffic through a tunnel if the traffic matches a specified pair of local and remote addresses. Only traffic that conforms to a traffic selector is permitted through an SA. Traffic selectors are negotiated between the initiator and the responder (the SRX Series hub).

Verifying ARI Routes

Purpose Verify that the ARI routes are added to the routing table.

Action From operational mode, enter the `show route` command.

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

```
inet.0: 23 destinations, 23 routes (22 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
```

1.1.0.0/16	*[Static/5] 02:57:57
	> to 2.2.2.253 via reth1.0
2.2.2.0/24	*[Direct/0] 02:58:43

```

> via reth1.0
2.2.2.1/32      *[Local/0] 02:59:25
                Local via reth1.0
5.5.0.0/16     *[Static/5] 02:57:57
                > to 2.2.2.253 via reth1.0
10.0.0.0/8     *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
10.157.64.0/19 *[Direct/0] 21:54:52
                > via fxp0.0
10.157.75.117/32 *[Local/0] 21:54:52
                Local via fxp0.0
10.254.75.117/32 *[Direct/0] 21:54:52
                > via lo0.0
30.1.1.0/24    *[Static/5] 02:28:10 [ARI route added based on TS1]
                > via st0.1
50.1.1.0/24    *[Static/5] 02:28:26
                > via st0.1
66.129.230.0/24 *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
66.129.236.0/24 *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
80.0.0.0/8     *[Direct/0] 02:57:57
                > via reth0.0
80.1.1.1/32    *[Local/0] 02:57:57
                Local via reth0.0
100.100.1.0/24 *[Direct/0] 02:57:57
                > via lo0.0
100.100.1.100/32 *[Local/0] 02:57:57
                Local via lo0.0
102.100.1.0/24 *[Static/5] 02:57:57
                > to 2.2.2.253 via reth1.0
104.100.1.0/24 *[Static/5] 02:57:57
                > to 2.2.2.253 via reth1.0
172.16.0.0/12  *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
192.168.0.0/16 *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
207.17.136.0/24 *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0
207.17.137.227/32 *[Static/5] 21:54:52
                > to 10.157.64.1 via fxp0.0

```

Meaning Auto route insertion (ARI) automatically inserts a static route for the remote network and hosts protected by a remote tunnel endpoint. A route is created based on the remote IP address configured in the traffic selector. In the case of traffic selectors, the configured remote address is inserted as a route in the routing instance associated with the st0 interface that is bound to the VPN.

Static routes to the eNodeB destinations 30.1.1.0/24 and 50.1.1.0/24 are added to the routing table on the SRX Series hub. These routes are reachable through the st0.1 interface.

See Also • [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)

Release History Table

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, IPv6 address is supported on AutoVPN.
17.4R1	Starting with Junos OS Release 17.4R1, AutoVPN networks that use secure tunnel interfaces in point-to-point mode support IPv6 addresses for traffic selectors and for IKE peers.
15.1X49-D120	Starting with Junos OS Release 15.1X49-D120, you can configure the CLI option reject-duplicate-connection at the [edit security ike gateway gateway-name dynamic] hierarchy level to retain an existing tunnel session and reject negotiation requests for a new tunnel with the same IKE ID.

Related Documentation

- [Monitoring VPN Traffic on page 939](#)

Auto Discovery VPNs

Auto Discovery VPN (ADVPN) dynamically establishes VPN tunnels between spokes to avoid routing traffic through the Hub.

- [Understanding Auto Discovery VPN on page 439](#)
- [Understanding Traffic Routing with Shortcut Tunnels on page 444](#)
- [Example: Improving Network Resource Utilization with Auto Discovery VPN Dynamic Tunnels on page 446](#)
- [Example: Configuring ADVPN with OSPFv3 for IPv6 Traffic on page 487](#)
- [Enabling OSPF to Update Routes Quickly After ADVPN Shortcut Tunnels Are Established on page 515](#)

Understanding Auto Discovery VPN

Auto Discovery VPN (ADVPN) is a technology that allows the central HUB to dynamically inform spokes about a better path for traffic between two spokes. When both spokes acknowledge the information from the HUB, they establish a shortcut tunnel and change the routing topology for the host to reach the other side without sending traffic through the HUB.

- [ADVPN Protocol on page 440](#)
- [Establishing a Shortcut on page 440](#)
- [Shortcut Initiator and Responder Roles on page 441](#)
- [Shortcut Attributes on page 441](#)
- [Shortcut Termination on page 443](#)
- [ADVPN Configuration Limitations on page 443](#)

ADVPN Protocol

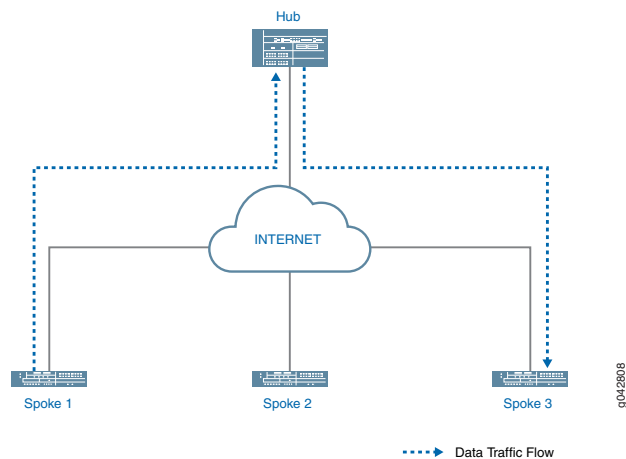
ADVPN uses an extension of IKEv2 protocol to exchange messages between two peers, which allows the spokes to establish a shortcut tunnel between each other. Devices that support the ADVPN extension send an **ADVPN_SUPPORTED** notification in the IKEv2 Notify payload including its capability information and the ADVPN version number during the initial IKE exchange. A device that supports ADVPN can act as either a shortcut suggester or a shortcut partner, but not both.

Establishing a Shortcut

An IPsec VPN gateway can act as a shortcut suggester when it notices that traffic is exiting a tunnel with one of its peers and entering a tunnel with another peer.

[Figure 26 on page 440](#) shows traffic from Spoke 1 to Spoke 3 passing through the hub.

Figure 26: Spoke-to-Spoke Traffic Passing Through Hub

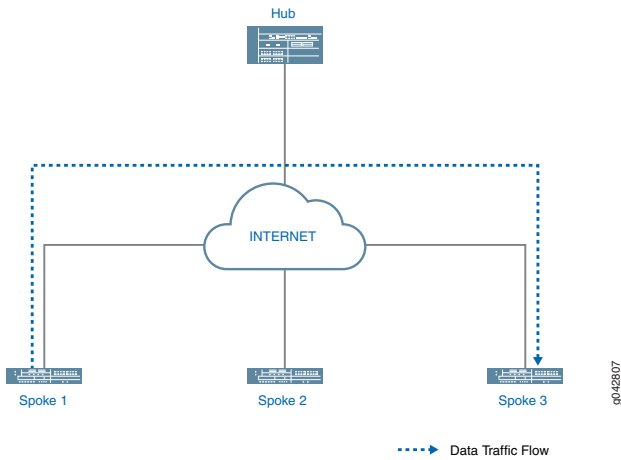


When ADVPN is configured on the devices, ADVPN shortcut capability information is exchanged between the hub and the spokes. As long as Spokes 1 and 3 have previously advertised ADVPN shortcut partner capability to the hub, the hub can suggest that Spokes 1 and 3 establish a shortcut between each other.

The shortcut suggester uses its already established IKEv2 SAs with the peers to begin a shortcut exchange with one of the two peers. If the peer accepts the shortcut exchange, then the shortcut suggester begins a shortcut exchange with the other peer. The shortcut exchange includes information to allow the peers (referred to as shortcut partners) to establish IKE and IPsec SAs with each other. The creation of the shortcut between the shortcut partners starts only after both peers accept the shortcut exchange.

[Figure 27 on page 441](#) shows traffic passing through a shortcut between Spokes 1 and 3. Traffic from Spoke 1 to Spoke 3 does not need to traverse the hub.

Figure 27: Spoke-to-Spoke Traffic Passing Through Shortcut



Shortcut Initiator and Responder Roles

The shortcut suggester chooses one of the shortcut partners to act as the initiator for the shortcut; the other partner acts as the responder. If one of the partners is behind a NAT device, then the partner behind the NAT device is chosen as the initiator. If none of the partners is behind a NAT device, then the suggester randomly chooses one of the partners as the initiator; the other partner acts as the responder. If both partners are behind NAT devices, then a shortcut cannot be created between them; the suggester does not send a shortcut exchange to any of the peers.

The shortcut suggester begins the shortcut exchange with the responder first. If the responder accepts the shortcut suggestion, then the suggester notifies the initiator.

Using information contained in the shortcut suggester's notification, the shortcut initiator establishes an IKEv2 exchange with the responder, and a new IPsec SA is established between the two partners. On each partner, the route to the network behind its partner now points to the shortcut instead of to the tunnel between the partner and the suggester. Traffic originating behind one of the partners that is destined to a network behind the other shortcut partner flows over the shortcut.

If the partners decline the shortcut suggestion, then the partners notify the suggester with the reason for the rejection. In this case, traffic between the partners continues to flow through the shortcut suggester.

Shortcut Attributes

The shortcut receives some of its attributes from the shortcut suggester while other attributes are inherited from the suggester-partner VPN tunnel configuration.

[Table 46 on page 442](#) shows the parameters of the shortcut.

Table 46: Shortcut Parameters

Attributes	Received/Inherited From
ADVPN	Configuration
Antireplay	Configuration
Authentication algorithm	Configuration
Dead peer detection	Configuration
DF bit	Configuration
Encryption algorithm	Configuration
Establish tunnels	Suggester
External interface	Configuration
Gateway policy	Configuration
General IKE ID	Configuration
IKE version	Configuration
Install interval	Configuration
Local address	Configuration
Local identity	Suggester
NAT traversal	Configuration
Perfect forward secrecy	Configuration
Protocol	Configuration
Proxy ID	Not applicable
Remote address	Suggester
Remote identity	Suggester
Respond bad SPI	Configuration
Traffic selector	Not applicable

Shortcut Termination

By default, the shortcut lasts indefinitely. Shortcut partners terminate the shortcut if traffic falls below a specified rate for a specified time. By default, the shortcut is terminated if traffic falls below 5 packets per second for 900 seconds; the idle time and idle threshold values are configurable for partners. The shortcut can be manually deleted on either shortcut partner with the **clear security ike security-association** or **clear security ipsec security-association** commands to clear the corresponding IKE or IPsec SA. Either of the shortcut partners can terminate the shortcut at any time by sending an IKEv2 delete payload to the other shortcut partner.

When the shortcut is terminated, the corresponding IKE SA and all child IPsec SAs are deleted. After the shortcut is terminated, the corresponding route is deleted on both shortcut partners and traffic between the two peers again flows through the suggester. Shortcut termination information is sent from a partner to the suggester.

The lifetime of a shortcut is independent of the tunnel between the shortcut suggester and shortcut partner. The shortcut is not terminated simply because the tunnel between the suggester and partner is terminated.

ADVPN Configuration Limitations

Note the following limitations when configuring ADVPN:

- ADVPN is only supported for site-to-site communications. Configuring an ADVPN suggester is only allowed on AutoVPN hubs.
- You cannot configure both suggester and partner roles. When ADVPN is enabled on a gateway, you cannot disable both suggester and partner roles on the gateway.
- As mentioned previously, you cannot create a shortcut between partners that are both behind NAT devices. The suggester can initiate a shortcut exchange if only one of the partners is behind a NAT device or if no partners are behind NAT devices.
- Multicast traffic is not supported.



NOTE: Starting with Junos OS Release 18.1R1, ADVPN supports IPv6.

The following configurations are not supported with ADVPN:

- IKEv1
- Policy-based VPN
- IKEv2 configuration payload
- Traffic selectors
- Preshared key
- Point-to-point secure tunnel interfaces

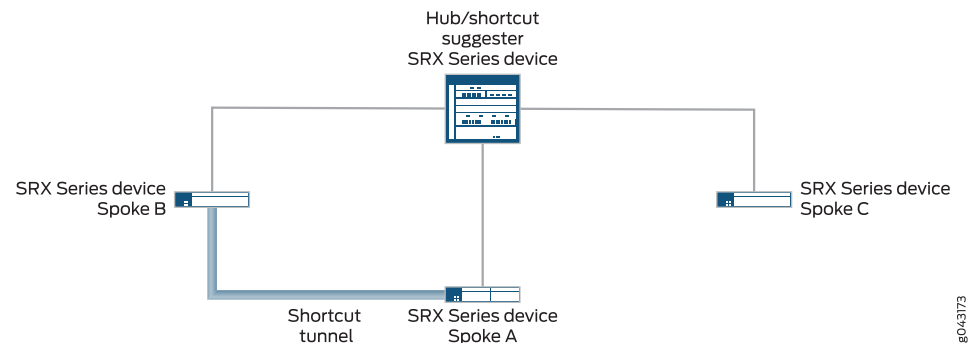
See Also

Understanding Traffic Routing with Shortcut Tunnels

Tunnel flaps or catastrophic changes can cause both static tunnels and shortcut tunnels to go down. When this happens, traffic to a specific destination might be routed through an unexpected shortcut tunnel instead of through an expected static tunnel.

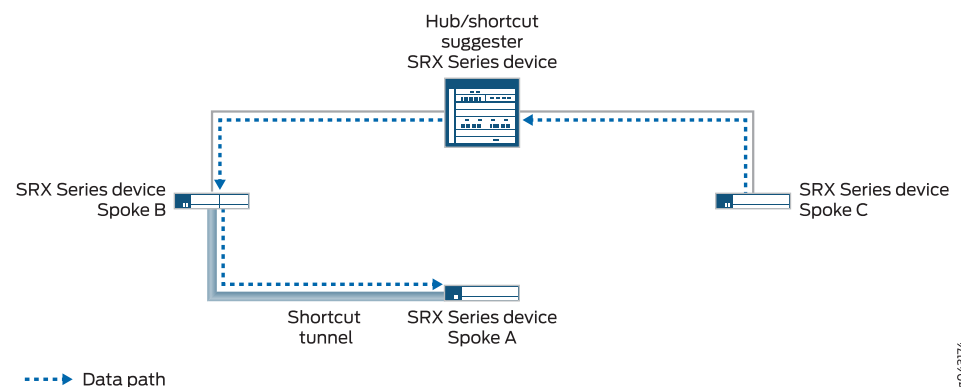
In [Figure 28 on page 444](#), static tunnels exist between the hub and each of the spokes. OSPF adjacencies are established between the hub and spokes. Spoke A also has a shortcut tunnel with Spoke B and OSPF adjacencies are established between the spokes. The hub (the shortcut suggester) recognizes that if connectivity between the hub and Spoke A goes down, Spoke A's network can be reached through the shortcut tunnel between Spoke B and Spoke A.

Figure 28: Static Tunnels and Shortcut Tunnel Established in Hub-and-Spoke Network



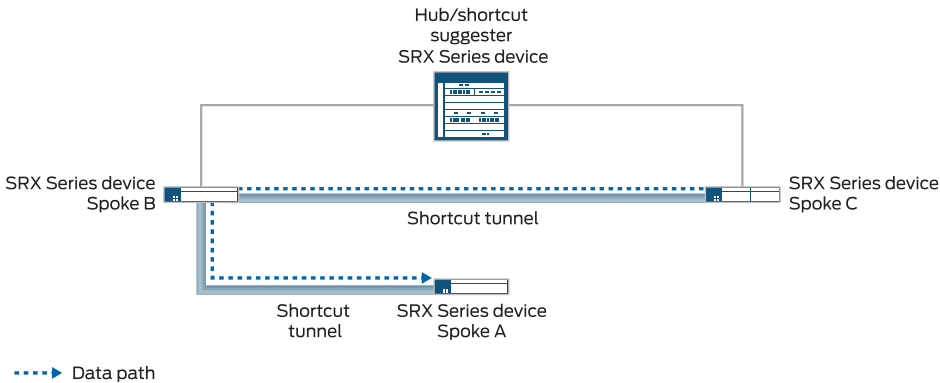
In [Figure 29 on page 444](#), the static tunnel between the hub and Spoke A is down. If there is new traffic from Spoke C to Spoke A, Spoke C forwards the traffic to the hub because it does not have a shortcut tunnel with Spoke A. The hub does not have an active static tunnel with Spoke A but it recognizes that there is a shortcut tunnel between Spoke A and Spoke B, so it forwards the traffic from Spoke C to Spoke B.

Figure 29: Traffic Path from Spoke C to Spoke A



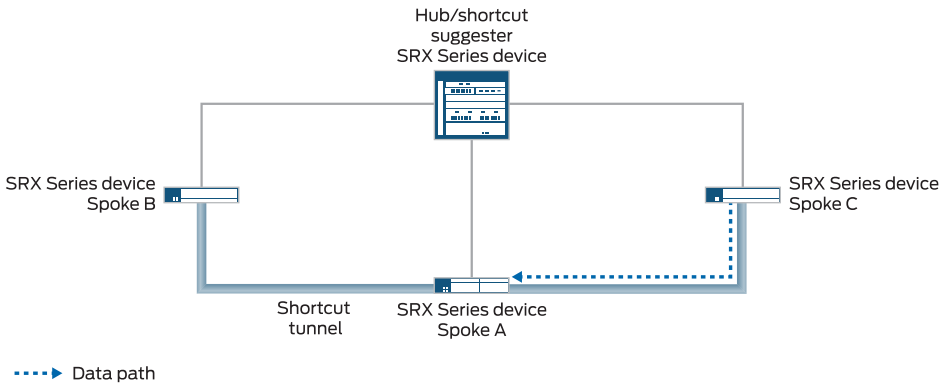
As long as both Spoke B and Spoke C support Auto Discovery VPN (ADVPN) partner capability, the hub can suggest that the spokes establish a direct shortcut between each other. This occurs even though there is no direct traffic between the two spokes. Traffic from Spoke C to Spoke A travels through the shortcut tunnel between Spoke C and Spoke B, and then through the shortcut tunnel between Spoke B and Spoke A (see [Figure 30 on page 445](#)).

Figure 30: Traffic Path from Spoke C to Spoke A Through Shortcut Tunnels



When the static tunnel between the hub and Spoke A is reestablished, the tunnel is advertised to all spokes. Spoke C learns that there is a better route to reach Spoke A; instead of passing traffic through Spoke B, it forwards traffic for Spoke A to the hub. The hub suggests that a shortcut tunnel be established between Spoke C and Spoke A. When the shortcut tunnel is established between Spoke C and Spoke A, traffic flows through the shortcut tunnel (see [Figure 31 on page 445](#)). Traffic between Spoke C and Spoke A no longer travels through Spoke B, and the shortcut tunnel between Spoke B and Spoke C eventually disappears.

Figure 31: Traffic Path from Spoke C to Spoke A Through Shortcut Tunnel





NOTE: You can use the `connection-limit` option at the `[edit security ike gateway gateway-name advpn partner]` hierarchy level to set the maximum number of shortcut tunnels that can be created with different shortcut partners using a particular gateway. The maximum number, which is also the default, is platform-dependent.

See Also • [Understanding Hub-and-Spoke VPNs on page 53](#)

Example: Improving Network Resource Utilization with Auto Discovery VPN Dynamic Tunnels

If you are deploying an AutoVPN network, you might be able to increase your network resource utilization by configuring Auto Discovery VPN (ADVPN). In AutoVPN networks, VPN traffic flows through the hub even when the traffic is travelling from one spoke to another. ADVPN allows VPN tunnels to be established dynamically between spokes, which can result in better network resource utilization. Use this example to configure ADVPN to enable dynamic spoke-to-spoke VPN tunnels in your AutoVPN network.

- [Requirements on page 446](#)
- [Overview on page 447](#)
- [Configuration on page 449](#)
- [Verification on page 469](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as AutoVPN hub and spokes.
- Junos OS Release 12.3X48-D10 or later releases that support ADVPN.
- Digital certificates enrolled in the hub and spokes that allow the devices to authenticate each other.

Before you begin:

1. Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates. See [“Understanding Local Certificate Requests” on page 997](#).
2. Enroll the digital certificates in each device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).



NOTE: This example uses the OSPF dynamic routing protocol as well as static route configurations to forward packets through VPN tunnels. You should be familiar with the OSPF dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configurations of an AutoVPN hub and two spokes for ADVPN. The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as to access resources on the hub. While traffic is initially passed from one spoke to the other through the hub, ADVPN allows the spokes to establish a direct security association between each other. The hub acts as the shortcut suggester. On the hub, the ADVPN configuration disables the **partner** role. On the spokes, ADVPN configuration disables the **suggester** role.

Certain Phase 1 and Phase 2 IKE tunnel options configured on the AutoVPN hub and spokes must have the same values. [Table 47 on page 447](#) shows the values used in this example.

Table 47: Phase 1 and Phase 2 Options for AutoVPN Hub and Spokes for ADVPN Example

Option	Value
<i>IKE proposal:</i>	
Authentication method	rsa-signatures
Diffie-Hellman (DH) group	group5
Authentication algorithm	sha1
Encryption algorithm	aes-256-cbc
<i>IKE policy:</i>	
Certificate	local-certificate
<i>IKE gateway:</i>	
Version	v2-only
<i>IPsec proposal:</i>	
Protocol	esp
Authentication algorithm	hmac-sha1-96
Encryption algorithm	aes-256-cbc
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	group5

The IKE gateway configuration on the hub and spokes include remote and local values that identify VPN peers. [Table 48 on page 448](#) shows the IKE gateway configuration for the hub and spokes in this example.

Table 48: IKE Gateway Configuration for ADVPN Example

Option	Hub	Spokes
Remote IP address	Dynamic	Spoke 1: 11.1.1.1 Spoke 2: 11.1.1.1
Local IP address	11.1.1.1	Spoke 1: 21.1.1.2 Spoke 2: 31.1.1.2
Remote IKE ID	Distinguished name (DN) with the string “XYZ” in the organization (O) field and “Sales” in the organization unit (OU) field in the spokes’ certificates	DN with the string “Sales” in the OU field in the hub’s certificate
Local IKE ID	DN on the hub’s certificate	DN on the spokes’ certificate

The hub authenticates the spokes’ IKE ID if the subject fields of the spokes’ certificates contain the string “XYZ” in the O field and “Sales” in the OU field.

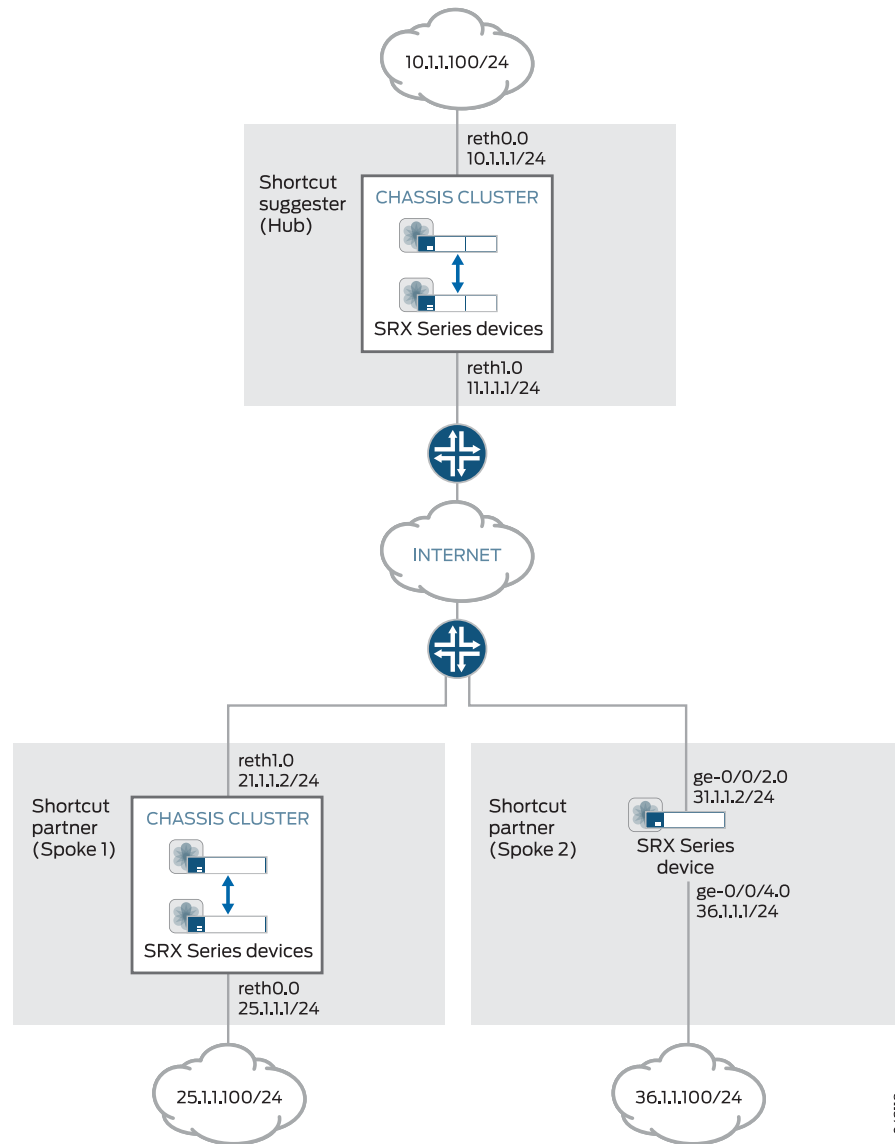


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

[Figure 32 on page 449](#) shows the SRX Series devices to be configured for this example.

Figure 32: AutoVPN Deployment with ADVPN



Configuration

- [Configuring the Suggester \(Hub\) on page 449](#)
- [Configuring the Partner \(Spoke 1\) on page 456](#)
- [Configuring the Partner \(Spoke 2\) on page 463](#)

Configuring the Suggester (Hub)

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network

configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/3 gigether-options redundant-parent reth0
set interfaces ge-0/0/4 gigether-options redundant-parent reth1
set interfaces ge-7/0/3 gigether-options redundant-parent reth0
set interfaces ge-7/0/4 gigether-options redundant-parent reth1
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 10.1.1.1/24
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 11.1.1.1/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 172.16.1.1/24
set protocols ospf graceful-restart restart-duration 300
set protocols ospf graceful-restart notify-duration 300
set protocols ospf graceful-restart no-strict-lsa-checking
set protocols ospf area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf area 0.0.0.0 interface st0.1 metric 10
set protocols ospf area 0.0.0.0 interface st0.1 retransmit-interval 1
set protocols ospf area 0.0.0.0 interface st0.1 dead-interval 40
set protocols ospf area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf area 0.0.0.0 interface reth0.0
set routing-options graceful-restart
set routing-options static route 21.1.1.0/24 next-hop 11.1.1.2
set routing-options static route 31.1.1.0/24 next-hop 11.1.1.2
set routing-options router-id 172.16.1.1
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate Suggester_Certificate_ID
set security ike gateway SUGGESTER_GW ike-policy IKE_POL
set security ike gateway SUGGESTER_GW dynamic distinguished-name wildcard O=XYZ,
    OU=Sales
set security ike gateway SUGGESTER_GW dynamic ike-user-type group-ike-id
set security ike gateway SUGGESTER_GW dead-peer-detection
set security ike gateway SUGGESTER_GW local-identity distinguished-name
set security ike gateway SUGGESTER_GW external-interface reth1.0
set security ike gateway SUGGESTER_GW local-address 11.1.1.1
set security ike gateway SUGGESTER_GW advpn partner disable
set security ike gateway SUGGESTER_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn SUGGESTER_VPN bind-interface st0.1
set security ipsec vpn SUGGESTER_VPN ike gateway SUGGESTER_GW
set security ipsec vpn SUGGESTER_VPN ike ipsec-policy IPSEC_POL
set security pki ca-profile advpn ca-identity advpn
set security pki ca-profile advpn enrollment url http://10.157.92.176:8080/scep/advpn/
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all

```

```

set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces reth0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces reth1.0
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the suggested:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/3 gigether-options redundant-parent reth0
user@host# set ge-0/0/4 gigether-options redundant-parent reth1
user@host# set ge-7/0/3 gigether-options redundant-parent reth0
user@host# set ge-7/0/4 gigether-options redundant-parent reth1
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet address 10.1.1.1/24
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 11.1.1.1/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 172.16.1.1/24

```

2. Configure the routing protocol and static routes.

```

[edit protocols ospf]
user@host# set graceful-restart restart-duration 300
user@host# set graceful-restart notify-duration 300
user@host# set graceful-restart no-strict-lsa-checking
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 metric 10
user@host# set area 0.0.0.0 interface st0.1 retransmit-interval 1
user@host# set area 0.0.0.0 interface st0.1 dead-interval 40
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface reth0.0

[edit routing-options]
user@host# set graceful-restart
user@host# set static route 21.1.1.0/24 next-hop 11.1.1.2
user@host# set static route 31.1.1.0/24 next-hop 11.1.1.2
user@host# set router-id 172.16.1.1

```

3. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures

```

```
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate Suggester_Certificate_ID

[edit security ike gateway SUGGESTER_GW]
user@host# set ike-policy IKE_POL
user@host# set dynamic distinguished-name wildcard O=XYZ, OU=Sales
user@host# set dynamic ike-user-type group-ike-id
user@host# set dead-peer-detection
user@host# set local-identity distinguished-name
user@host# set external-interface reth1.0
user@host# set local-address 11.1.1.1
user@host# set advpn partner disable
user@host# set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals IPSEC_PROP

[edit security isec vpn SUGGESTER_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway SUGGESTER_GW
user@host# set ike ipsec-policy IPSEC_POL
```

5. Configure certificate information.

```
[edit security pki]
user@host# set ca-profile advpn ca-identity advpn
user@host# set ca-profile advpn enrollment url
    http://10.157.92.176:8080/scep/advpn/
```

6. Configure zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces reth0.0
```



```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces reth1.0
```

7. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/3 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-0/0/4 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-7/0/3 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-7/0/4 {
  gigether-options {
    redundant-parent reth1;
  }
}
reth0 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 10.1.1.1/24;
    }
  }
}
reth1 {
  redundant-ether-options {
    redundancy-group 1;
  }
}
```

```

    }
    unit 0 {
        family inet {
            address 11.1.1.1/24;
        }
    }
}
st0 {
    unit 1 {
        multipoint;
        family inet {
            address 172.16.1.1/24;
        }
    }
}
[edit]
user@host# show protocols
ospf {
    graceful-restart {
        restart-duration 300;
        notify-duration 300;
        no-strict-lsa-checking;
    }
    area 0.0.0.0 {
        interface st0.1 {
            interface-type p2mp;
            metric 10;
            retransmit-interval 1;
            dead-interval 40;
            demand-circuit;
            dynamic-neighbors;
        }
        interface reth0.0;
    }
}
[edit]
user@host# show routing-options
graceful-restart;
static {
    route 21.1.1.0/24 next-hop 11.1.1.2;
    route 31.1.1.0/24 next-hop 11.1.1.2;
}
router-id 172.16.1.1;
[edit]
user@host# show security ike
proposal IKE_PROP {
    authentication-method rsa-signatures;
    dh-group group5;
    authentication-algorithm sha1;
    encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
    proposals IKE_PROP;
    certificate {
        local-certificate Suggester_Certificate_ID;
    }
}

```

```

    }
  }
  gateway SUGGESTER_GW {
    ike-policy IKE_POL;
    dynamic {
      distinguished-name {
        wildcard O=XYZ, OU=Sales;
      }
      ike-user-type group-ike-id;
    }
    dead-peer-detection {
    }
    local-identity distinguished-name;
    external-interface reth1.0
    local-address 11.1.1.1;
    advpn {
      partner {
        disable;
      }
    }
    version v2-only;
  }
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-256-cbc;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group5;
  }
  proposals IPSEC_PROP;
}
vpn SUGGESTER_VPN {
  bind-interface st0.1;
  ike {
    gateway SUGGESTER_GW;
    ipsec-policy IPSEC_POL;
  }
}
[edit]
user@host# show security pki
ca-profile advpn {
  ca-identity advpn;
  enrollment {
    url http://10.157.92.176:8080/scep/advpn/;
  }
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {

```

```

        all;
    }
    protocols {
        all;
    }
}
interfaces {
    st0.1;
    reth0.0;
}
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        reth1.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Partner (Spoke 1)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/3 gigether-options redundant-parent reth0
set interfaces ge-0/0/4 gigether-options redundant-parent reth1
set interfaces ge-7/0/3 gigether-options redundant-parent reth0
set interfaces ge-7/0/4 gigether-options redundant-parent reth1
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 25.1.1.1/24
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 21.1.1.2/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 172.16.1.2/24
set protocols ospf graceful-restart restart-duration 300
set protocols ospf graceful-restart notify-duration 300
set protocols ospf graceful-restart no-strict-lsa-checking
set protocols ospf area 0.0.0.0 interface st0.1 interface-type p2mp

```

```

set protocols ospf area 0.0.0.0 interface st0.1 metric 15
set protocols ospf area 0.0.0.0 interface st0.1 retransmit-interval 1
set protocols ospf area 0.0.0.0 interface st0.1 dead-interval 40
set protocols ospf area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf area 0.0.0.0 interface reth0.0
set routing-options graceful-restart
set routing-options static route 11.1.1.0/24 next-hop 21.1.1.1
set routing-options static route 31.1.1.0/24 next-hop 21.1.1.1
set routing-options router-id 172.16.1.2
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate Partner1_Certificate_ID
set security ike gateway PARTNER_GW ike-policy IKE_POL
set security ike gateway PARTNER_GW address 11.1.1.1
set security ike gateway PARTNER_GW local-identity distinguished-name
set security ike gateway PARTNER_GW remote-identity distinguished-name container
    OU=Sales
set security ike gateway PARTNER_GW external-interface reth1
set security ike gateway PARTNER_GW local-address 21.1.1.2
set security ike gateway PARTNER_GW advpn suggerter disable
set security ike gateway PARTNER_GW advpn partner
set security ike gateway PARTNER_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn PARTNER_VPN bind-interface st0.1
set security ipsec vpn PARTNER_VPN ike gateway PARTNER_GW
set security ipsec vpn PARTNER_VPN ike ipsec-policy IPSEC_POL
set security ipsec vpn PARTNER_VPN establish-tunnels immediately
set security pki ca-profile advpn ca-identity advpn
set security pki ca-profile advpn enrollment url http://10.157.92.176:8080/scep/advpn/
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces st0.1
set security zones security-zone trust interfaces reth0.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces reth1.0
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure spoke 1:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/3 gigether-options redundant-parent reth0
user@host# set ge-0/0/4 gigether-options redundant-parent reth1
user@host# set ge-7/0/3 gigether-options redundant-parent reth0
user@host# set ge-7/0/4 gigether-options redundant-parent reth1
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet address 25.1.1.2/24
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 21.1.1.2/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 172.16.1.2/24
```

2. Configure the routing protocol and static routes.

```
[edit protocols ospf]
user@host# set graceful-restart restart-duration 300
user@host# set graceful-restart notify-duration 300
user@host# set graceful-restart no-strict-lsa-checking
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 metric 15
user@host# set area 0.0.0.0 interface st0.1 retransmit-interval 1
user@host# set area 0.0.0.0 interface st0.1 dead-interval 40
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set protocols ospf area 0.0.0.0 interface reth0.0

[edit routing-options]
user@host# set graceful-restart
user@host# set static route 11.1.1.0/24 next-hop 21.1.1.1
user@host# set static route 31.1.1.0/24 next-hop 21.1.1.1
user@host# set router-id 172.16.1.2
```

3. Configure Phase 1 options.

```
[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate Partner1_Certificate_ID

[edit security ike gateway PARTNER_GW]
user@host# set ike-policy IKE_POL
user@host# set address 11.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=Sales
user@host# set external-interface reth1
```

```

user@host# set local-address 21.1.1.2
user@host# set advpn suggerter disable
user@host# set advpn partner
user@host# set version v2-only

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals IPSEC_PROP

[edit security isec vpn PARTNER_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway PARTNER_GW
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately

```

5. Configure certificate information.

```

[edit security pki]
user@host# set ca-profile advpn ca-identity advpn
user@host# set ca-profile advpn enrollment url
    http://10.157.92.176:8080/scep/advpn/

```

6. Configure zones.

```

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces st0.1
user@host# set interfaces reth0.0

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces reth1.0

```

7. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/3 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-0/0/4 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-7/0/3 {
  gigether-options {
    redundant-parent reth0;
  }
}
ge-7/0/4 {
  gigether-options {
    redundant-parent reth1;
  }
}
reth0 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 25.1.1.1/24;
    }
  }
}
reth1 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 21.1.1.2/24;
    }
  }
}
st0 {
  unit 1 {
    multipoint;
    family inet {
      address 172.16.1.2/24;
    }
  }
}
```



```

    }
  }
[edit]
user@host# show protocols
ospf {
  graceful-restart {
    restart-duration 300;
    notify-duration 300;
    no-strict-lsa-checking;
  }
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      metric 15;
      retransmit-interval 1;
      dead-interval 40;
      demand-circuit;
      dynamic-neighbors;
    }
    interface reth0.0;
  }
}
[edit]
user@host# show routing-options
graceful-restart;
static {
  route 11.1.1.0/24 next-hop 21.1.1.1;
  route 31.1.1.0/24 next-hop 21.1.1.1;
}
router-id 172.16.1.2;
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group5;
  authentication-algorithm sha1;
  encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
  proposals IKE_PROP;
  certificate {
    local-certificate Partner1_Certificate_ID;
  }
}
gateway PARTNER_GW {
  ike-policy IKE_POL;
  address 11.1.1.1;
  local-identity distinguished-name;
  remote-identity distinguished-name container OU=Sales;
  external-interface reth1;
  local-address 21.1.1.2;
  advpn {
    suggester {
      disable;
    }
  }
}

```

```
    partner {
    }
  }
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-256-cbc;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group5;
  }
  proposals IPSEC_PROP;
}
vpn PARTNER_VPN {
  bind-interface st0.1;
  ike {
    gateway PARTNER_GW;
    ipsec-policy IPSEC_POL;
  }
  establish-tunnels immediately;
}
[edit]
user@host# show security pki
ca-profile advpn {
  ca-identity advpn;
  enrollment {
    url http://10.157.92.176:8080/scep/advpn/;
  }
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  protocols {
    all;
  }
}
  interfaces {
    st0.1;
    reth0.0;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
}
```

```

protocols {
    all;
}
}
interfaces {
    reth1.0;
}
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Partner (Spoke 2)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/2 unit 0 family inet address 31.1.1.2/24
set interfaces ge-0/0/4 unit 0 family inet address 36.1.1.1/24
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet address 172.16.1.3/24
set protocols ospf graceful-restart restart-duration 300
set protocols ospf graceful-restart notify-duration 300
set protocols ospf graceful-restart no-strict-lsa-checking
set protocols ospf area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf area 0.0.0.0 interface st0.1 metric 15
set protocols ospf area 0.0.0.0 interface st0.1 retransmit-interval 1
set protocols ospf area 0.0.0.0 interface st0.1 dead-interval 40
set protocols ospf area 0.0.0.0 interface st0.1 demand-circuit
set protocols ospf area 0.0.0.0 interface st0.1 dynamic-neighbors
set protocols ospf area 0.0.0.0 interface ge-0/0/4.0
set routing-options graceful-restart
set routing-options static route 11.1.1.0/24 next-hop 31.1.1.1
set routing-options static route 21.1.1.0/24 next-hop 31.1.1.1
set routing-options router-id 172.16.1.3
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate Partner2_Certificate_ID
set security ike gateway PARTNER_GW ike-policy IKE_POL
set security ike gateway PARTNER_GW address 11.1.1.1
set security ike gateway PARTNER_GW dead-peer-detection
set security ike gateway PARTNER_GW local-identity distinguished-name
set security ike gateway PARTNER_GW remote-identity distinguished-name container
OU=Sales

```

```

set security ike gateway PARTNER_GW external-interface ge-0/0/2.0
set security ike gateway PARTNER_GW local-address 31.1.1.2
set security ike gateway PARTNER_GW advpn suggerter disable
set security ike gateway PARTNER_GW advpn partner
set security ike gateway PARTNER_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn PARTNER_VPN bind-interface st0.1
set security ipsec vpn PARTNER_VPN ike gateway PARTNER_GW
set security ipsec vpn PARTNER_VPN ike ipsec-policy IPSEC_POL
set security ipsec vpn PARTNER_VPN establish-tunnels immediately
set security pki ca-profile advpn ca-identity advpn
set security pki ca-profile advpn enrollment url http://10.157.92.176:8080/scep/advpn/
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/4.0
set security zones security-zone trust interfaces st0.1
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/2.0
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure spoke 2:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/2 unit 0 family inet address 31.1.1.2/24
user@host# set ge-0/0/4 unit 0 family inet address 36.1.1.1/24
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet address 172.16.1.3/24

```

2. Configure the routing protocol and static routes.

```

[edit protocols ospf]
user@host# set graceful-restart restart-duration 300
user@host# set graceful-restart notify-duration 300
user@host# set graceful-restart no-strict-lsa-checking
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 metric 15
user@host# set area 0.0.0.0 interface st0.1 retransmit-interval 1
user@host# set area 0.0.0.0 interface st0.1 dead-interval 40
user@host# set area 0.0.0.0 interface st0.1 demand-circuit
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/4.0

```

```
[edit routing-options]
user@host# set graceful-restart
user@host# set static route 11.1.1.0/24 next-hop 31.1.1.1
user@host# set static route 21.1.1.0/24 next-hop 31.1.1.1
user@host# set router-id 172.16.1.3
```

3. Configure Phase 1 options.

```
[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate Partner2_Certificate_ID

[edit security ike gateway PARTNER_GW]
user@host# set ike-policy IKE_POL
user@host# set address 11.1.1.1
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=Sales
user@host# set external-interface ge-0/0/2.0
user@host# set local-address 31.1.1.2
user@host# set advpn suggerter disable
user@host# set advpn partner
user@host# set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals IPSEC_PROP

[edit security isec vpn PARTNER_VPN]
user@host# set bind-interface st0.1
user@host# set ike gateway PARTNER_GW
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately
```

5. Configure certificate information.

```
[edit security pki]
user@host# set ca-profile advpn ca-identity advpn
```

```
user@host# set ca-profile advpn enrollment url
http://10.157.92.176:8080/scep/advpn/
```

6. Configure zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/4.0
user@host# set interfaces st0.1
```

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/2.0
```

7. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security pki**, **show security zones**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/2 {
  unit 0 {
    family inet {
      address 31.1.1.2/24;
    }
  }
}
ge-0/0/4 {
  unit 0 {
    family inet {
      address 36.1.1.1/24;
    }
  }
}
st0 {
  unit 1 {
    multipoint;
    family inet {
      address 172.16.1.3/24;
    }
  }
}
```

```

    }
  }
[edit]
user@host# show protocols
ospf {
  graceful-restart {
    restart-duration 300;
    notify-duration 300;
    no-strict-lsa-checking;
  }
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      metric 15;
      retransmit-interval 1;
      dead-interval 40;
      demand-circuit;
      dynamic-neighbors;
    }
    interface ge-0/0/4.0;
  }
}
[edit]
user@host# show routing-options
graceful-restart;
static {
  route 11.1.1.0/24 next-hop 31.1.1.1;
  route 21.1.1.0/24 next-hop 31.1.1.1;
}
router-id 172.16.1.3;
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group5;
  authentication-algorithm sha1;
  encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
  proposals IKE_PROP;
  certificate {
    local-certificate Partner2_Certificate_ID
  }
}
gateway PARTNER_GW {
  ike-policy IKE_POL;
  address 11.1.1.1;
  local-identity distinguished-name;
  remote-identity distinguished-name container OU=Sales;
  external-interface ge-0/0/2.0;
  local-address 31.1.1.2;
  advpn {
    suggester{
      disable;
    }
  }
}

```

```
    partner {
    }
  }
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-256-cbc;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group5;
  }
  proposals IPSEC_PROP;
}
vpn PARTNER_VPN {
  bind-interface st0.1;
  ike {
    gateway PARTNER_GW;
    ipsec-policy IPSEC_POL;
  }
  establish-tunnels immediately;
}
[edit]
user@host# show security pki
ca-profile advpn {
  ca-identity advpn;
  enrollment {
    url http://10.157.92.176:8080/scep/advpn/;
  }
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  protocols {
    all;
  }
}
  interfaces {
    ge-0/0/4.0;
    st0.1;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
}
```



```

protocols {
    all;
}
}
interfaces {
    ge-0/0/2.0;
}
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly. First, verify that tunnels are established between the AutoVPN hub and spokes. When traffic is passed from one spoke to another through the hub, a shortcut can be established between the spokes. Verify that the shortcut partners have established a tunnel between them and that a route to the peer is installed on the partners.

- [Verifying Tunnels Between the Hub and Spokes on page 469](#)
- [Verifying the Shortcut Tunnel Between Partners on page 477](#)

Verifying Tunnels Between the Hub and Spokes

Purpose Verify that tunnels are established between the AutoVPN hub and spokes. Initial traffic from one spoke to another must travel through the hub.

Action From operational mode, enter the **show security ike security-associations** and **show security ipsec security-associations** commands on the hub and spokes.

The following commands are entered on the hub:

```
user@host> show security ike security-associations
```

```
node1:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
10957048	UP	2d58d8fbc396762d	46145be580c68be0	IKEv2	31.1.1.2
10957049	UP	fa05ee6d0f2cfb22	16f5ca836b118c0e	IKEv2	21.1.1.2

```
user@host> show security ike security-associations detail
```

```
node1:
```

```
-----
IKE peer 31.1.1.2, Index 10957048, Gateway Name: SUGGESTER_GW
```

```

Auto Discovery VPN:
Type: Static, Local Capability: Suggester, Peer Capability: Partner
Suggester Shortcut Suggestions Statistics:
  Suggestions sent      :    0
  Suggestions accepted:    0
  Suggestions declined:    0
Role: Responder, State: UP
Initiator cookie: 2d58d8fbc396762d, Responder cookie: 46145be580c68be0
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 11.1.1.1:500, Remote: 31.1.1.2:500
Lifetime: Expires in 28196 seconds
Peer ike-id: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes :          2030
  Output bytes :          2023
  Input packets:           4
  Output packets:          4
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 11.1.1.1:500, Remote: 31.1.1.2:500
Local identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
Remote identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

IKE peer 21.1.1.2, Index 10957049, Gateway Name: SUGGESTER_GW
Auto Discovery VPN:
Type: Static, Local Capability: Suggester, Peer Capability: Partner
Suggester Shortcut Suggestions Statistics:
  Suggestions sent      :    0
  Suggestions accepted:    0
  Suggestions declined:    0
Role: Responder, State: UP
Initiator cookie: fa05ee6d0f2cfb22, Responder cookie: 16f5ca836b118c0e
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 11.1.1.1:500, Remote: 21.1.1.2:500
Lifetime: Expires in 28219 seconds
Peer ike-id: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes :          2030
  Output bytes :          2023
  Input packets:           4
  Output packets:          4

```

```

IPsec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 11.1.1.1:500, Remote: 21.1.1.2:500
Local identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
Remote identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

```

```
user@host> show security ipsec security-associations
```

```
node1:
```

```

-----
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port Gateway
<201326593 ESP:aes-cbc-256/sha1 44ccf265 2999/ unlim - root 500 31.1.1.2

>201326593 ESP:aes-cbc-256/sha1 a9d301b0 2999/ unlim - root 500 31.1.1.2

<201326594 ESP:aes-cbc-256/sha1 98a2b155 3022/ unlim - root 500 21.1.1.2

>201326594 ESP:aes-cbc-256/sha1 de912bcd 3022/ unlim - root 500 21.1.1.2

```

```
user@host> show security ipsec security-associations detail
```

```
node1:
```

```

-----
ID: 201326593 Virtual-system: root, VPN Name: SUGGESTER_VPN
Local Gateway: 11.1.1.1, Remote Gateway: 31.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 2, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Tunnel events:
  Tue Jan 13 2015 12:57:48 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:57:48 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:57:48 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: 44ccf265, AUX-SPI: 0
  Hard lifetime: Expires in 2991 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2414 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: a9d301b0, AUX-SPI: 0
  Hard lifetime: Expires in 2991 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2414 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

```

```
ID: 201326594 Virtual-system: root, VPN Name: SUGGESTER_VPN
Local Gateway: 11.1.1.1, Remote Gateway: 21.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 3, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Tunnel events:
  Tue Jan 13 2015 12:58:11 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:58:11 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:58:11 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: 98a2b155, AUX-SPI: 0
Hard lifetime: Expires in 3014 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2436 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: de912bcd, AUX-SPI: 0
Hard lifetime: Expires in 3014 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2436 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
```

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

```
inet.0: 28 destinations, 28 routes (27 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

25.1.1.0/24      *[OSPF/10] 00:00:27, metric 11
> to 172.16.1.2 via st0.1
36.1.1.0/24      *[OSPF/10] 00:00:27, metric 11
> to 172.16.1.3 via st0.1
172.16.1.2/32    *[OSPF/10] 00:00:27, metric 10
> to 172.16.1.2 via st0.1
172.16.1.3/32    *[OSPF/10] 00:00:27, metric 10
> to 172.16.1.3 via st0.1
224.0.0.5/32     *[OSPF/10] 00:00:48, metric 1
MultiRecv
```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.3	st0.1	Full	172.16.1.3	128	-
172.16.1.2	st0.1	Full	172.16.1.2	128	-

The following commands are entered on spoke 1:

```
user@host> show security ike security-associations
```

```
node0:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
578872	UP	fa05ee6d0f2cfb22	16f5ca836b118c0e	IKEv2	11.1.1.1

```
user@host> show security ike security-associations detail
```

```
node0:
```

```
-----
IKE peer 11.1.1.1, Index 578872, Gateway Name: PARTNER_GW
Auto Discovery VPN:
  Type: Static, Local Capability: Partner, Peer Capability: Suggester
Partner Shortcut Suggestions Statistics:
  Suggestions received:    0
  Suggestions accepted:    0
  Suggestions declined:    0
Role: Initiator, State: UP
Initiator cookie: fa05ee6d0f2cfb22, Responder cookie: 16f5ca836b118c0e
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 21.1.1.2:500, Remote: 11.1.1.1:500
Lifetime: Expires in 28183 seconds
Peer ike-id: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes :          2023
  Output bytes :          2030
  Input packets:           4
  Output packets:          4
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 21.1.1.2:500, Remote: 11.1.1.1:500
Local identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Remote identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
Flags: IKE SA is created
```

```
user@host> show security ipsec security-associations
```

```
node0:
```

```
-----
Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<67108866 ESP:aes-cbc-256/sha1 de912bcd 2985/ unlim - root 500 11.1.1.1
>67108866 ESP:aes-cbc-256/sha1 98a2b155 2985/ unlim - root 500 11.1.1.1
```

```
user@host> show security ipsec security-associations detail
```

```
node0:
```

```
-----
ID: 67108866 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 21.1.1.2, Remote Gateway: 11.1.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x8608a29
Tunnel events:
  Tue Jan 13 2015 12:58:11 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:58:11 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:58:11 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: de912bcd, AUX-SPI: 0
Hard lifetime: Expires in 2980 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2358 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 98a2b155, AUX-SPI: 0
Hard lifetime: Expires in 2980 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2358 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
```

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

```
inet.0: 29 destinations, 29 routes (28 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both
```

```
10.1.1.0/24      *[OSPF/10] 00:11:46, metric 16
                  > to 172.16.1.1 via st0.1
36.1.1.0/24      *[OSPF/10] 00:11:46, metric 26
                  > to 172.16.1.1 via st0.1
172.16.1.1/32    *[OSPF/10] 00:11:46, metric 15
                  > to 172.16.1.1 via st0.1
172.16.1.3/32    *[OSPF/10] 00:11:46, metric 25
                  > to 172.16.1.1 via st0.1
224.0.0.5/32     *[OSPF/10] 00:16:52, metric 1
                  MultiRecv
```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.1	st0.1	Full	172.16.1.1	128	-

The following commands are entered on spoke 2:

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
2299162	UP	2d58d8fbc396762d	46145be580c68be0	IKEv2	11.1.1.1

```
user@host> show security ike security-associations detail
```

```
IKE peer 11.1.1.1, Index 2299162, Gateway Name: PARTNER_GW
Auto Discovery VPN:
  Type: Static, Local Capability: Partner, Peer Capability: Suggester
  Partner Shortcut Suggestions Statistics:
    Suggestions received: 0
    Suggestions accepted: 0
    Suggestions declined: 0
Role: Initiator, State: UP
Initiator cookie: 2d58d8fbc396762d, Responder cookie: 46145be580c68be0
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 31.1.1.2:500, Remote: 11.1.1.1:500
Lifetime: Expires in 28135 seconds
Peer ike-id: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes : 2023
  Output bytes : 2030
  Input packets: 4
  Output packets: 4
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

  Negotiation type: Quick mode, Role: Initiator, Message ID: 0
  Local: 31.1.1.2:500, Remote: 11.1.1.1:500
  Local identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

  Remote identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
Flags: IKE SA is created
```

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb Mon lsys Port Gateway
<67108866 ESP:aes-cbc-256/sha1 a9d301b0 2936/ unlim - root 500 11.1.1.1

>67108866 ESP:aes-cbc-256/sha1 44ccf265 2936/ unlim - root 500 11.1.1.1
```

```
user@host> show security ipsec security-associations detail
```

```
ID: 67108866 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 31.1.1.2, Remote Gateway: 11.1.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
```

```

Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x8608a29
Tunnel events:
  Tue Jan 13 2015 12:57:48 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:57:48 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:57:48 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: a9d301b0, AUX-SPI: 0
  Hard lifetime: Expires in 2933 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2311 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 44ccf265, AUX-SPI: 0
  Hard lifetime: Expires in 2933 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2311 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

```

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

```

inet.0: 36 destinations, 36 routes (35 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

```

```

10.1.1.0/24      *[OSPF/10] 00:00:09, metric 16
                  > to 172.16.1.1 via st0.1
25.1.1.0/24      *[OSPF/10] 00:00:09, metric 26
                  > to 172.16.1.1 via st0.1
172.16.1.1/32    *[OSPF/10] 00:00:09, metric 15
                  > to 172.16.1.1 via st0.1
172.16.1.2/32    *[OSPF/10] 00:00:09, metric 25
                  > to 172.16.1.1 via st0.1
224.0.0.5/32     *[OSPF/10] 00:17:52, metric 1
                  MultiRecv

```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.1	st0.1	Full	172.16.1.1	128	-

Meaning The `show security ike security-associations` command lists all active IKE Phase 1 SAs. The `show security ipsec security-associations` command lists all active IKE Phase 2 SAs. The hub shows two active tunnels, one to each spoke. Each spoke shows an active tunnel to the hub.

If no SAs are listed for IKE Phase 1, then there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

If no SAs are listed for IKE Phase 2, then there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

The **show route protocol ospf** command displays entries in the routing table that were learned from the OSPF protocol. The **show ospf neighbor** command displays information about OSPF neighbors.

Verifying the Shortcut Tunnel Between Partners

Purpose The AutoVPN hub can act as a shortcut suggester when it notices that traffic is exiting a tunnel with one of its spokes and entering a tunnel with another spoke. A new IPsec SA, or shortcut, is established between the two shortcut partners. On each partner, the route to the network behind its partner now points to the shortcut tunnel instead of to the tunnel between the partner and the suggester (hub).

Action From operational mode, enter the **show security ike security-associations**, **show security ipsec security-associations**, **show route protocol ospf**, and **show ospf neighbor** commands on the spokes.

The following commands are entered on the hub:

```
user@host> show security ike security-associations
```

```
node0:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
10957048	UP	2d58d8fbc396762d	46145be580c68be0	IKEv2	31.1.1.2
10957049	UP	fa05ee6d0f2cfb22	16f5ca836b118c0e	IKEv2	21.1.1.2

```
user@host> show security ike security-associations detail
```

```
node0:
```

```
-----
IKE peer 31.1.1.2, Index 10957048, Gateway Name: SUGGESTER_GW
Auto Discovery VPN:
  Type: Static, Local Capability: Suggester, Peer Capability: Partner
  Suggester Shortcut Suggestions Statistics:
    Suggestions sent      :    1
    Suggestions accepted:    1
    Suggestions declined:    0
  Role: Responder, State: UP
  Initiator cookie: 2d58d8fbc396762d, Responder cookie: 46145be580c68be0
  Exchange type: IKEv2, Authentication method: RSA-signatures
  Local: 11.1.1.1:500, Remote: 31.1.1.2:500
  Lifetime: Expires in 27781 seconds
  Peer ike-id: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
  Xauth user-name: not available
  Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
```

```

Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes : 260
Output bytes : 548
Input packets: 3
Output packets: 3
IPSec security associations: 0 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 11.1.1.1:500, Remote: 31.1.1.2:500
Local identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
Remote identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

IKE peer 21.1.1.2, Index 10957049, Gateway Name: SUGGESTER_GW
Auto Discovery VPN:
Type: Static, Local Capability: Suggester, Peer Capability: Partner
Suggester Shortcut Suggestions Statistics:
Suggestions sent : 1
Suggestions accepted: 1
Suggestions declined: 0
Role: Responder, State: UP
Initiator cookie: fa05ee6d0f2cfb22, Responder cookie: 16f5ca836b118c0e
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 11.1.1.1:500, Remote: 21.1.1.2:500
Lifetime: Expires in 27804 seconds
Peer ike-id: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
Authentication : hmac-sha1-96
Encryption : aes256-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes : 244
Output bytes : 548
Input packets: 3
Output packets: 3
IPSec security associations: 0 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 11.1.1.1:500, Remote: 21.1.1.2:500
Local identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
Remote identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

```

```
user@host> show security ipsec security-associations
```

```
node0:
```

```
-----
s Total active tunnels: 2
```

```

ID      Algorithm      SPI      Life:sec/kb  Mon  lsys  Port  Gateway
<201326593 ESP:aes-cbc-256/sha1 44ccf265 2584/ unlim - root 500 31.1.1.2

>201326593 ESP:aes-cbc-256/sha1 a9d301b0 2584/ unlim - root 500 31.1.1.2

<201326594 ESP:aes-cbc-256/sha1 98a2b155 2607/ unlim - root 500 21.1.1.2

>201326594 ESP:aes-cbc-256/sha1 de912bcd 2607/ unlim - root 500 21.1.1.2

```

```
user@host> show security ipsec security-associations detail
```

```
node0:
```

```

-----
ID: 201326593 Virtual-system: root, VPN Name: SUGGESTER_VPN
Local Gateway: 11.1.1.1, Remote Gateway: 31.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Tunnel events:
  Tue Jan 13 2015 13:09:48 -0800: Bind-interface's address received. Information
  updated (1 times)
  Tue Jan 13 2015 13:09:48 -0800: Tunnel is ready. Waiting for trigger event
  or peer to trigger negotiation (1 times)
Direction: inbound, SPI: 44ccf265, AUX-SPI: 0
  Hard lifetime: Expires in 2578 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2001 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: a9d301b0, AUX-SPI: 0
  Hard lifetime: Expires in 2578 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2001 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

ID: 201326594 Virtual-system: root, VPN Name: SUGGESTER_VPN
Local Gateway: 11.1.1.1, Remote Gateway: 21.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Tunnel events:
  Tue Jan 13 2015 13:09:48 -0800: Bind-interface's address received. Information
  updated (1 times)
  Tue Jan 13 2015 13:09:48 -0800: Tunnel is ready. Waiting for trigger event
  or peer to trigger negotiation (1 times)
Direction: inbound, SPI: 98a2b155, AUX-SPI: 0
  Hard lifetime: Expires in 2601 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2023 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed

```

```

Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: de912bcd, AUX-SPI: 0
Hard lifetime: Expires in 2601 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2023 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

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

```

inet.0: 28 destinations, 28 routes (27 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

```

```

25.1.1.0/24      *[OSPF/10] 00:04:49, metric 11
                  > to 172.16.1.2 via st0.1
36.1.1.0/24      *[OSPF/10] 00:04:49, metric 11
                  > to 172.16.1.3 via st0.1
172.16.1.2/32    *[OSPF/10] 00:04:49, metric 10
                  > to 172.16.1.2 via st0.1
172.16.1.3/32    *[OSPF/10] 00:04:49, metric 10
                  > to 172.16.1.3 via st0.1
224.0.0.5/32     *[OSPF/10] 00:05:10, metric 1
                  MultiRecv

```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.3	st0.1	Full	172.16.1.3	128	-
172.16.1.2	st0.1	Full	172.16.1.2	128	-

The following commands are entered on spoke 1:

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
578872	UP	fa05ee6d0f2cfb22	16f5ca836b118c0e	IKEv2	11.1.1.1
578873	UP	895e4d9c7c5da7a4	17de7f18b45139b4	IKEv2	31.1.1.2

```
user@host> show security ike security-associations detail
```

```
node0:
```

```

-----
IKE peer 11.1.1.1, Index 578872, Gateway Name: PARTNER_GW
Auto Discovery VPN:
Type: Static, Local Capability: Partner, Peer Capability: Suggester
Partner Shortcut Suggestions Statistics:
Suggestions received: 1
Suggestions accepted: 1
Suggestions declined: 0
Role: Initiator, State: UP
Initiator cookie: fa05ee6d0f2cfb22, Responder cookie: 16f5ca836b118c0e

```

```

Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 21.1.1.2:500, Remote: 11.1.1.1:500
Lifetime: Expires in 27906 seconds
Peer ike-id: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes  :          2495
  Output bytes :          2274
  Input packets:           6
  Output packets:          7
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 21.1.1.2:500, Remote: 11.1.1.1:500
Local identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Remote identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
Flags: IKE SA is created

IKE peer 31.1.1.2, Index 578873, Gateway Name: PARTNER_GW
Auto Discovery VPN:
  Type: Shortcut, Local Capability: Partner, Peer Capability: Partner
  Role: Initiator, State: UP
  Initiator cookie: 895e4d9c7c5da7a4, Responder cookie: 17de7f18b45139b4
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 21.1.1.2:500, Remote: 31.1.1.2:500
Lifetime: Expires in 28787 seconds
Peer ike-id: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-5
Traffic statistics:
  Input bytes  :          1855
  Output bytes :          1990
  Input packets:           2
  Output packets:           2
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 21.1.1.2:500, Remote: 31.1.1.2:500
Local identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Remote identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

```

```
user@host> show security ipsec security-associations
```

```
node0:
```

```
-----
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<67108866 ESP:aes-cbc-256/sha1 de912bcd 2709/ unlim - root 500 11.1.1.1
>67108866 ESP:aes-cbc-256/sha1 98a2b155 2709/ unlim - root 500 11.1.1.1
<67108868 ESP:aes-cbc-256/sha1 75d0177b 3590/ unlim - root 500 31.1.1.2
>67108868 ESP:aes-cbc-256/sha1 e4919d73 3590/ unlim - root 500 31.1.1.2
```

```
user@host> show security ipsec security-associations detail
```

```
node0:
```

```
-----
ID: 67108866 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 21.1.1.2, Remote Gateway: 11.1.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x8608a29
Tunnel events:
  Tue Jan 13 2015 12:58:11 -0800: IPSec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:58:11 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:58:11 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: de912bcd, AUX-SPI: 0
Hard lifetime: Expires in 2701 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2079 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 98a2b155, AUX-SPI: 0
Hard lifetime: Expires in 2701 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2079 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

ID: 67108868 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 21.1.1.2, Remote Gateway: 31.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Auto Discovery VPN:
  Type: Shortcut, Shortcut Role: Initiator
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x40608a29
Tunnel events:
  Tue Jan 13 2015 13:12:52 -0800: IPSec SA negotiation successfully completed
```

```
(1 times)
Tue Jan 13 2015 13:12:52 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
Tue Jan 13 2015 13:12:52 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: 75d0177b, AUX-SPI: 0
Hard lifetime: Expires in 3582 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2959 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: e4919d73, AUX-SPI: 0
Hard lifetime: Expires in 3582 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2959 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
```

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

```
inet.0: 29 destinations, 29 routes (28 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

10.1.1.0/24      *[OSPF/10] 00:03:29, metric 16
                 > to 172.16.1.1 via st0.1
36.1.1.0/24      *[OSPF/10] 00:00:35, metric 16
                 > to 172.16.1.3 via st0.1
172.16.1.1/32    *[OSPF/10] 00:03:29, metric 15
                 > to 172.16.1.1 via st0.1
172.16.1.3/32    *[OSPF/10] 00:00:35, metric 15
                 > to 172.16.1.3 via st0.1
224.0.0.5/32     *[OSPF/10] 00:20:22, metric 1
                 MultiRecv
```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.3	st0.1	Full	172.16.1.3	128	-
172.16.1.1	st0.1	Full	172.16.1.1	128	

The following commands are entered on spoke 2:

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
2299162	UP	2d58d8fbc396762d	46145be580c68be0	IKEv2	11.1.1.1
2299163	UP	895e4d9c7c5da7a4	17de7f18b45139b4	IKEv2	21.1.1.2

```
user@host> show security ike security-associations detail
```

```

IKE peer 11.1.1.1, Index 2299162, Gateway Name: PARTNER_GW
Auto Discovery VPN:
  Type: Static, Local Capability: Partner, Peer Capability: Suggester
  Partner Shortcut Suggestions Statistics:
    Suggestions received: 1
    Suggestions accepted: 1
    Suggestions declined: 0
  Role: Initiator, State: UP
  Initiator cookie: 2d58d8fbc396762d, Responder cookie: 46145be580c68be0
  Exchange type: IKEv2, Authentication method: RSA-signatures
  Local: 31.1.1.2:500, Remote: 11.1.1.1:500
  Lifetime: Expires in 27835 seconds
  Peer ike-id: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA, C=US
  Xauth user-name: not available
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication : hmac-sha1-96
    Encryption : aes256-cbc
    Pseudo random function: hmac-sha1
    Diffie-Hellman group : DH-group-5
  Traffic statistics:
    Input bytes : 2571
    Output bytes : 2290
    Input packets: 7
    Output packets: 7
  IPsec security associations: 2 created, 0 deleted
  Phase 2 negotiations in progress: 1

    Negotiation type: Quick mode, Role: Initiator, Message ID: 0
    Local: 31.1.1.2:500, Remote: 11.1.1.1:500
    Local identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

    Remote identity: DC=XYZ, CN=suggester, OU=Sales, O=XYZ, L=Sunnyvale, ST=CA,
C=US
    Flags: IKE SA is created

IKE peer 21.1.1.2, Index 2299163, Gateway Name: PARTNER_GW
Auto Discovery VPN:
  Type: Shortcut, Local Capability: Partner, Peer Capability: Partner
  Role: Responder, State: UP
  Initiator cookie: 895e4d9c7c5da7a4, Responder cookie: 17de7f18b45139b4
  Exchange type: IKEv2, Authentication method: RSA-signatures
  Local: 31.1.1.2:500, Remote: 21.1.1.2:500
  Lifetime: Expires in 28739 seconds
  Peer ike-id: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US
  Xauth user-name: not available
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication : hmac-sha1-96
    Encryption : aes256-cbc
    Pseudo random function: hmac-sha1
    Diffie-Hellman group : DH-group-5
  Traffic statistics:
    Input bytes : 2066
    Output bytes : 1931
    Input packets: 3
    Output packets: 3
  IPsec security associations: 2 created, 0 deleted
  Phase 2 negotiations in progress: 1

```



```

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 31.1.1.2:500, Remote: 21.1.1.2:500
Local identity: DC=XYZ, CN=partner2, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Remote identity: DC=XYZ, CN=partner1, OU=Sales, O=XYZ, L=NewYork, ST=NY, C=US

Flags: IKE SA is created

```

```
user@host> show security ipsec security-associations
```

```

Total active tunnels: 2
ID      Algorithm      SPI          Life:sec/kb  Mon lsys Port  Gateway
<67108866 ESP:aes-cbc-256/sha1 a9d301b0 2638/ unlim - root 500 11.1.1.1

>67108866 ESP:aes-cbc-256/sha1 44ccf265 2638/ unlim - root 500 11.1.1.1

<67108868 ESP:aes-cbc-256/sha1 e4919d73 3542/ unlim - root 500 21.1.1.2

>67108868 ESP:aes-cbc-256/sha1 75d0177b 3542/ unlim - root 500 21.1.1.2

```

```
user@host> show security ipsec security-associations detail
```

```

ID: 67108866 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 31.1.1.2, Remote Gateway: 11.1.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x8608a29
Tunnel events:
  Tue Jan 13 2015 12:57:48 -0800: IPSec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 12:57:48 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 12:57:48 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: a9d301b0, AUX-SPI: 0
  Hard lifetime: Expires in 2632 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2010 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 44ccf265, AUX-SPI: 0
  Hard lifetime: Expires in 2632 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2010 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

ID: 67108868 Virtual-system: root, VPN Name: PARTNER_VPN
Local Gateway: 31.1.1.2, Remote Gateway: 21.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Auto Discovery VPN:
  Type: Shortcut, Shortcut Role: Responder
Version: IKEv2

```

```

DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x40608aa9
Tunnel events:
  Tue Jan 13 2015 13:12:52 -0800: IPsec SA negotiation successfully completed
(1 times)
  Tue Jan 13 2015 13:12:52 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Tue Jan 13 2015 13:12:52 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: e4919d73, AUX-SPI: 0
  Hard lifetime: Expires in 3536 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2958 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 75d0177b, AUX-SPI: 0
  Hard lifetime: Expires in 3536 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 2958 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
  Anti-replay service: counter-based enabled, Replay window size: 64

```

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

```

inet.0: 36 destinations, 36 routes (35 active, 0 holddown, 1 hidden)
Restart Complete
+ = Active Route, - = Last Active, * = Both

10.1.1.0/24      *[OSPF/10] 00:03:55, metric 16
                 > to 172.16.1.1 via st0.1
25.1.1.0/24      *[OSPF/10] 00:01:02, metric 16
                 > to 172.16.1.2 via st0.1
172.16.1.1/32    *[OSPF/10] 00:03:55, metric 15
                 > to 172.16.1.1 via st0.1
172.16.1.2/32    *[OSPF/10] 00:01:02, metric 15
                 > to 172.16.1.2 via st0.1
224.0.0.5/32     *[OSPF/10] 00:21:38, metric 1
                 MultiRecv

```

```
user@host> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
172.16.1.2	st0.1	Full	172.16.1.2	128	-
172.16.1.1	st0.1	Full	172.16.1.1	128	-

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. The hub still shows two active tunnels, one to each spoke. Each spoke shows two active tunnels, one to the hub and one to its shortcut partner.

The **show route protocol ospf** command shows the addition of routes to the partner and to the hub.

See Also • [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62](#)

Example: Configuring ADVPN with OSPFv3 for IPv6 Traffic

This example shows how to configure an ADVPN hub and two spokes to create a shortcut tunnel and change the routing topology for the host to reach the other side without sending traffic through the hub. This example configures ADVPN for IPv6 environment using OSPFv3 to forward packets through the VPN tunnels.

- [Requirements on page 487](#)
- [Overview on page 487](#)
- [Configuration on page 490](#)
- [Verification on page 513](#)

Requirements

This example uses the following hardware and software components:

- Three supported SRX Series devices as ADVPN hub and spokes
- Junos OS Release 18.1R1, and later releases.

Before you begin:

- Obtain the address of the certificate authority (CA) and the information they require (such as the challenge password) when you submit requests for local certificates.



NOTE: You should be familiar with the dynamic routing protocol that is used to forward packets through the VPN tunnels.

Overview

This example shows the configuration of an ADVPN hub and the subsequent configurations of two spokes.

In this example, the first step is to enroll digital certificates in each device using the Simple Certificate Enrollment Protocol (SCEP). The certificates for the spokes contain the organizational unit (OU) value “SLT” in the subject field; the hub is configured with a group IKE ID to match the value “SLT” in the OU field.

The spokes establish IPsec VPN connections to the hub, which allows them to communicate with each other as well as access resources on the hub. Phase 1 and Phase 2 IKE tunnel options configured on the ADVPN hub and all spokes must have the same values. [Table 41 on page 373](#) shows the options used in this example.

Table 49: Phase 1 and Phase 2 Options for ADPN Hub and Spoke Basic OSPFv3 Configurations

Option	Value
<i>IKE proposal:</i>	

Table 49: Phase 1 and Phase 2 Options for ADPN Hub and Spoke Basic OSPFv3 Configurations (continued)

Option	Value
Authentication method	RSA digital certificates
Diffie-Hellman (DH) group	19
Authentication algorithm	SHA-384
Encryption algorithm	AES 256 CBC
<i>IKE policy:</i>	
Mode	Main
<i>IPsec proposal:</i>	
Protocol	ESP
Lifetime seconds	3000
Encryption algorithm	AES 256 GCM
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	19

The same certificate authority (CA) is configured on all devices.

[Table 42 on page 374](#) shows the options configured on the hub and on all spokes.

Table 50: ADVPN OSPFv3 Configuration for Hub and All Spokes

Option	Hub	All Spokes
<i>IKE gateway:</i>		
Remote IP address	Dynamic	2001:db8:2000::1
Remote IKE ID	Distinguished name (DN) on the spoke's certificate with the string SLT in the organizational unit (OU) field	DN on the hub's certificate
Local IKE ID	DN on the hub's certificate	DN on the spoke's certificate
External interface	reth1	Spoke 1: ge-0/0/0.0 Spoke 2: ge-0/0/0.0
<i>VPN:</i>		

Table 50: ADVPN OSPFv3 Configuration for Hub and All Spokes (continued)

Option	Hub	All Spokes
Bind interface	st0.1	st0.1
Establish tunnels	(not configured)	establish-tunnels immediately

Table 43 on page 374 shows the configuration options that are different on each spoke.

Table 51: Comparison Between the OSPFv3 Spoke Configurations

Option	Spoke 1	Spoke 2
st0.1 interface	2001:db8:9000::2/64	2001:db8:9000::3/64
Interface to internal network	(ge-0/0/1.0) 2001:db8:4000::1/64	(ge-0/0/1.0) 2001:db8:6000::1/64
Interface to Internet	(ge-0/0/0.0) 2001:db8:3000::2/64	(ge-0/0/0.0) 2001:db8:5000::2/64

Routing information for all devices is exchanged through the VPN tunnels.

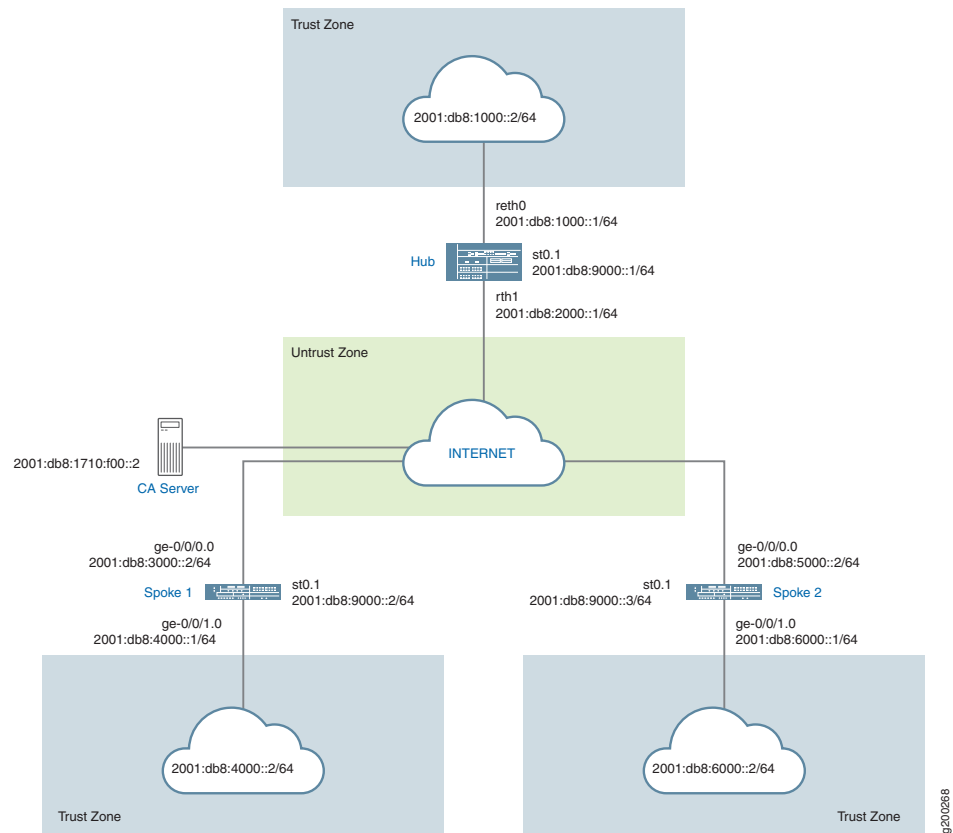


NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.

Topology

Figure 23 on page 375 shows the SRX Series devices to be configured for ADVPN in this example.

Figure 33: ADVPN Deployment with OSPFv3



Configuration

To configure ADVPN, perform these tasks:



NOTE: The first section describes how to obtain CA and local certificates online using the Simple Certificate Enrollment Protocol (SCEP) on the hub and spoke devices.

- [Enroll Device Certificates with SCEP on page 490](#)
- [Configuring the Hub on page 495](#)
- [Configuring Spoke 1 on page 502](#)
- [Configuring Spoke 2 on page 508](#)

Enroll Device Certificates with SCEP

Step-by-Step Procedure

To enroll digital certificates with SCEP on the hub:

1. Configure the CA.

```
[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit
```

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile1
```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email hub@example.net ip-address
1.1.1.1 subject
DC=example.net,CN=hub,OU=SLT,O=example,L=Bangalore,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40a6d5f300000000258d
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Bangalore, Common name: hub, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Bangalore, O=example, OU=SLT, CN=hub
Alternate subject: "hub@example.net", example.net, 1.1.1.1
Validity:
  Not before: 11- 6-2012 09:39
  Not after: 11- 6-2013 09:49
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:c9:c9:cc:30:b6:7a:86:12:89:b5:18:b3:76
01:2d:cc:65:a8:a8:42:78:cd:d0:9a:a2:c0:aa:c4:bd:da:af:88:f3
2a:78:1f:0a:58:e6:11:2c:81:8f:0e:7c:de:86:fc:48:4c:28:5b:8b
34:91:ff:2e:91:e7:b5:bd:79:12:de:39:46:d9:fb:5c:91:41:d1:da
90:f5:09:00:9b:90:07:9d:50:92:7d:ff:fb:3f:3c:bc:34:e7:e3:c8
ea:cb:99:18:b4:b6:1d:a8:99:d3:36:b9:1b:36:ef:3e:a1:fd:48:82
```

```

6a:da:22:07:da:e0:d2:55:ef:57:be:09:7a:0e:17:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  e1:f7:a1:a6:1e:c3:97:69:a5:07:9b:09:14:1a:c7:ae:09:f1:f6:35 (sha1)
  a0:02:fa:8d:5c:63:e5:6d:f7:f4:78:56:ac:4e:b2:c4 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 1:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```

user@host> request security pki generate-key-pair certificate-id Local1

```

4. Enroll the local certificate.

```

user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke1@example.net
ip-address 2.2.2.1 subject
DC=example.net,CN=spoke1,OU=SLT,O=example,L=Mysore,ST=KA,C=IN
challenge-password <password>

```

5. Verify the local certificate.

```

user@host> show security pki local-certificate detail

```

```

Certificate identifier: Local1
Certificate version: 3
Serial number: 40a7975f00000000258e
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

```



```

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Mysore, Common name: spoke1, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Mysore, O=example, OU=SLT, CN=spoke1
Alternate subject: "spoke1@example.net", example.net, 2.2.2.1
Validity:
  Not before: 11- 6-2012 09:40
  Not after: 11- 6-2013 09:50
Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:d8:45:09:77:cd:36:9a:6f:58:44:18:91:db
  b0:c7:8a:ee:c8:d7:a6:d2:e2:e7:20:46:2b:26:1a:92:e2:4e:8a:ce
  c9:25:d9:74:a2:81:ad:ea:e0:38:a0:2f:2d:ab:a6:58:ac:88:35:f4
  90:01:08:33:33:75:2c:44:26:f8:25:18:97:96:e4:28:de:3b:35:f2
  4a:f5:92:b7:57:ae:73:4f:8e:56:71:ab:81:54:1d:75:88:77:13:64
  1b:6b:01:96:15:0a:1c:54:e3:db:f8:ec:ec:27:5b:86:39:c1:09:a1
  e4:24:1a:19:0d:14:2c:4b:94:a4:04:91:3f:cb:ef:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  b6:24:2a:0e:96:5d:8c:4a:11:f3:5a:24:89:7c:df:ea:d5:c0:80:56 (sha1)
  31:58:7f:15:bb:d4:66:b8:76:1a:42:4a:8a:16:b3:a9 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Step-by-Step Procedure To enroll digital certificates with SCEP on spoke 2:

1. Configure the CA.

```

[edit]
user@host# set security pki ca-profile ca-profile1 ca-identity ca-profile1
user@host# set security pki ca-profile ca-profile1 enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set security pki ca-profile ca-profile1 revocation-check disable
user@host# commit

```

2. Enroll the CA certificate.

```

user@host> request security pki ca-certificate enroll ca-profile ca-profile1

```

Type **yes** at the prompt to load the CA certificate.

3. Generate a key pair.

```
user@host> request security pki generate-key-pair certificate-id Local1
```

4. Enroll the local certificate.

```
user@host> request security pki local-certificate enroll ca-profile ca-profile1
certificate-id Local1 domain-name example.net email spoke2@example.net
ip-address 3.3.3.1 subject
DC=example.net,CN=spoke2,OU=SLT,O=example,L=Tumkur,ST=KA,C=IN
challenge-password <password>
```

5. Verify the local certificate.

```
user@host> show security pki local-certificate detail
```

```
Certificate identifier: Local1
Certificate version: 3
Serial number: 40bb71d400000000258f
Issuer:
  Common name: CASERVER1, Domain component: net, Domain component: internal

Subject:
  Organization: example, Organizational unit: SLT, Country: IN, State: KA,

  Locality: Tumkur, Common name: spoke2, Domain component: example.net
Subject string:
  C=IN, DC=example.net, ST=KA, L=Tumkur, O=example, OU=SLT, CN=spoke2
Alternate subject: "spoke2@example.net", example.net, 3.3.3.1
Validity:
  Not before: 11- 6-2012 10:02
  Not after: 11- 6-2013 10:12
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b6:2e:e2:da:e6:ac:57:e4:5d:ff:de:f6:89
27:d6:3e:1b:4a:3f:b2:2d:b3:d3:61:ed:ed:6a:07:d9:8a:d2:24:03
77:1a:fe:84:e1:12:8a:2d:63:6e:bf:02:6b:15:96:5a:4f:37:a0:46
44:09:96:c0:fd:bb:ab:79:2c:5d:92:bd:31:f0:3b:29:51:ce:89:8e
7c:2b:02:d0:14:5b:0a:a9:02:93:21:ea:f9:fc:4a:e7:08:bc:b1:6d
7c:f8:3e:53:58:8e:f1:86:13:fe:78:b5:df:0b:8e:53:00:4a:46:11
58:4a:38:e9:82:43:d8:25:47:7d:ef:18:f0:ef:a7:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://ca-server1/CertEnroll/CASERVER1.crl
  file://\ca-server1\CertEnroll\CASERVER1.crl
Fingerprint:
  1a:6d:77:ac:fd:94:68:ce:cf:8a:85:f0:39:fc:e0:6b:fd:fe:b8:66 (sha1)
  00:b1:32:5f:7b:24:9c:e5:02:e6:72:75:9e:a5:f4:77 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```



NOTE: The organizational unit (OU) shown in the subject field is SLT. The IKE configuration on the hub includes `ou=SLT` to identify the spoke.

Configuring the Hub

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set chassis cluster traceoptions flag all
set chassis cluster traceoptions level all
set chassis cluster reth-count 2
set chassis cluster node 0
set chassis cluster node 1
set chassis cluster redundancy-group 0 node 0 priority 254
set chassis cluster redundancy-group 0 node 1 priority 1
set chassis cluster redundancy-group 1 node 0 priority 254
set chassis cluster redundancy-group 1 node 1 priority 1
set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate HUB
set security ike gateway IKE_GWA_1 ike-policy IKE_POL
set security ike gateway IKE_GWA_1 dynamic distinguished-name wildcard OU=SLT
set security ike gateway IKE_GWA_1 dynamic ike-user-type group-ike-id
set security ike gateway IKE_GWA_1 dead-peer-detection always-send
set security ike gateway IKE_GWA_1 dead-peer-detection interval 10
set security ike gateway IKE_GWA_1 dead-peer-detection threshold 3
set security ike gateway IKE_GWA_1 local-identity distinguished-name
set security ike gateway IKE_GWA_1 external-interface reth1
set security ike gateway IKE_GWA_1 advpn partner disable
set security ike gateway IKE_GWA_1 version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPNA_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPNA_1 ike gateway IKE_GWA_1
set security ipsec vpn IPSEC_VPNA_1 ike ipsec-policy IPSEC_POL
set security policies default-policy permit-all
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces reth1.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all

```

```

set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces reth0.0
set interfaces ge-0/0/0 gigether-options redundant-parent reth1
set interfaces ge-0/0/1 gigether-options redundant-parent reth0
set interfaces ge-7/0/0 gigether-options redundant-parent reth1
set interfaces ge-7/0/1 gigether-options redundant-parent reth0
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet
set interfaces reth0 unit 0 family inet6 address 2001:db8:1000::1/64
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet
set interfaces reth1 unit 0 family inet6 address 2001:db8:2000::1/64
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet6 address 2001:db8:9000::1/64
set routing-options rib inet6.0 static route 2001:db8:3000::0/64 next-hop
2001:db8:2000::2
set routing-options rib inet6.0 static route 2001:db8:5000::0/64 next-hop
2001:db8:2000::2
set protocols ospf3 area 0.0.0.0 interface reth0.0
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the hub:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 gigether-options redundant-parent reth1
user@host# set ge-0/0/1 gigether-options redundant-parent reth0
user@host# set ge-7/0/0 gigether-options redundant-parent reth1
user@host# set ge-7/0/1 gigether-options redundant-parent reth0
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet
user@host# set reth0 unit 0 family inet6 address 2001:db8:1000::1/64
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet
user@host# set reth1 unit 0 family inet6 address 2001:db8:2000::1/64
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet6 address 2001:db8:9000::1/64

```

2. Configure the routing protocol.

```

[edit protocols ospf3]
user@host# set ospf3 area 0.0.0.0 interface reth0.0
user@host# set ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors

[edit routing-options]

```

```

user@host# set rib inet6.0 static route 2001:db8:3000::0/64 next-hop
2001:db8:2000::2
user@host# set rib inet6.0 static route 2001:db8:5000::0/64 next-hop
2001:db8:2000::2

```

3. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate HUB

[edit security ike gateway IKE_GWA_1]
user@host# set ike-policy IKE_POL
user@host# set dynamic distinguished-name wildcard OU=SLT
user@host# set ike-user-type group-ike-id
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set external-interface reth1
user@host# set version v2-only

```

4. Configure Phase 2 options.

```

[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPNA_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GWA_1
user@host# set ike ipsec-policy IPSEC_POL

```

5. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all

```

```

user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces reth1.0
user@host# set interfaces st0.1

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces reth0.0

```

6. Configure the default security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

7. Configure the CA profile.

```

[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set pki ca-profile ROOT-CA revocation-check disable

```

8. Configure chassis cluster

```

[edit chassis cluster]
set traceoptions flag all
set traceoptions level all
set reth-count 2
set node 0
set node 1
set redundancy-group 0 node 0 priority 254
set redundancy-group 0 node 1 priority 1
set redundancy-group 1 node 0 priority 254
set redundancy-group 1 node 1 priority 1

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki show chassis cluster** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
    gigether-options {
        redundant-parent reth1;
    }
}

```

```

    }
  }
  ge-0/0/1 {
    gigether-options {
      redundant-parent reth0;
    }
  }
  reth0 {
    redundant-ether-options {
      redundancy-group 1;
    }
    unit 0 {
      family inet;
      family inet6 {
        address 2001:db8:1000::1/64;
      }
    }
  }
  reth1 {
    redundant-ether-options {
      redundancy-group 1;
    }
    unit 0 {
      family inet;
      family inet6 {
        address 2001:db8:2000::1/64;
      }
    }
  }
  st0 {
    unit 1 {
      multipoint;
      family inet6 {
        address 2001:db8:9000::1/64 {
          primary;
        }
      }
    }
  }
}
[edit]
user@host# show protocols
ospf3 {
  traceoptions {
    file ospf;
    flag all;
  }
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      demand-circuit;
      dynamic-neighbors;
    }
    interface ge-0/0/1.0;
    interface reth0.0;
  }
}

```

```
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route 2001:db8:3000::/64 next-hop 2001:db8:2000::2;
    route 2001:db8:5000::/64 next-hop 2001:db8:2000::2;
  }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate HUB;
  }
}
gateway IKE_GWA_1 {
  ike-policy IKE_POL;
  dynamic {
    distinguished-name {
      wildcard OU=SLT;
    }
    ike-user-type group-ike-id;
  }
  dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
  }
  local-identity distinguished-name;
  external-interface reth1;
  advpn {
    partner {
      disable;
    }
  }
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  encryption-algorithm aes-256-gcm;
  lifetime-seconds 3000;
}
policy IPSEC_POL {
```



```
perfect-forward-secrecy {
    keys group19;
}
proposals IPSEC_PROP;
}
vpn IPSEC_VPNA_1 {
    bind-interface st0.1;
    ike {
        gateway IKE_GWA_1;
        ipsec-policy IPSEC_POL;
    }
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        st0.1;
        reth1.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        reth0.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
    ca-identity ROOT-CA;
    enrollment {
        url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
        retry 5;
        retry-interval 0;
    }
}
```

```

    revocation-check {
        disable;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE1
set security ike gateway IKE_GW_SPOKE_1 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_1 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_1 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_1 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_1 remote-identity distinguished-name container
  OU=SLT
set security ike gateway IKE_GW_SPOKE_1 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_1 advpn suggerter disable
set security ike gateway IKE_GW_SPOKE_1 version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_1 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike gateway IKE_GW_SPOKE_1
set security ipsec vpn IPSEC_VPN_SPOKE_1 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_1 establish-tunnels immediately
set security policies default-policy permit-all
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/1.0
set security zones security-zone untrust host-inbound-traffic system-services all

```

```

set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/0.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
set interfaces st0 unit 1 multipoint
set interfaces st0 unit 1 family inet6 address 2001:db8:9000::2/64
set routing-options rib inet6.0 static route 2001:db8:2000::0/64 next-hop
    2001:db8:3000::1
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 1:

1. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:3000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:4000::1/64
user@host# set st0 unit 1 multipoint
user@host# set st0 unit 1 family inet6 address 2001:db8:9000::2/64

```

2. Configure the routing protocol.

```

[edit protocols ospf3]
set area 0.0.0.0 interface ge-0/0/1.0
set area 0.0.0.0 interface st0.1 interface-type p2mp
set area 0.0.0.0 interface st0.1 dynamic-neighbors

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
    2001:db8:3000::1

```

3. Configure Phase 1 options.

```

[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main

```

```
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE1

[edit security ike gateway IKE_GW_SPOKE_1]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
user@host# set external-interface ge-0/0/0.0
user@host# set advpn suggerter disable
user@host# set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROPI]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPN_SPOKE_1]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GW_SPOKE_1
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/1.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:3000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:4000::1/64;
    }
  }
}
st0 {
  unit 1 {
    multipoint;
    family inet6 {
      address 2001:db8:9000::2/64;
    }
  }
}
[edit]
user@host# show protocols
ospf3 {
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      dynamic-neighbors;
    }
    interface ge-0/0/1.0;
  }
}
[edit]
```

```
user@host# show routing-options
rib inet6.0 {
  static {
    route 2001:db8:2000::/64 next-hop [ 2001:db8:3000::1 2001:db8:5000::1 ];
  }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
  lifetime-seconds 6000;
}
policy IKE_POL {
  mode main;
  proposals IKE_PROP;
  certificate {
    local-certificate SPOKE1;
  }
}
gateway IKE_GW_SPOKE_1 {
  ike-policy IKE_POL;
  address 2001:db8:2000::1;
  dead-peer-detection {
    always-send;
    interval 10;
    threshold 3;
  }
  local-identity distinguished-name;
  remote-identity distinguished-name container OU=SLT;
  external-interface ge-0/0/0.0;
  advpn {
    suggester {
      disable;
    }
  }
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
  protocol esp;
  encryption-algorithm aes-256-gcm;
  lifetime-seconds 3000;
}
policy IPSEC_POL {
  perfect-forward-secrecy {
    keys group19;
  }
  proposals IPSEC_PROP;
}
vpn IPSEC_VPN_SPOKE_1 {
  bind-interface st0.1;
```

```
ike {
    gateway IKE_GW_SPOKE_1;
    ipsec-policy IPSEC_POL;
}
establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        st0.1;
        ge-0/0/0.0;
    }
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        ge-0/0/1.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
    ca-identity ROOT-CA;
    enrollment {
        url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
        retry 5;
        retry-interval 0;
    }
    revocation-check {
        disable;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Spoke 2

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security pki ca-profile ROOT-CA ca-identity ROOT-CA
set security pki ca-profile ROOT-CA enrollment url
  http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
set security pki ca-profile ROOT-CA enrollment retry 5
set security pki ca-profile ROOT-CA enrollment retry-interval 0
set security pki ca-profile ROOT-CA revocation-check disable
set security ike proposal IKE_PROP authentication-method rsa-signatures
set security ike proposal IKE_PROP dh-group group19
set security ike proposal IKE_PROP authentication-algorithm sha-384
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike proposal IKE_PROP lifetime-seconds 6000
set security ike policy IKE_POL mode main
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL certificate local-certificate SPOKE2
set security ike gateway IKE_GW_SPOKE_2 ike-policy IKE_POL
set security ike gateway IKE_GW_SPOKE_2 address 2001:db8:2000::1
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection always-send
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection interval 10
set security ike gateway IKE_GW_SPOKE_2 dead-peer-detection threshold 3
set security ike gateway IKE_GW_SPOKE_2 local-identity distinguished-name
set security ike gateway IKE_GW_SPOKE_2 remote-identity distinguished-name container
  OU=SLT
set security ike gateway IKE_GW_SPOKE_2 external-interface ge-0/0/0.0
set security ike gateway IKE_GW_SPOKE_2 advpn suggerter disable
set security ike gateway IKE_GW_SPOKE_2 version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-gcm
set security ipsec proposal IPSEC_PROP lifetime-seconds 3000
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group19
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn IPSEC_VPN_SPOKE_2 bind-interface st0.1
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike gateway IKE_GW_SPOKE_2
set security ipsec vpn IPSEC_VPN_SPOKE_2 ike ipsec-policy IPSEC_POL
set security ipsec vpn IPSEC_VPN_SPOKE_2 establish-tunnels immediately
set security policies default-policy permit-all
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols ospf3
set security zones security-zone trust interfaces ge-0/0/1.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols ospf3
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/0.0
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
set interfaces ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
set interfaces st0 unit 1 family inet6 address 2001:db8:9000::3/64
set routing-options rib inet6.0 static route 2001:db8:2000::/64 next-hop 2001:db8:5000::1
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0

```



```
set protocols ospf3 area 0.0.0.0 interface st0.1 interface-type p2mp
set protocols ospf3 area 0.0.0.0 interface st0.1 dynamic-neighbors
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure spoke 2:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet6 address 2001:db8:5000::2/64
user@host# set ge-0/0/1 unit 0 family inet6 address 2001:db8:6000::1/64
user@host# set st0 unit 1 family inet6 address 2001:db8:9000::3/64
```

2. Configure the routing protocol.

```
[edit protocols ospf3]
user@host# set area 0.0.0.0 interface st0.1 interface-type p2mp
user@host# set area 0.0.0.0 interface st0.1 dynamic-neighbors
user@host# set area 0.0.0.0 interface ge-0/0/1.0

[edit routing-options]
user@host# set rib inet6.0 static route 2001:db8:2000::/64 next-hop
2001:db8:5000::1
```

3. Configure Phase 1 options.

```
[edit security ike proposal IKE_PROP]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set authentication-algorithm sha-384
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 6000

[edit security ike policy IKE_POL]
user@host# set mode main
user@host# set proposals IKE_PROP
user@host# set certificate local-certificate SPOKE2

[edit security ike gateway IKE_GW_SPOKE_2]
user@host# set ike-policy IKE_POL
user@host# set address 2001:db8:2000::1
user@host# set dead-peer-detection always-send
user@host# set dead-peer-detection interval 10
user@host# set dead-peer-detection threshold 3
user@host# set local-identity distinguished-name
user@host# set remote-identity distinguished-name container OU=SLT
```

```
user@host# set external-interface ge-0/0/0.0
user@host# set advpn suggerter disable
user@host# set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROPI]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm
user@host# set lifetime-seconds 3000

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn IPSEC_VPN_SPOKE_2]
user@host# set bind-interface st0.1
user@host# set ike gateway IKE_GW_SPOKE_2
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately
```

5. Configure zones.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces st0.1
user@host# set interfaces ge-0/0/0.0

[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols ospf3
user@host# set interfaces ge-0/0/1.0
```

6. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

7. Configure the CA profile.

```
[edit security pki]
user@host# set ca-profile ROOT-CA ca-identity ROOT-CA
user@host# set ca-profile ROOT-CA enrollment url
    http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll
user@host# set ca-profile ROOT-CA enrollment retry 5
user@host# set ca-profile ROOT-CA enrollment retry-interval 0
user@host# set ca-profile ROOT-CA revocation-check disable
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show routing-options**, **show security ike**, **show security ipsec**, **show security zones**, **show security policies**, and **show security pki** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet6 {
      address 2001:db8:5000::2/64;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet6 {
      address 2001:db8:6000::1/64;
    }
  }
}
st0 {
  unit 1 {
    family inet6 {
      address 2001:db8:9000::3/64;
    }
  }
}
[edit]
user@host# show protocols
ospf3 {
  area 0.0.0.0 {
    interface st0.1 {
      interface-type p2mp;
      dynamic-neighbors;
    }
    interface ge-0/0/1.0;
  }
}
[edit]
user@host# show routing-options
rib inet6.0 {
  static {
    route 2001:db8:2000::/64 next-hop [ 2001:db8:3000::1 2001:db8:5000::1 ];
  }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method rsa-signatures;
  dh-group group19;
  authentication-algorithm sha-384;
  encryption-algorithm aes-256-cbc;
```

```
lifetime-seconds 6000;
}
policy IKE_POL {
mode main;
proposals IKE_PROP;
certificate {
local-certificate SPOKE2;
}
}
gateway IKE_GW_SPOKE_2 {
ike-policy IKE_POL;
address 2001:db8:2000::1;
dead-peer-detection {
always-send;
interval 10;
threshold 3;
}
local-identity distinguished-name;
remote-identity distinguished-name container OU=SLT;
external-interface ge-0/0/0.0;
advpn {
suggester {
disable
}
}
}
version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
protocol esp;
encryption-algorithm aes-256-gcm;
lifetime-seconds 3000;
}
policy IPSEC_POL {
perfect-forward-secrecy {
keys group19;
}
proposals IPSEC_PROP;
}
vpn IPSEC_VPN_SPOKE_2 {
bind-interface st0.1;
ike {
gateway IKE_GW_SPOKE_2;
ipsec-policy IPSEC_POL;
}
establish-tunnels immediately;
}
[edit]
user@host# show security zones
security-zone untrust {
host-inbound-traffic {
system-services {
all;
}
}
```

```

    protocols {
        ospf3;
    }
}
interfaces {
    ge-0/0/0.0;
    st0.1;
}
}
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            ospf3;
        }
    }
    interfaces {
        ge-0/0/1.0;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}
[edit]
user@host# show security pki
ca-profile ROOT-CA {
    ca-identity ROOT-CA;
    enrollment {
        url http://2001:db8:1710:f00::2/certsrv/mscep/mscep.dll;
        retry 5;
        retry-interval 0;
    }
    revocation-check {
        disable;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Status on page 514](#)
- [Verifying IPsec Status on page 514](#)
- [Verifying IPsec Next-Hop Tunnels on page 514](#)
- [Verifying OSPFv3 on page 515](#)

Verifying IKE Status

Purpose Verify the IKE status.

Action From operational mode, enter the **show security ike sa** command.

```
user@host> show security ike sa
```

Index Address	State	Initiator cookie	Responder cookie	Mode	Remote
4295070	UP	2001:db8:1ad4ba7a115fa229	2001:db8:32e6382a058bb296	Main	
2001:db8:3000::2					
295069	UP	2001:db8:88a1520c20cbbe04	2001:db8:7fa4c8e365393c48	Main	
2001:db8:5000::2					

Meaning The **show security ike sa** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the hub and spokes.

Verifying IPsec Status

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec sa** command.

```
user@host> show security ipsec sa
```

Total active tunnels: 2		Total Ipsec sas: 2					
ID	Algorithm	SPI	Life:sec/kb	Mon	lsys	Port	Gateway
<67108881	ESP:aes-gcm-256/None	3dba3f80	2979/	unlim	-	root 500	2001:db8:5000::2
>67108881	ESP:aes-gcm-256/None	46746d5d	2979/	unlim	-	root 500	2001:db8:5000::2
<67108882	ESP:aes-gcm-256/None	16dceb60	2992/	unlim	-	root 500	2001:db8:3000::2
>67108882	ESP:aes-gcm-256/None	681209c2	2992/	unlim	-	root 500	2001:db8:3000::2

Meaning The **show security ipsec sa** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the hub and spokes.

Verifying IPsec Next-Hop Tunnels

Purpose Verify the IPsec next-hop tunnels.

Action From operational mode, enter the **show security ipsec next-hop-tunnels** command.

```
user@host> show security ipsec next-hop-tunnels
```

Next-hop gateway	interface	IPSec VPN name	Flag	IKE-ID
XAUTH username				
2001:db8:9000::2	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available
2001:db8:9000::3	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available
2001:db8::5668:ad10:fcd8:10c8	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE2 Not-Available
2001:db8::5668:ad10:fcd8:112f	st0.1	IPSEC_VPNA_1	Auto	C=US, DC=example.net, ST=CA, L=Sunnyvale, O=example, OU=SLT, CN=SPOKE1 Not-Available

Meaning The next-hop gateways are the IP addresses for the **st0** interfaces of the spokes. The next hop should be associated with the correct IPsec VPN name.

Verifying OSPFv3

Purpose Verify that OSPFv3 references the IP addresses for the **st0** interfaces of the spokes.

Action From operational mode, enter the **show ospf3 neighbor interface** command.

```
user@host> show ospf3 neighbor interface
```

ID	Interface	State	Pri	Dead
2001:db8:128.221.129.41	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:110e				
2001:db8:20:54:49.693	INFO	{ret} = ID		
2001:db8:128.221.129.41	st0.1	Full	128	-
Neighbor-address 2001:db8::5668:ad10:fcd8:110e				

See Also • [Example: Configuring a Route-Based VPN on page 112](#)

Enabling OSPF to Update Routes Quickly After ADVPN Shortcut Tunnels Are Established

Problem **Description:** OSPF can take up to 9 seconds to update a shortcut route in the routing table. It can take up to 10 seconds before traffic is forwarded to the shortcut tunnel.

Symptoms: When a shortcut tunnel is established between two shortcut partners, OSPF initiates an OSPF hello packet. Because of the timing of the shortcut tunnel establishment and the OSPF neighbor installation, the first packet in the tunnel might be dropped. This can cause OSPF to try again to establish an OSPF adjacency.

By default, the interval at which the OSPF retries to establish an adjacency is 10 seconds. After a shortcut tunnel is established, it can take more than 10 seconds for OSPF to establish an adjacency between the partners.

Solution Configuring a smaller retry interval, such as 1 or 2 seconds, can enable OSPF to establish adjacencies faster over the shortcut tunnel. For example, use the following configurations:

```
[edit]
set protocols ospf area 0.0.0.0 interface st0.1 retransmit-interval 1
set protocols ospf area 0.0.0.0 interface st0.1 dead-interval 40
```

See Also • [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62](#)

Release History Table

Release	Description
18.1R1	Starting with Junos OS Release 18.1R1, ADVPN supports IPv6.

Related Documentation • [IPv6 IPsec VPNs on page 671](#)

CHAPTER 3

Configuring Policy-Based IPsec VPNs

- [Policy-Based IPsec VPNs on page 517](#)

Policy-Based IPsec VPNs

A policy-based VPN is a configuration in which an IPsec VPN tunnel created between two end points is specified within the policy itself with a policy action for the transit traffic that meets the policy's match criteria.

- [Understanding Policy-Based IPsec VPNs on page 517](#)
- [Example: Configuring a Policy-Based VPN on page 518](#)

Understanding Policy-Based IPsec VPNs

For policy-based IPsec VPNs, a security policy specifies as its action the VPN tunnel to be used for transit traffic that meets the policy's match criteria. A VPN is configured independent of a policy statement. The policy statement refers to the VPN by name to specify the traffic that is allowed access to the tunnel. For policy-based VPNs, each policy creates an individual IPsec security association (SA) with the remote peer, each of which counts as an individual VPN tunnel. For example, if a policy contains a group source address and a group destination address, whenever one of the users belonging to the address set attempts to communicate with any one of the hosts specified as the destination address, a new tunnel is negotiated and established. Because each tunnel requires its own negotiation process and separate pair of SAs, the use of policy-based IPsec VPNs can be more resource-intensive than route-based VPNs.

Examples of where policy-based VPNs can be used:

- You are implementing a dial-up VPN.
- Policy-based VPNs allow you to direct traffic based on firewall policies.



NOTE: We recommend that you use route-based VPN when you want to configure a VPN between multiple remote sites. Route-based VPNs can provide the same capabilities as policy-based VPNs.

See Also • [IPsec VPN Overview on page 31](#)

- [Example: Configuring a Route-Based VPN on page 112](#)
- [Example: Configuring a Hub-and-Spoke VPN on page 71](#)

Example: Configuring a Policy-Based VPN

This example shows how to configure a policy-based IPsec VPN to allow data to be securely transferred between a branch office and the corporate office.

- [Requirements on page 518](#)
- [Overview on page 518](#)
- [Configuration on page 522](#)
- [Verification on page 533](#)

Requirements

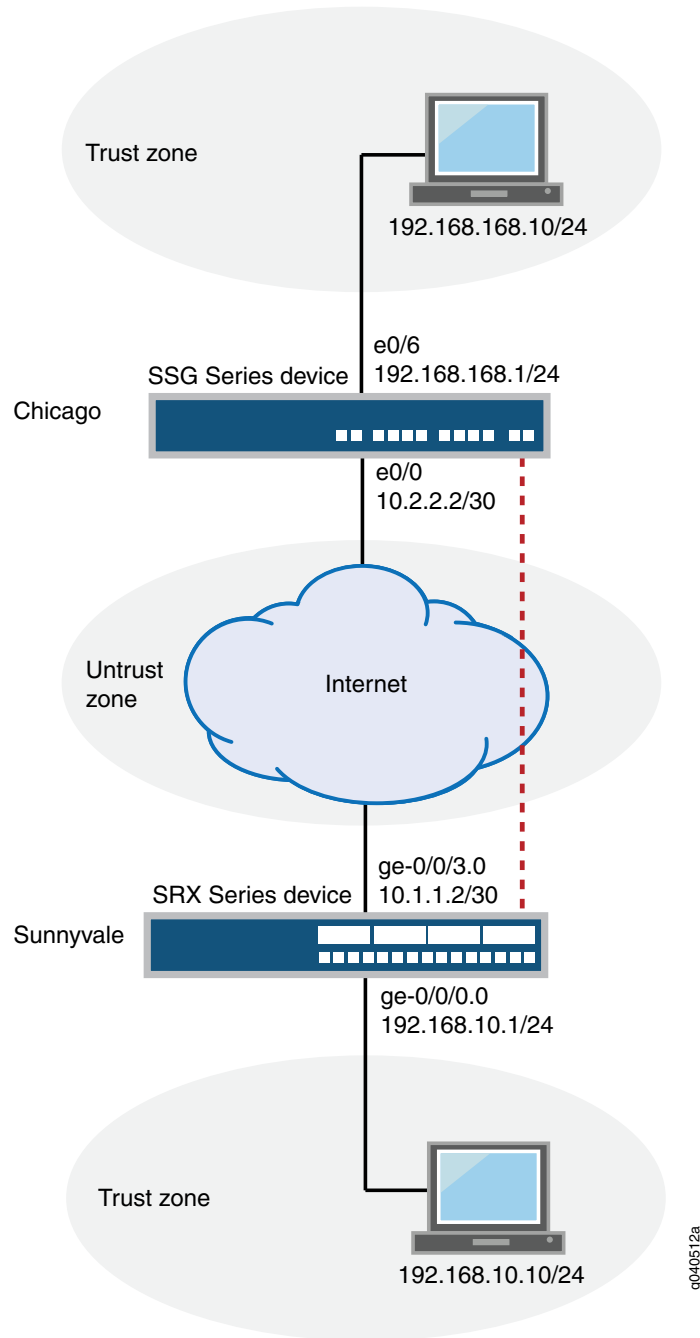
Before you begin, read ["IPsec VPN Overview" on page 31](#).

Overview

In this example, you configure a policy-based VPN for a branch office in Chicago, Illinois, because you do not need to conserve tunnel resources or configure many security policies to filter traffic through the tunnel. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

[Figure 34 on page 519](#) shows an example of a policy-based VPN topology. In this topology, the SRX Series device is located in Sunnyvale, and an SSG Series device (or it can be another third-party device) is located in Chicago.

Figure 34: Policy-Based VPN Topology



IKE IPsec tunnel negotiation occurs in two phases. In Phase 1, participants establish a secure channel in which to negotiate the IPsec security association (SA). In Phase 2, participants negotiate the IPsec SA for authenticating traffic that will flow through the

tunnel. Just as there are two phases to tunnel negotiation, there are two phases to tunnel configuration.

In this example, you configure interfaces, an IPv4 default route, security zones, and address books. Then you configure IKE Phase 1, IPsec Phase 2, security policy, and TCP-MSS parameters. See [Table 52 on page 520](#) through [Table 56 on page 522](#).

Table 52: Interface, Security Zone, and Address Book Information

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/0.0	192.168.10.1/24
	ge-0/0/3.0	10.1.1.2/30
Security zones	trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/0.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/3.0 interface is bound to this zone.
Address book entries	sunnyvale	<ul style="list-style-type: none"> This address is an entry in the address book book1, which is attached to a zone called trust. The address for this address book entry is 192.168.10.0/24.
	chicago	<ul style="list-style-type: none"> This address is an entry in the address book book2, which is attached to a zone called untrust. The address for this address book entry is 192.168.168.0/24.

Table 53: IKE Phase 1 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ike-phase1-proposal	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: aes-128-cbc
Policy	ike-phase1-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-phase1-proposal IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gw-chicago	<ul style="list-style-type: none"> IKE policy reference: ike-phase1-policy External interface: ge-0/0/3.0 Gateway address: 10.2.2.2

Table 54: IPsec Phase 2 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipsec-phase2-proposal	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: aes-128-cbc
Policy	ipsec-phase2-policy	<ul style="list-style-type: none"> Proposal reference: ipsec-phase2-proposal PFS: Diffie-Hellman group2
VPN	ike-vpn-chicago	<ul style="list-style-type: none"> IKE gateway reference: gw-chicago IPsec policy reference: ipsec-phase2-policy

Table 55: Security Policy Configuration Parameters

Purpose	Name	Configuration Parameters
This security policy permits traffic from the trust zone to the untrust zone.	vpn-tr-untr	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address sunnyvale destination-address chicago application any Permit action: tunnel ipsec-vpn ike-vpn-chicago Permit action: tunnel pair-policy vpn-untr-tr
This security policy permits traffic from the untrust zone to the trust zone.	vpn-untr-tr	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address chicago destination-address sunnyvale application any Permit action: tunnel ipsec-vpn ike-vpn-chicago Permit action: tunnel pair-policy vpn-tr-untr
<p>This security policy permits all traffic from the trust zone to the untrust zone.</p> <p>NOTE: You must put the vpn-tr-untr policy before the permit-any security policy. Junos OS performs a security policy lookup starting at the top of the list. If the permit-any policy comes before the vpn-tr-untr policy, all traffic from the trust zone will match the permit-any policy and be permitted. Thus, no traffic will ever match the vpn-tr-untr policy.</p>	permit-any	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any source-destination any application any Action: permit

Table 56: TCP-MSS Configuration Parameters

Purpose	Configuration Parameters
<p>TCP-MSS is negotiated as part of the TCP three-way handshake and limits the maximum size of a TCP segment to better fit the maximum transmission unit (MTU) limits on a network. This is especially important for VPN traffic, as the IPsec encapsulation overhead, along with the IP and frame overhead, can cause the resulting Encapsulating Security Payload (ESP) packet to exceed the MTU of the physical interface, thus causing fragmentation. Fragmentation results in increased use of bandwidth and device resources.</p> <p>NOTE: We recommend a value of 1350 as the starting point for most Ethernet-based networks with an MTU of 1500 or greater. You might need to experiment with different TCP-MSS values to obtain optimal performance. For example, you might need to change the value if any device in the path has a lower MTU, or if there is any additional overhead such as PPP or Frame Relay.</p>	MSS value: 1350

Configuration

Configuring Basic Network, Security Zone, and Address Book Information

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
set security zones security-zone untrust interfaces ge-0/0/3.0
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security address-book book1 address sunnyvale 192.168.10.0/24
set security address-book book1 attach zone trust
set security address-book book2 address chicago 192.168.168.0/24
set security address-book book2 attach zone untrust
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure basic network, security zone, and address book information:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 192.168.10.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 10.1.1.2/30
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
```

3. Configure the untrust security zone.

```
[edit ]
user@host# edit security zones security-zone untrust
```

4. Assign an interface to the security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/3.0
```

5. Specify allowed system services for the security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@host# edit security zones security-zone trust
```

7. Assign an interface to the security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/0.0
```

8. Specify allowed system services for the security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

9. Create an address book and attach it to a zone.

```
[edit security address-book book1]
user@host# set address sunnyvale 192.168.10.0/24
user@host# set attach zone trust
```

10. Create another address book and attach it to a zone.

```
[edit security address-book book2]
user@host# set address chicago 192.168.168.0/24
user@host# set attach zone untrust
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security address-book** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 192.168.10.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.1.1.2/30
    }
  }
}
```

```
[edit]
user@host# show routing-options
static {
  route 0.0.0.0/0 next-hop 10.1.1.1;
}
```

```
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      ike;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
[edit]
user@host# show security address-book
book1 {
```



```

address sunnyvale 192.168.10.0/24;
attach {
    zone trust;
}
}
book2 {
    address chicago 192.168.168.0/24;
    attach {
        zone untrust;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-phase1-proposal authentication-method pre-shared-keys
set security ike proposal ike-phase1-proposal dh-group group2
set security ike proposal ike-phase1-proposal authentication-algorithm sha1
set security ike proposal ike-phase1-proposal encryption-algorithm aes-128-cbc
set security ike policy ike-phase1-policy mode main
set security ike policy ike-phase1-policy proposals ike-phase1-proposal
set security ike policy ike-phase1-policy pre-shared-key ascii-text "$ABC123"
set security ike gateway gw-chicago external-interface ge-0/0/3.0
set security ike gateway gw-chicago ike-policy ike-phase1-policy
set security ike gateway gw-chicago address 10.2.2.2

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@host# set proposal ike-phase1-proposal

```

2. Define the IKE proposal authentication method.

```

[edit security ike proposal ike-phase1-proposal]
user@host# set authentication-method pre-shared-keys

```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike-phase1-proposal]
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike-phase1-proposal]
user@host# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike-phase1-proposal]
user@host# set encryption-algorithm aes-128-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]
user@host# set policy ike-phase1-policy
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike-phase1-policy]
user@host# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-phase1-policy]
user@host# set proposals ike-phase1-proposal
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike-phase1-policy]
user@host# set pre-shared-key ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike gateway gw-chicago]
user@host# set external-interface ge-0/0/3.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway gw-chicago]
user@host# set ike-policy ike-phase1-policy
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ike-phase1-proposal {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm aes-128-cbc;
}
policy ike-phase1-policy {
  mode main;
  proposals ike-phase1-proposal;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway gw-chicago {
  ike-policy ike-phase1-policy;
  address 10.2.2.2;
  external-interface ge-0/0/3.0;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec-phase2-proposal protocol esp
set security ipsec proposal ipsec-phase2-proposal authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec-phase2-proposal encryption-algorithm aes-128-cbc
set security ipsec policy ipsec-phase2-policy proposals ipsec-phase2-proposal
set security ipsec policy ipsec-phase2-policy perfect-forward-secrecy keys group2
set security ipsec vpn ike-vpn-chicago ike gateway gw-chicago
set security ipsec vpn ike-vpn-chicago ike ipsec-policy ipsec-phase2-policy
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@host# set security ipsec proposal ipsec-phase2-proposal
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security ipsec proposal ipsec-phase2-proposal]  
user@host# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]  
user@host# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec-phase2-proposal]  
user@host# set encryption-algorithm aes-128-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]  
user@host# set policy ipsec-phase2-policy
```

6. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec-phase2-policy]  
user@host# set proposals ipsec-phase2-proposal
```

7. Specify IPsec Phase 2 PFS to use Diffie-Hellman group 2.

```
[edit security ipsec policy ipsec-phase2-policy]  
user@host# set perfect-forward-secrecy keys group2
```

8. Specify the IKE gateway.

```
[edit security ipsec]  
user@host# set vpn ike-vpn-chicago ike gateway gw-chicago
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]  
user@host# set vpn ike-vpn-chicago ike ipsec-policy ipsec-phase2-policy
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ipsec
proposal ipsec-phase2-proposal {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm aes-128-cbc;
}
policy ipsec-phase2-policy {
    perfect-forward-secrecy {
        keys group2;
    }
    proposals ipsec-phase2-proposal;
}
vpn ike-vpn-chicago {
    ike {
        gateway gw-chicago;
        ipsec-policy ipsec-phase2-policy;
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone untrust policy vpn-tr-untr match
source-address sunnyvale
set security policies from-zone trust to-zone untrust policy vpn-tr-untr match
destination-address chicago
set security policies from-zone trust to-zone untrust policy vpn-tr-untr match application
any
set security policies from-zone trust to-zone untrust policy vpn-tr-untr then permit tunnel
ipsec-vpn ike-vpn-chicago
set security policies from-zone trust to-zone untrust policy vpn-tr-untr then permit tunnel
pair-policy vpn-untr-tr
set security policies from-zone untrust to-zone trust policy vpn-untr-tr match
source-address chicago
set security policies from-zone untrust to-zone trust policy vpn-untr-tr match
destination-address sunnyvale
set security policies from-zone untrust to-zone trust policy vpn-untr-tr match application
any
set security policies from-zone untrust to-zone trust policy vpn-untr-tr then permit tunnel
ipsec-vpn ike-vpn-chicago
set security policies from-zone untrust to-zone trust policy vpn-untr-tr then permit tunnel
pair-policy vpn-tr-untr
set security policies from-zone trust to-zone untrust policy permit-any match
source-address any
set security policies from-zone trust to-zone untrust policy permit-any match
destination-address any
```

```

set security policies from-zone trust to-zone untrust policy permit-any match application
any
set security policies from-zone trust to-zone untrust policy permit-any then permit
insert security policies from-zone trust to-zone untrust policy vpn-tr-untr before policy
permit-any

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the untrust zone.

```

[edit security policies from-zone trust to-zone untrust]
user@host# set policy vpn-tr-untr match source-address sunnyvale
user@host# set policy vpn-tr-untr match destination-address chicago
user@host# set policy vpn-tr-untr match application any
user@host# set policy vpn-tr-untr then permit tunnel ipsec-vpn ike-vpn-chicago
user@host# set policy vpn-tr-untr then permit tunnel pair-policy vpn-untr-tr

```

2. Create the security policy to permit traffic from the untrust zone to the trust zone.

```

[edit security policies from-zone untrust to-zone trust]
user@host# set policy vpn-untr-tr match source-address chicago
user@host# set policy vpn-untr-tr match destination-address sunnyvale
user@host# set policy vpn-untr-tr match application any
user@host# set policy vpn-untr-tr then permit tunnel ipsec-vpn ike-vpn-chicago
user@host# set policy vpn-untr-tr then permit tunnel pair-policy vpn-tr-untr

```

3. Create the security policy to permit traffic from the trust zone to the untrust zone.

```

[edit security policies from-zone trust to-zone untrust]
user@host# set policy permit-any match source-address any
user@host# set policy vpn-untr-tr match destination-address any
user@host# set policy vpn-untr-tr match application any
user@host# set policy vpn-untr-tr then permit

```

4. Reorder the security policies so that the vpn-tr-untr security policy is placed above the permit-any security policy.

```

[edit security policies from-zone trust to-zone untrust]
user@host# insert policy vpn-tr-untr before policy permit-any

```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security policies
from-zone trust to-zone untrust {
  policy vpn-tr-untr {
    match {
      source-address sunnyvale;
      destination-address chicago;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn ike-vpn-chicago;
          pair-policy vpn-untr-tr;
        }
      }
    }
  }
}
policy permit-any {
  match {
    source-address any;
    destination-address any;
    application any;
  }
  then {
    permit
  }
}
}
from-zone untrust to-zone trust {
  policy vpn-untr-tr {
    match {
      source-address chicago;
      destination-address sunnyvale;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn ike-vpn-chicago;
          pair-policy vpn-tr-untr;
        }
      }
    }
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network

configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure

To configure TCP-MSS information:

1. Configure TCP-MSS information.

```
[edit]
user@host# set security flow tcp-mss ipsec-vpn mss 1350
```

Results From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security flow
tcp-mss {
  ipsec-vpn {
    mss 1350;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the SSG Series Device

CLI Quick Configuration

For reference, the configuration for the SSG Series device is provided. For information about configuring SSG Series devices, see the *Concepts and Examples ScreenOS Reference Guide*, which is located at <https://www.juniper.net/documentation>.

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interface ethernet0/6 zone Trust
set interface ethernet0/0 zone Untrust
set interface ethernet0/6 ip 192.168.168.1/24
set interface ethernet0/6 route
set interface ethernet0/0 ip 10.2.2.2/30
set interface ethernet0/0 route
set flow tcp-mss 1350
set address Trust "local-net" 192.168.168.0 255.255.255.0
set address Untrust "corp-net" 192.168.10.0 255.255.255.0
set ike gateway corp-ike address 10.1.1.2 Main outgoing-interface ethernet0/0 preshare
395psksecr3t sec-level standard
set vpn corp-vpn gateway corp-ike replay tunnel idletime 0 sec-level standard
```



```

set policy id 11 from Trust to Untrust "local-net" "corp-net" "ANY" tunnel vpn "corp-vpn"
pair-policy 10
set policy id 10 from Untrust to Trust "corp-net" "local-net" "ANY" tunnel vpn "corp-vpn"
pair-policy 11
set policy id 1 from Trust to Untrust "ANY" "ANY" "ANY" nat src permit
set route 0.0.0.0/0 interface ethernet0/0 gateway 10.2.2.1

```

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Phase 1 Status on page 533](#)
- [Verifying the IPsec Phase 2 Status on page 535](#)
- [Reviewing Statistics and Errors for an IPsec Security Association on page 536](#)

Verifying the IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you need to send traffic from a host in the 192.168.10/24 network to a host in the 192.168.168/24 network. For policy-based VPNs, a separate host must generate the traffic; traffic initiated from the SRX Series device will not match the VPN policy. We recommend that the test traffic be from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate ping from 192.168.10.10 to 192.168.168.10.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
4	10.2.2.2	UP	5e1db3f9d50b0de6	e50865d9ebf134f8	Main

```
user@host> show security ike security-associations index 4 detail
```

```

IKE peer 10.2.2.2, Index 4,
Role: Responder, State: UP
Initiator cookie: 5e1db3f9d50b0de6, Responder cookie: e50865d9ebf134f8
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 10.1.1.2:500, Remote: 10.2.2.2:500
Lifetime: Expires in 28770 seconds
Algorithms:
Authentication      : sha1
Encryption           : aes-128-cbc
Pseudo random function: hmac-sha1
Traffic statistics:
Input bytes         :           852

```

```

Output bytes      :           856
Input packets    :             5
Output packets    :             4
Flags: Caller notification sent
IPsec security associations: 1 created, 0 deleted
Phase 2 negotiations in progress: 0

```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 security associations (SAs). If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote Address—Verify that the remote IP address is correct.
- State
 - UP—The Phase 1 SA has been established.
 - DOWN—There was a problem establishing the Phase 1 SA.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations index 1 detail** command lists additional information about the security association with an index number of 1:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Initiator and responder role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying the IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
total configured sa: 2
ID   Gateway      Port  Algorithm      SPI      Life:sec/kb  Mon  vsys
<2   10.2.2.2      500   ESP:aes-128/sha1 a63eb26f 3565/ unlim  -    0
>2   10.2.2.2      500   ESP:aes-128/sha1 a1024ed9 3565/ unlim  -    0
```

```
user@host> show security ipsec security-associations index 2 detail
```

```
Virtual-system: Root
Local Gateway: 10.1.1.2, Remote Gateway: 10.2.2.2
Local Identity: ipv4_subnet(any:0,[0..7]=192.168.10.0/24)
Remote Identity: ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
  DF-bit: clear
  Policy-name: vpnpolicy-unt-tr

Direction: inbound, SPI: 2789126767, AUX-SPI: 0
Hard lifetime: Expires in 3558 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2986 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)

Anti-replay service: enabled, Replay window size: 32

Direction: outbound, SPI: 2701283033,, AUX-SPI: 0
Hard lifetime: Expires in 3558 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2986 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc
Anti-replay service: enabled, Replay window size: 32
```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 2. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500, which indicates that no NAT-traversal is implemented. (NAT-traversal uses port 4500 or another random high-number port.)
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3565/ unlim value indicates that the Phase 2 lifetime expires in 3565 seconds, and that no lifesize has been specified, which indicates that it is unlimited.

Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.

- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U (up) or D (down) is listed.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index 16384 detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common reasons for a Phase 2 failure. For policy-based VPNs, the proxy ID is derived from the security policy. The local address and remote address are derived from the address book entries, and the service is derived from the application configured for the policy. If Phase 2 fails because of a proxy ID mismatch, you can use the policy to confirm which address book entries are configured. Verify that the addresses match the information being sent. Check the service to ensure that the ports match the information being sent.

Reviewing Statistics and Errors for an IPsec Security Association

Purpose Review ESP and authentication header counters and errors for an IPsec security association.

Action From operational mode, enter the **show security ipsec statistics index *index_number*** command, using the index number of the VPN for which you want to see statistics.

```
user@host> show security ipsec statistics index 2
```

```
ESP Statistics:
  Encrypted bytes:      920
  Decrypted bytes:     6208
  Encrypted packets:    5
  Decrypted packets:   87
AH Statistics:
  Input bytes:          0
  Output bytes:         0
  Input packets:        0
  Output packets:       0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
```

You can also use the **show security ipsec statistics** command to review statistics and errors for all SAs.

To clear all IPsec statistics, use the **clear security ipsec statistics** command.

Meaning If you see packet loss issues across a VPN, you can run the **show security ipsec statistics** or **show security ipsec statistics detail** command several times to confirm that the

encrypted and decrypted packet counters are incrementing. You should also check if the other error counters are incrementing.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [Example: Configuring a Route-Based VPN on page 112](#)
 - [Example: Configuring a Hub-and-Spoke VPN on page 71](#)

- Related Documentation**
- [AutoVPN on Hub-and-Spoke Devices on page 225](#)

CHAPTER 4

Configuring CoS-Based IPsec VPNs

- [CoS-Based IPsec VPNs on page 539](#)

CoS-Based IPsec VPNs

You can configure Junos class-of-service (CoS) features to provide multiple classes of service for VPNs. On the device, you can configure multiple forwarding classes for transmitting packets, define which packets are placed into each output queue, schedule the transmission service level for each queue, and manage congestion.

- [Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs on page 539](#)
- [Understanding Traffic Selectors and CoS-Based IPsec VPNs on page 542](#)
- [Example: Configuring CoS-Based IPsec VPNs on page 544](#)

Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs

Class of service (CoS) forwarding classes (FCs) configured on the SRX Series device can be mapped to IPsec security associations (SAs). Packets for each FC are mapped to a different IPsec SA, thus providing for CoS treatment on the local device and on intermediate routers.

- [Benefits of CoS-Based IPsec VPNs with Multiple IPsec SAs on page 539](#)
- [Overview on page 540](#)
- [Mapping FCs to IPsec SAs on page 540](#)
- [IPsec SA Negotiation on page 540](#)
- [Rekey on page 541](#)
- [Adding or Deleting FCs from a VPN on page 541](#)
- [Dead Peer Detection \(DPD\) on page 541](#)
- [Commands on page 541](#)
- [Supported VPN Features on page 541](#)

Benefits of CoS-Based IPsec VPNs with Multiple IPsec SAs

- Helps you ensure different data streams, with each tunnel using a separate set of security associations.

- Helps you to facilitate the IPsec VPN deployments where differentiated traffic is required, such as voice-over-IP.

Overview

This feature is proprietary to Juniper Networks and works with supported SRX platforms and Junos OS releases. The VPN peer device must be an SRX Series device or vSRX instance that supports this feature or any other product that support the same functionality in the same way as SRX Series device.

Mapping FCs to IPsec SAs

Up to 8 forwarding classes (FC) can be configured for a VPN with the **multi-sa forwarding-classes** at the `[edit security ipsec vpn vpn-name]` hierarchy level. The number of IPsec SAs negotiated with a peer gateway is based on the number of FCs configured for the VPN. The mapping of FCs to IPsec SAs applies to all traffic selectors configured for the VPN.

All IPsec SAs created for the FCs of a specific VPN are represented by the same tunnel ID. Tunnel-related events consider the state and statistics of all IPsec SAs. All IPsec SAs related to a tunnel are anchored to the same SPU or the same thread ID on SRX Series devices or vSRX instances.

IPsec SA Negotiation

When multiple FCs are configured for a VPN, a unique IPsec SA is negotiated with the peer for each FC. In addition, a default IPsec SA is negotiated to send packets that do not match a configured FC. The default IPsec is negotiated even if the VPN peer device is not configured for FCs or does not support FC to IPsec SA mapping. The default IPsec SA is the first IPsec SA to be negotiated and the last SA to be torn down.

Depending on the number of FCs configured. When IPsec SAs are in the process of negotiating, packets may arrive with an FC for which an IPsec SA has yet to be negotiated. Until an IPsec SA for a given FC is negotiated, the traffic is sent to the default IPsec SA. A packet with an FC that does not match any of the installed IPsec SAs is sent on the default IPsec SA.

Mapping of FCs to IPsec SAs is done on the local VPN gateway. The local and peer gateways may have FCs configured in a different order. Each peer gateway maps FCs in the order in which IPsec SA negotiations are completed. Thus, the local and peer gateways might have different FC to IPsec SA mappings. A gateway stops negotiating new IPsec SAs once the configured number of FCs is reached. A peer gateway may initiate more IPsec SAs than the number of FCs configured on the local gateway. In this case, the local gateway accepts the additional IPsec SA requests—up to 18 IPsec SAs. The local gateway uses the other IPsec SAs only for decrypting incoming IPsec traffic. If a packet is received with an FC that does not match any configured FC, the packet is sent on the default FC IPsec SA.

If a delete notification is received for the default IPsec SA from the peer device, only the default IPsec SA is deleted and the default IPsec SA is negotiated newly. During this time, traffic which might go on default IPsec SA is be dropped. The VPN tunnel is brought down only if the default IPsec SA is the last SA.

If the **establish-tunnels immediately** option is configured and committed for the VPN, the SRX Series device negotiates IPsec SA without waiting for traffic to arrive. If negotiations do not complete for an IPsec SA for a configured FC, negotiations are retried every 60 seconds.

If the **establish-tunnels on-traffic** option is configured for the VPN, the SRX Series device negotiates IPsec SAs when the first data packet arrives; the FC for the first packet does not matter. With either option, the default IPsec SA is negotiated first, then each IPsec SA is negotiated one by one in the order in which the FCs are configured on the device.

Rekey

When using Multi SAs with Differentiated Services Code Point (DSCP) traffic steering with traffic selectors, the following behavior occurs during rekey. When the traffic selectors performs rekeying, if one or more of the traffic selectors are unable to rekey for any reason, the specific SA is brought down when the lifetime expires. In this case, traffic that uses to match the specific SA is sent through the default traffic selector instead.

Adding or Deleting FCs from a VPN

When FCs are added or deleted from a VPN, the IKE and IPsec SAs for the VPN are brought up or down and restarts the negotiations. The **clear security ipsec security-associations** command clears all IPsec SAs.

Dead Peer Detection (DPD)

When DPD is configured with this feature, the **optimized** mode sends probes only when there is outgoing traffic and no incoming traffic on any of the IPsec SA. While the **probe-idle** mode sends probes only when there is no outgoing and no incoming traffic on any of the IPsec SAs. VPN monitoring is not supported with DPD feature.

Commands

The **show security ipsec sa details index *tunnel-id*** command displays all IPsec SA details including the FC name. The **show security ipsec stats index *tunnel-id*** command displays statistics for each FC.

Supported VPN Features

The following VPN features are supported with CoS-based IPsec VPNs:

- Route-based site-to-site VPNs. Policy-based VPNs are not supported.
- AutoVPN.
- Traffic selectors.
- Auto Discovery VPNs (ADVPNs).
- IKEv2. IKEv1 is not supported.
- Dead peer detection (DPD). VPN monitoring is not supported.

See Also • [Understanding Traffic Selectors and CoS-Based IPsec VPNs on page 542](#)

- [Example: Configuring CoS-Based IPsec VPNs on page 544](#)
- *Forwarding Classes Overview*

Understanding Traffic Selectors and CoS-Based IPsec VPNs

A traffic selector is an agreement between IKE peers to permit traffic through a VPN tunnel if the traffic matches a specified pair of local and remote addresses. Only traffic that conforms to a traffic selector is permitted through the associated security association (SA).

The CoS-based IPsec VPN feature supports the following scenarios

- One or multiple traffic selectors in a route-based site-to-site VPN with the same FCs.
- Multiple traffic selectors, with different FCs for each traffic selector. This scenario requires separate VPN configurations.

This topic describes the VPN configurations and the IPsec SA that are negotiated for each scenario.

In the following scenarios, three FCs are configured on the SRX Series device:

```
forwarding-classes {  
    queue 7 voip-data;  
    queue 6 web-data;  
    queue 5 control-data;  
}
```

In the first scenario, VPN vpn1 is configured with a single traffic selector ts1 and the three FCs:

```
ipsec {  
    vpn vpn1 {  
        ts1 {  
            local-ip 3.3.3.0/24;  
            remote-ip 4.4.4.0/24;  
        }  
  
        multi-sa {  
            forwarding-class web-data;  
            forwarding-class voip-data;  
            forwarding-class control-data;  
        }  
    }  
}
```

In the configuration above, four IPsec SAs are negotiated for traffic selector ts1—one for the default IPsec SA and three for the IPsec SAs that are mapped to FCs.

In the second scenario, VPN vpn1 is configured with two traffic selectors ts1 and ts2 and the three FCs:

```
ipsec {
  vpn vpn1 {
    ts1 {
      local-ip 3.3.3.0/24;
      remote-ip 4.4.4.0/24;
    }
    ts2 {
      local-ip 6.6.6.0/24;
      remote-ip 7.7.7.0/24;
    }
  }
  multi-sa {
    forwarding-class web-data;
    forwarding-class voip-data;
    forwarding-class control-data;
  }
}
```

In the configuration above, four IPsec SAs are negotiated for traffic selector ts1 and four IPsec SAs are negotiated for traffic selector ts2. For each traffic selector, there is one IPsec SA negotiated for the default IPsec SA and three IPsec SAs negotiated for the IPsec SAs that are mapped to FCs.

In the third scenario, traffic selectors ts1 and ts2 support different sets of FCs. The traffic selectors need to be configured for different VPNs:

```
ipsec {
  vpn vpn1 {
    bind-interface st0.0;
    ts1 {
      local-ip 3.3.3.0/24;
      remote-ip 4.4.4.0/24;
    }
    multi-sa {
      forwarding-class web-data;
      forwarding-class voip-data;
      forwarding-class control-data;
    }
  }
  vpn vpn2 {
    bind-interface st0.0;
    ts2 {
      local-ip 6.6.6.0/24;
      remote-ip 7.7.7.0/24;
    }
    multi-sa {
      forwarding-class web-data;
      forwarding-class voip-data;
    }
  }
}
```

In the configuration above, four IPsec SAs are negotiated for traffic selector ts1 in VPN vpn1—one for the default IPsec SA and three for the IPsec SAs that are mapped to FCs.

- See Also**
- [Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs on page 539](#)
 - [Example: Configuring CoS-Based IPsec VPNs on page 544](#)

Example: Configuring CoS-Based IPsec VPNs

This example shows how to configure a CoS-based IPsec VPNs with multiple IPsec SAs to allow packets mapping for each forwarding class to a different IPsec SA, thus providing for CoS treatment on the local device and on intermediate routers.



NOTE: This feature is proprietary to Juniper Networks and only works with supported SRX platforms and Junos OS releases. The VPN peer device must be an SRX Series device or vSRX instance that supports this feature.

- [Requirements on page 544](#)
- [Overview on page 544](#)
- [Configuration on page 547](#)
- [Verification on page 562](#)

Requirements

This example uses the following hardware:

- Any SRX Series device

Before you begin:

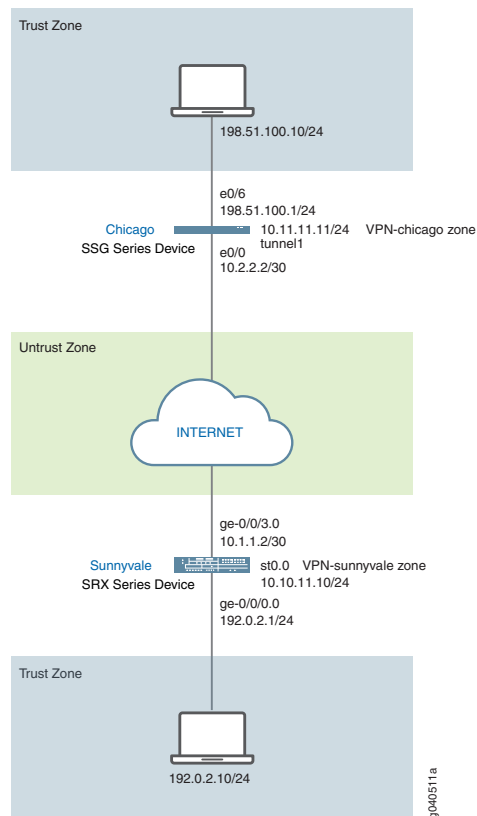
- Understand how Class of service (CoS) forwarding classes (FCs) configured on the SRX Series device can be mapped to IPsec security associations (SAs). See [Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs](#).
- Understand Traffic Selectors and CoS-Based IPsec VPNs. See [Understanding Traffic Selectors and CoS-Based IPsec VPNs](#).

Overview

In this example, you configure an IPsec route-based VPN for a branch office in Chicago, because you do not need to conserve tunnel resources or configure many security policies to filter traffic through the tunnel. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale.

[Figure 35 on page 545](#) shows an example of an IPsec route-based VPN topology. In this topology, one SRX Series device is located in Sunnyvale, and another SRX Series device is located in Chicago.

Figure 35: IPsec Route-Based VPN Topology



In this example, you configure interfaces, an IPv4 default route and security zones. Then you configure IKE, IPsec, a security policy, and CoS parameters. See [Table 57 on page 545](#) through [Table 60 on page 547](#).

Table 57: Interface, Static Route, and Security Zone Information

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/0.0	203.0.113.1/25
	ge-0/0/3.0	198.51.100.2/30
	st0.0 (tunnel interface)	inet
Static routes	0.0.0.0/0 (default route)	The next hop is 198.51.100.2.

Table 57: Interface, Static Route, and Security Zone Information (continued)

Feature	Name	Configuration Parameters
Security zones	trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/0.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/3.0 interface is bound to this zone.
	vpn	The st0.0 interface is bound to this zone.

Table 58: IKE Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ike-proposal	<ul style="list-style-type: none"> Authentication method: rsa-signatures Diffie-Hellman group: group14 Authentication algorithm: sha-256 Encryption algorithm: aes-256-cbc
Policy	ike-policy	<ul style="list-style-type: none"> Mode: main Proposal reference: ike-proposal IKE policy authentication method: rsa-signatures
Gateway	gw-chicago	<ul style="list-style-type: none"> IKE policy reference: ike-policy External interface: ge-0/0/3.0 Gateway address: 198.51.100.102

Table 59: IPsec Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha-256 Encryption algorithm: aes-256-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop
VPN	ipsec_vpn1	<ul style="list-style-type: none"> IKE gateway reference: gw-chicago IPsec policy reference: ipsec_pol

Table 60: Security Policy Configuration Parameters

Purpose	Name	Configuration Parameters
The security policy permits traffic from the trust zone to the vpn zone.	vpn	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address sunnyvale destination-address chicago application any Action: permit
The security policy permits traffic from the vpn zone to the trust zone.	vpn	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address chicago destination-address sunnyvale application any Action: permit

Configuration

- [Configuring Basic Network and Security Zone Information on page 547](#)
- [Configuring CoS on page 550](#)
- [Configuring IKE on page 555](#)
- [Configuring IPsec on page 558](#)
- [Configuring Security Policies on page 561](#)

Configuring Basic Network and Security Zone Information

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family inet address 203.0.113.1/25
set interfaces ge-0/0/3 unit 0 family inet address 198.51.100.2/30
set interfaces st0 unit 0 family inet
set routing-options static route 0.0.0.0/0 next-hop 198.51.100.2
set security zones security-zone untrust interfaces ge-0/0/3.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone vpn interfaces st0.0
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interface, static route, and security zone information:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 203.0.113.1/25
user@host# set interfaces ge-0/0/3 unit 0 family inet address 198.51.100.2/30
user@host# set interfaces st0 unit 0 family inet
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 198.51.100.2
```

3. Configure the untrust security zone.

```
[edit ]
user@host# edit security zones security-zone untrust
```

4. Assign an interface to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/3.0
```

5. Specify allowed system services for the security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@host# edit security zones security-zone trust
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/0.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

9. Configure the vpn security zone.

```
[edit]
user@host# edit security zones security-zone vpn
```


10. Assign an interface to the security zone.

```
[edit security zones security-zone vpn]
user@host# set interfaces st0.0
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 203.0.113.2/25;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 198.51.100.2/30;
    }
  }
}
st0 {
  unit 0 {
    family inet ;
  }
}
```

```
[edit]
user@host# show routing-options
static {
  route 0.0.0.0/0 next-hop 198.51.100.2;
}
```

```
[edit]
user@host# show security zones
security-zone Host {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
security-zone untrust {
```

```

host-inbound-traffic {
  system-services {
    ike;
  }
}
interfaces {
  ge-0/0/3.0;
}
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
  interfaces {
    ge-0/0/0.0;
  }
}
security-zone vpn {
  interfaces {
    st0.0;
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring CoS

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set class-of-service classifiers dscp ba-classifier import default
set class-of-service classifiers dscp ba-classifier forwarding-class best-effort loss-priority
  high code-points 000000
set class-of-service classifiers dscp ba-classifier forwarding-class ef-class loss-priority
  high code-points 000001
set class-of-service classifiers dscp ba-classifier forwarding-class af-class loss-priority
  high code-points 001010
set class-of-service classifiers dscp ba-classifier forwarding-class network-control
  loss-priority high code-points 000011
set class-of-service classifiers dscp ba-classifier forwarding-class res-class loss-priority
  high code-points 000100
set class-of-service classifiers dscp ba-classifier forwarding-class web-data loss-priority
  high code-points 000101
set class-of-service classifiers dscp ba-classifier forwarding-class control-data
  loss-priority high code-points 000111
set class-of-service classifiers dscp ba-classifier forwarding-class voip-data loss-priority
  high code-points 000110
set class-of-service forwarding-classes queue 7 voip-data
set class-of-service forwarding-classes queue 6 control-data

```

```

set class-of-service forwarding-classes queue 5 web-data
set class-of-service forwarding-classes queue 4 res-class
set class-of-service forwarding-classes queue 2 af-class
set class-of-service forwarding-classes queue 1 ef-class
set class-of-service forwarding-classes queue 0 best-effort
set class-of-service forwarding-classes queue 3 network-control
set class-of-service interfaces ge-0/0/3 unit 0 classifiers dscp ba-classifier
set class-of-service interfaces ge-0/0/3 unit 0 scheduler-map sched_1
set class-of-service scheduler-maps sched_1 forwarding-class voip-data scheduler Q7
set class-of-service scheduler-maps sched_1 forwarding-class control-data scheduler
  Q6
set class-of-service scheduler-maps sched_1 forwarding-class web-data scheduler Q5
set class-of-service scheduler-maps sched_1 forwarding-class res-class scheduler Q4
set class-of-service scheduler-maps sched_1 forwarding-class af-class scheduler Q2
set class-of-service scheduler-maps sched_1 forwarding-class ef-class scheduler Q1
set class-of-service scheduler-maps sched_1 forwarding-class best-effort scheduler Q0
set class-of-service scheduler-maps sched_1 forwarding-class network-control scheduler
  Q3
set class-of-service schedulers Q7 transmit-rate percent 5
set class-of-service schedulers Q7 priority strict-high
set class-of-service schedulers Q6 transmit-rate percent 25
set class-of-service schedulers Q6 priority high
set class-of-service schedulers Q5 transmit-rate remainder
set class-of-service schedulers Q5 priority high
set class-of-service schedulers Q4 transmit-rate percent 25
set class-of-service schedulers Q4 priority medium-high
set class-of-service schedulers Q3 transmit-rate remainder
set class-of-service schedulers Q3 priority medium-high
set class-of-service schedulers Q2 transmit-rate percent 10
set class-of-service schedulers Q2 priority medium-low
set class-of-service schedulers Q1 transmit-rate percent 10
set class-of-service schedulers Q1 priority medium-low
set class-of-service schedulers Q0 transmit-rate remainder
set class-of-service schedulers Q0 priority low

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure CoS:

1. Configure behavior aggregate classifiers for DiffServ CoS.

```

[edit class-of-service]
user@host# edit classifiers dscp ba-classifier
user@host# set import default

```

2. Configure a best-effort forwarding class classifier.

```

[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class best-effort loss-priority high code-points 000000

```

3. Define the DSCP value to be assigned to the forwarding class.

```
[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class ef-class loss-priority high code-points 000001
user@host# set forwarding-class af-class loss-priority high code-points 001010
user@host# set forwarding-class network-control loss-priority high code-points
000011
user@host# set forwarding-class res-class loss-priority high code-points 000100
user@host# set forwarding-class web-data loss-priority high code-points 000101
user@host# set forwarding-class control-data loss-priority high code-points 000111
user@host# set forwarding-class voip-data loss-priority high code-points 000110
```

4. Define eight forwarding classes (queue names) for the eight queues.

```
[edit class-of-service forwarding-classes]
user@host# set queue 7 voip-data
user@host# set queue 6 control-data
user@host# set queue 5 web-data
user@host# set queue 4 res-class
user@host# set queue 2 af-class
user@host# set queue 1 ef-class
user@host# set queue 0 best-effort
user@host# set queue 3 network-control
```

5. Configure classifiers on the ingress (ge) interfaces.

```
[edit class-of-service]
user@host# set interfaces ge-0/0/3 unit 0 classifiers dscp ba-classifier
```

6. Apply the scheduler map to the ge interface.

```
[edit class-of-service]
user@host# set interfaces ge-0/0/3 unit 0 scheduler-map sched_1
```

7. Configure the scheduler map to associate schedulers with defined forwarding classes.

```
[edit class-of-service]
user@host# set scheduler-maps sched_1 forwarding-class voip-data scheduler Q7
user@host# set scheduler-maps sched_1 forwarding-class control-data scheduler
Q6
user@host# set scheduler-maps sched_1 forwarding-class web-data scheduler Q5
user@host# set scheduler-maps sched_1 forwarding-class res-class scheduler Q4
user@host# set scheduler-maps sched_1 forwarding-class af-class scheduler Q2
user@host# set scheduler-maps sched_1 forwarding-class ef-class scheduler Q1
user@host# set scheduler-maps sched_1 forwarding-class best-effort scheduler
Q0
user@host# set scheduler-maps sched_1 forwarding-class network-control scheduler
Q3
```

8. Define the schedulers with priority and transmit rates.

```
[edit set class-of-service]
user@host# set schedulers Q7 transmit-rate percent 5
user@host# set schedulers Q7 priority strict-high
user@host# set schedulers Q6 transmit-rate percent 25
user@host# set schedulers Q6 priority high
user@host# set schedulers Q5 transmit-rate remainder
user@host# set schedulers Q5 priority high
user@host# set schedulers Q4 transmit-rate percent 25
user@host# set schedulers Q4 priority medium-high
user@host# set schedulers Q3 transmit-rate remainder
user@host# set schedulers Q3 priority medium-high
user@host# set schedulers Q2 transmit-rate percent 10
user@host# set schedulers Q2 priority medium-low
user@host# set schedulers Q1 transmit-rate percent 10
user@host# set schedulers Q1 priority medium-low
user@host# set schedulers Q0 transmit-rate remainder
user@host# set schedulers Q0 priority low
```

Results From configuration mode, confirm your configuration by entering the **show class-of-service** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show class-of-service
classifiers {
  dscp ba-classifier {
    import default;
    forwarding-class best-effort {
      loss-priority high code-points 000000;
    }
    forwarding-class ef-class {
      loss-priority high code-points 000001;
    }
    forwarding-class af-class {
      loss-priority high code-points 001010;
    }
    forwarding-class network-control {
      loss-priority high code-points 000011;
    }
    forwarding-class res-class {
      loss-priority high code-points 000100;
    }
    forwarding-class web-data {
      loss-priority high code-points 000101;
    }
    forwarding-class control-data {
      loss-priority high code-points 000111;
    }
    forwarding-class voip-data {
      loss-priority high code-points 000110;
    }
  }
}
```

```
    }
  }
}
forwarding-classes {
  queue 7 voip-data;
  queue 6 control-data;
  queue 5 web-data;
  queue 4 res-class;
  queue 2 af-class;
  queue 1 ef-class;
  queue 0 best-effort;
  queue 3 network-control;
}
interfaces {
  ge-0/0/3 {
    unit 0 {
      classifiers {
        dscp ba-classifier;
      }
    }
  }
  ge-0/0/3 {
    unit 0 {
      scheduler-map sched_1;
    }
  }
}
scheduler-maps {
  sched_1 {
    forwarding-class voip-data scheduler Q7;
    forwarding-class control-data scheduler Q6;
    forwarding-class web-data scheduler Q5;
    forwarding-class res-class scheduler Q4;
    forwarding-class af-class scheduler Q2;
    forwarding-class ef-class scheduler Q1;
    forwarding-class best-effort scheduler Q0;
    forwarding-class network-control scheduler Q3;
  }
}
schedulers {
  Q7 {
    transmit-rate percent 5;
    priority strict-high;
  }
  Q6 {
    transmit-rate percent 25;
    priority high;
  }
  Q5 {
    transmit-rate {
      remainder;
    }
    priority high;
  }
  Q4 {
```

```

        transmit-rate percent 25;
        priority medium-high;
    }
    Q3 {
        transmit-rate {
            remainder;
        }
        priority medium-high;
    }
    Q2 {
        transmit-rate percent 10;
        priority medium-low;
    }
    Q1 {
        transmit-rate percent 10;
        priority medium-low;
    }
    Q0 {
        transmit-rate {
            remainder;
        }
        priority low;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike-proposal authentication-method pre-shared-keys
set security ike proposal ike-proposal dh-group group14
set security ike proposal ike-proposal authentication-algorithm sha-256
set security ike proposal ike-proposal encryption-algorithm aes-256-cbc
set security ike policy ike-policy mode main
set security ike policy ike-policy proposals ike-proposal
set security ike policy ike-policy pre-shared-key ascii-text $ABC123
set security ike gateway gw-chicago external-interface ge-0/0/3.0
set security ike gateway gw-chicago ike-policy ike-policy
set security ike gateway gw-chicago address 198.51.100.102
set security ike gateway gw-chicago version v2-only

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE proposal.

```
[edit security ike]  
user@host# set proposal ike-proposal
```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike-proposal]  
user@host# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike-proposal]  
user@host# set dh-group group14
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike-proposal]  
user@host# set authentication-algorithm sha-256
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike-proposal]  
user@host# set encryption-algorithm aes-256-cbc
```

6. Create an IKE policy.

```
[edit security ike]  
user@host# set policy ike-policy
```

7. Set the IKE mode.

```
[edit security ike]  
user@host# set policy ike-policy mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike-policy]  
user@host# set proposals ike-proposal
```


9. Define the IKE policy authentication method.

```
[edit security ike policy ike-policy]
user@host# set pre-shared-key ascii-text $ABC123
```

10. Create an IKE gateway and define its external interface.

```
[edit security ike]
user@host# set gateway gw-chicago external-interface ge-0/0/3.0
```

11. Define the IKE policy reference.

```
[edit security ike gateway gw-chicago]
user@host# set ike-policy ike-policy
```

12. Define the IKE gateway address.

```
[edit security ike gateway gw-chicago]
user@host# set address 198.51.100.102
```

13. Define the IKE gateway version.

```
[edit security ike gateway gw-chicago]
user@host# set version v2-only
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ike-proposal {
  authentication-method pre-shared-keys;
  dh-group group14;
  authentication-algorithm sha-256;
  encryption-algorithm aes-256-cbc;
}
policy ike-policy {
  mode main;
  proposals ike-proposal;
  pre-shared-key ascii-text "$ABC123";
}
gateway gw-chicago {
  ike-policy ike-policy;
  address 198.51.100.102;
  external-interface ge-0/0/3.0;
  version v2-only;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec traceoptions flag all
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha-256
set security ipsec proposal ipsec_prop encryption-algorithm aes256-cbc
set security ipsec proposal ipsec_prop lifetime-seconds 3600
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn ipsec_vpn1 bind-interface st0.1
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class ef-class
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class af-class
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class res-class
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class web-data
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class control-data
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class voip-data
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class network-control
set security ipsec vpn ipsec_vpn1 multi-sa forwarding-class best-effort
set security ipsec vpn ipsec_vpn1 ike gateway IKE_GW1
set security ipsec vpn ipsec_vpn1 ike ipsec-policy ipsec_pol
set security ipsec vpn ipsec_vpn1 establish-tunnels immediately
set security ipsec vpn ipsec_vpn1 traffic-selector ipsec_vpn1_TS1 local-ip 203.0.113.2/25
set security ipsec vpn ipsec_vpn1 traffic-selector ipsec_vpn1_TS1 remote-ip 192.0.2.30/24
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Enable IPsec trace options.

```
[edit]
user@host# set security ipsec traceoptions flag all
```

2. Create an IPsec proposal.

```
[edit]
user@host# set security ipsec proposal ipsec_prop
```

3. Specify the IPsec proposal protocol.

```
[edit security ipsec proposal ipsec_prop]
user@host# set protocol esp
```

4. Specify the IPsec proposal authentication algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set authentication-algorithm hmac-sha-256
```

5. Specify the IPsec proposal encryption algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set encryption-algorithm aes256-cbc
```

6. Specify the lifetime (in seconds) of an IPsec security association (SA).

```
[set security ipsec proposal ipsec_prop]
user@host# set lifetime-seconds 3600
```

7. Create the IPsec policy.

```
[edit security ipsec]
user@host# set policy ipsec_pol
```

8. Specify the IPsec proposal reference.

```
[edit security ipsec policy ipsec_pol]
user@host# set proposals ipsec-prop
```

9. Specify the interface to bind.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 bind-interface st0.1
```

10. Configure the forwarding class to the multiple IPsec SA.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class ef-class
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class af-class
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class res-class
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class web-data
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class control-data
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class voip-data
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class network-control
user@host# set vpn ipsec_vpn1 multi-sa forwarding-class best-effort
```

11. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 ike gateway IKE_GW1
```

12. Specify the IPsec policies.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 ike ipsec-policy ipsec_pol
```

13. Specify that the tunnel be brought up immediately to negotiate IPsec SA when the first data packet arrives to be sent.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 establish-tunnels immediately
```

14. Configure local IP addresses for a traffic selector.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 traffic-selector ipsec_vpn1_TS1 local-ip 203.0.113.2/25
```

15. Configure remote IP addresses for a traffic selector.

```
[edit security ipsec]
user@host# set vpn ipsec_vpn1 traffic-selector ipsec_vpn1_TS1 remote-ip
192.0.2.30/24
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ipsec
traceoptions {
  flag all;
}
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-sha-256;
  encryption-algorithm aes256-cbc;
}
proposal ipsec-prop {
  lifetime-seconds 3600;
}
policy ipsec_pol {
  proposals ipsec_prop;
}
vpn ipsec_vpn1 {
  bind-interface st0.1;
  multi-sa {
    forwarding-class ef-class;
    forwarding-class af-class;
    forwarding-class res-class;
    forwarding-class web-data;
```

```

forwarding-class control-data;
forwarding-class voip-data;
forwarding-class network-control;
forwarding-class best-effort;
}
ike {
    gateway IKE_GW1;
    ipsec-policy ipsec_pol;
}
traffic-selector ipsec_vpn1_TS1 {
    local-ip 203.0.113.2/25;
    remote-ip 192.0.2.30/24;
}
establish-tunnels immediately;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security policies from-zone trust to-zone vpn policy vpn match source-address
sunnyvale
set security policies from-zone trust to-zone vpn policy vpn match destination-address
chicago
set security policies from-zone trust to-zone vpn policy vpn match application any
set security policies from-zone trust to-zone vpn policy vpn then permit
set security policies from-zone vpn to-zone trust policy vpn match source-address chicago
set security policies from-zone vpn to-zone trust policy vpn match destination-address
sunnyvale
set security policies from-zone vpn to-zone trust policy vpn match application any
set security policies from-zone vpn to-zone trust policy vpn then permit

```



NOTE: Enable security policies trace options for troubleshooting the policy-related issues.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the vpn zone.

```
[edit security policies from-zone trust to-zone vpn]
```

```
user@host# set policy vpn match source-address sunnyvale
user@host# set policy vpn match destination-address chicago
user@host# set policy vpn match application any
user@host# set policy vpn then permit
```

2. Create the security policy to permit traffic from the vpn zone to the trust zone.

```
[edit security policies from-zone vpn to-zone trust]
user@host# set policy vpn match source-address chicago
user@host# set policy vpn match destination-address sunnyvale
user@host# set policy vpn match application any
user@host# set policy vpn then permit
```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security policies
from-zone trust to-zone vpn {
  policy vpn {
    match {
      source-address sunnyvale;
      destination-address chicago;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone vpn to-zone trust {
  policy vpn {
    match {
      source-address chicago;
      destination-address sunnyvale;
      application any;
    }
    then {
      permit;
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IPsec Security Associations on page 563](#)

Verifying IPsec Security Associations

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index 131073 detail** and **show security ipsec statistics index 131073** commands.

For brevity, the show command outputs does not display all the values of the configuration. Only a subset of the configuration is displayed. Rest of the configuration on the system has been replaced with ellipses (...).

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 2      Total Ipsec sas: 18
ID   Algorithm      SPI      Life:sec/kb Mon lsys Port Gateway
<131073 ESP:aes256/sha256 2d8e710b 1949/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 5f3a3239 1949/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 5d227e19 1949/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 5490da 1949/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 211fb8bc 1949/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 dde29cd0 1949/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 49b64080 1949/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 314afea0 1949/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 fec6f6ea 1949/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 428a3a0d 1949/ unlim - root 500 5.0.0.1
...
```

```
user@host> show security ipsec security-associations index 131073 detail
```

```
ID: 131073 Virtual-system: root, VPN Name: IPSEC_VPN1
Local Gateway: 4.0.0.1, Remote Gateway: 5.0.0.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1
Port: 500, Nego#: 18, Fail#: 0, Def-Del#: 0 Flag: 0x600a39
Multi-sa, Configured SAs# 9, Negotiated SAs#: 9
Tunnel events:
  Mon Apr 23 2018 22:20:54 -0700: IPsec SA negotiation successfully completed
(1 times)
  Mon Apr 23 2018 22:20:54 -0700: IKE SA negotiation successfully completed (2
times)
  Mon Apr 23 2018 22:20:18 -0700: User cleared IKE SA from CLI, corresponding
```

```

IPSec SAs cleared (1 times)
  Mon Apr 23 2018 22:19:55 -0700: IPSec SA negotiation successfully completed
(2 times)
  Mon Apr 23 2018 22:19:23 -0700: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Mon Apr 23 2018 22:19:23 -0700: Bind-interface's zone received. Information
updated (1 times)
  Mon Apr 23 2018 22:19:23 -0700: External interface's zone received. Information
updated (1 times)
  Direction: inbound, SPI: 2d8e710b, AUX-SPI: 0
    , VPN Monitoring: -
    Hard lifetime: Expires in 1930 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 1563 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
    Anti-replay service: counter-based enabled, Replay window size: 64
    Multi-sa FC Name: default
  Direction: outbound, SPI: 5f3a3239, AUX-SPI: 0
    , VPN Monitoring: -
    Hard lifetime: Expires in 1930 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 1563 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
    Anti-replay service: counter-based enabled, Replay window size: 64
    Multi-sa FC Name: default
  Direction: inbound, SPI: 5d227e19, AUX-SPI: 0
    , VPN Monitoring: -
    Hard lifetime: Expires in 1930 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 1551 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
    Anti-replay service: counter-based enabled, Replay window size: 64
    Multi-sa FC Name: best-effort
  Direction: outbound, SPI: 5490da, AUX-SPI: 0
    , VPN Monitoring: -
    Hard lifetime: Expires in 1930 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 1551 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
    Anti-replay service: counter-based enabled, Replay window size: 64
...

```

```

user@host> show security ipsec statistics index 131073

```

```

ESP Statistics:
  Encrypted bytes:          952
  Decrypted bytes:         588
  Encrypted packets:        7
  Decrypted packets:        7
AH Statistics:
  Input bytes:              0
  Output bytes:             0
  Input packets:            0
  Output packets:           0

```



```

Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
FC Name      Encrypted Pkts  Decrypted Pkts  Encrypted bytes  Decrypted bytes
best-effort  7                7                952              588
custom_q1    0                0                0                0
custom_q2    0                0                0                0
network-control 0                0                0                0
custom_q4    0                0                0                0
custom_q5    0                0                0                0
custom_q6    0                0                0                0
custom_q7    0                0                0                0
default      0                0                0                0

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 131073. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500.
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 1949/ unlim value indicates that the Phase lifetime expires in 1949 seconds, and that no lifesize has been specified, which indicates that it is unlimited.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.

The **show security ike security-associations index 131073 detail** command lists additional information about the SA with an index number of 131073:

- The local identity and remote identity make up the proxy ID for the SA. A proxy ID mismatch is one of the most common causes for a Phase failure. If no IPsec SA is listed, confirm that Phase proposals, including the proxy ID settings, are correct for both peers.
- Displays all the child SA details including forwarding class name.

The **show security ipsec statistics index 131073** command lists statistics for each forwarding class name.

- An error value of zero in the output indicates a normal condition.

- We recommend running this command multiple times to observe any packet loss issues across a VPN. Output from this command also displays the statistics for encrypted and decrypted packet counters, error counters, and so on.
- You must enable security flow trace options to investigate which ESP packets are experiencing errors and why.

- See Also**
- [Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs on page 539](#)
 - [Understanding Traffic Selectors and CoS-Based IPsec VPNs on page 542](#)
 - [IPsec VPN Overview on page 31](#)
 - [Example: Configuring a Policy-Based VPN on page 518](#)
 - [Understanding Internet Key Exchange Version 2 on page 132](#)

- Related Documentation**
- *Class of Service Feature Guide for Security Devices*

CHAPTER 5

Configuring VPNs with NAT-T

- [Route-Based and Policy-Based VPNs with NAT-T on page 567](#)

Route-Based and Policy-Based VPNs with NAT-T

Network Address Translation-Traversal (NAT-T) is a method used for managing IP address translation-related issues encountered when the data protected by IPsec passes through a device configured with NAT for address translation.

- [Understanding NAT-T on page 567](#)
- [Example: Configuring a Route-Based VPN with Only the Responder Behind a NAT Device on page 568](#)
- [Example: Configuring a Policy-Based VPN with Both an Initiator and a Responder Behind a NAT Device on page 599](#)
- [Example: Configuring NAT-T with Dynamic Endpoint VPN on page 629](#)

Understanding NAT-T

Network Address Translation-Traversal (NAT-T) is a method for getting around IP address translation issues encountered when data protected by IPsec passes through a NAT device for address translation. Any changes to the IP addressing, which is the function of NAT, causes IKE to discard packets. After detecting one or more NAT devices along the datapath during Phase 1 exchanges, NAT-T adds a layer of User Datagram Protocol (UDP) encapsulation to IPsec packets so they are not discarded after address translation. NAT-T encapsulates both IKE and ESP traffic within UDP with port 4500 used as both the source and destination port. Because NAT devices age out stale UDP translations, keepalive messages are required between the peers.

There are two broad categories of NAT:

- Static NAT, where there is a one-to-one relationship between the private and public addresses. Static NAT works in both inbound and outbound directions.
- Dynamic NAT, where there is a many-to-one or many-to-many relationship between the private and public addresses. Dynamic NAT works in the outbound direction only.

The location of a NAT device can be such that:

- Only the IKEv1 or IKEv2 initiator is behind a NAT device. Multiple initiators can be behind separate NAT devices. Initiators can also connect to the responder through multiple NAT devices.
- Only the IKEv1 or IKEv2 responder is behind a NAT device.
- Both the IKEv1 or IKEv2 initiator and the responder are behind a NAT device.

Dynamic endpoint VPN covers the situation where the initiator's IKE external address is not fixed and is therefore not known by the responder. This can occur when the initiator's address is dynamically assigned by an ISP or when the initiator's connection crosses a dynamic NAT device that allocates addresses from a dynamic address pool.

Configuration examples for NAT-T are provided for the topology in which only the responder is behind a NAT device and the topology in which both the initiator and responder are behind a NAT device. Site-to-site IKE gateway configuration for NAT-T is supported on both the initiator and responder. A remote IKE ID is used to validate a peer's local IKE ID during Phase 1 of IKE tunnel negotiation. Both the initiator and responder require a **local-identity** and a **remote-identity** setting.

On SRX5400, SRX5600, and SRX5800 devices, the IPsec NAT-T tunnel scaling and sustaining issues are as follows:

- For a given private IP address, the NAT device should translate both 500 and 4500 private ports to the same public IP address.
- The total number of tunnels from a given public translated IP cannot exceed 1000 tunnels.

See Also • [IPsec VPN Overview on page 31](#)

Example: Configuring a Route-Based VPN with Only the Responder Behind a NAT Device

This example shows how to configure a route-based VPN with a responder behind a NAT device to allow data to be securely transferred between a branch office and the corporate office.

- [Requirements on page 568](#)
- [Overview on page 568](#)
- [Configuration on page 573](#)
- [Verification on page 592](#)

Requirements

Before you begin, read "[IPsec VPN Overview](#)" on page 31.

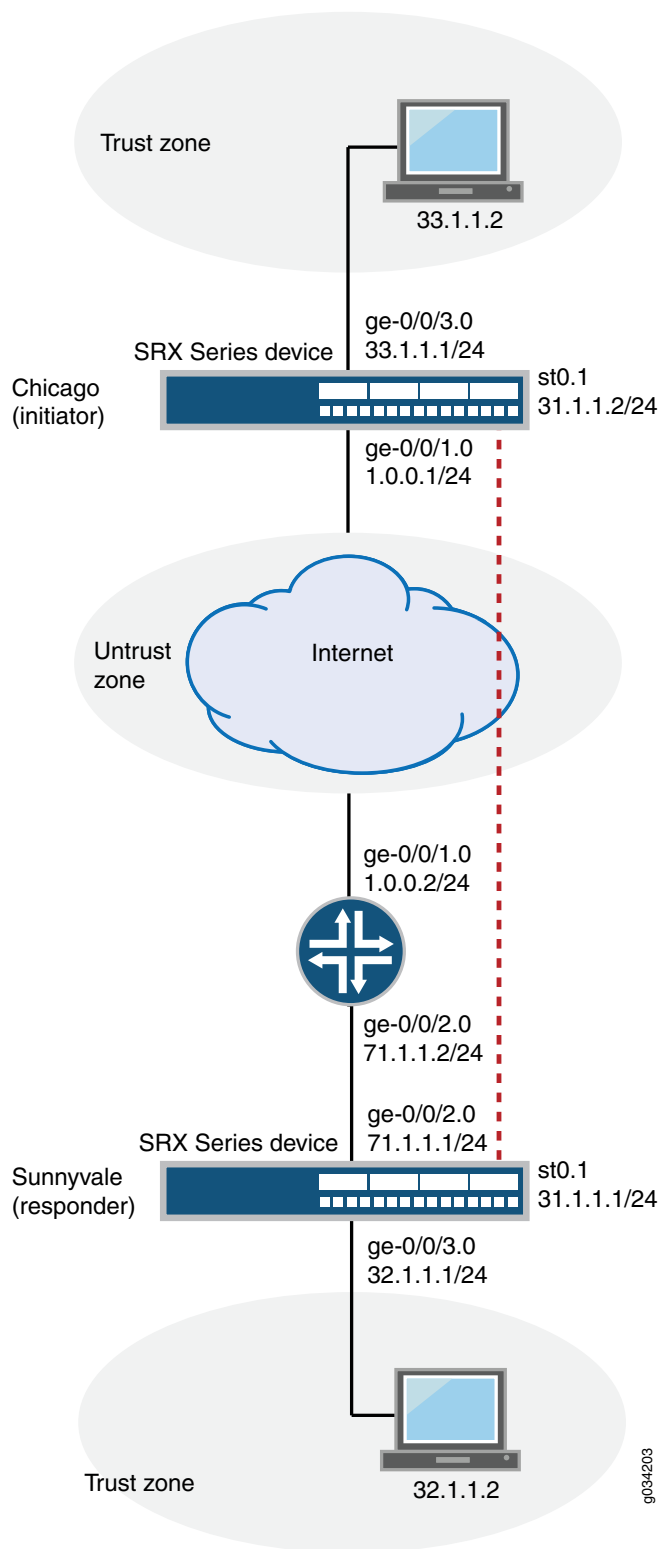
Overview

In this example, you configure a route-based VPN for a branch office in Chicago, Illinois, because you want to conserve tunnel resources but still get granular restrictions on VPN

traffic. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

[Figure 36 on page 570](#) shows an example of a topology for route-based VPN with only the responder behind a NAT device.

Figure 36: Route-Based VPN Topology with Only the Responder Behind a NAT Device



In this example, you configure interfaces, routing options, security zones, and security policies for both an initiator in Chicago and a responder in Sunnyvale. Then you configure IKE Phase 1 and IPsec Phase 2 parameters.

Packets sent from the initiator with a destination address 1.1.1.1/32 are translated to the destination address 71.1.1.1/32 on the NAT device.

See [Table 61 on page 571](#) through [Table 63 on page 572](#) for specific configuration parameters used for the initiator in the examples.

Table 61: Interface, Routing Options, Zones, and Security Policies for the Initiator

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/1	1.0.0.1/24
	ge-0/0/3	33.1.1.1/24
	st0.1 (tunnel interface)	31.1.1.2/24
Static routes	32.1.1.0/24	The next hop is st0.1.
	1.1.1.1/32	The next hop is 1.0.0.2.
Security zones	untrust	<ul style="list-style-type: none"> Only IKE system service is allowed. The ge-0/0/1.0 and the st0.1 interfaces are bound to this zone.
	trust	<ul style="list-style-type: none"> All system services are allowed. All protocols are allowed. The ge-0/0/3.0 interface is bound to this zone.
Security policies	to-sunnyvale	Permit traffic from 33.1.1.1/24 in the trust zone to 32.1.1.1/24 in the untrust zone.
	from-sunnyvale	Permit traffic from 32.1.1.1/24 in the untrust zone to 33.1.1.1/24 in the trust zone.

Table 62: IKE Phase 1 Configuration Parameters for the Initiator

Feature	Name	Configuration Parameters
Proposal	ike_prop	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: 3des-cbc
Policy	ike_pol	<ul style="list-style-type: none"> Mode: main Proposal reference: ike_prop IKE Phase 1 policy authentication method: pre-shared-key ascii-text

Table 62: IKE Phase 1 Configuration Parameters for the Initiator (continued)

Feature	Name	Configuration Parameters
Gateway	gw1	<ul style="list-style-type: none"> IKE policy reference: ike_pol External interface: ge-0/0/1.0 Gateway address: 1.1.1.1 Local peer (initiator): branch_natt1@example.net Remote peer (responder): responder_natt1@example.net

Table 63: IPsec Phase 2 Configuration Parameters for the Initiator

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: 3des-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop Perfect forward secrecy (PFS) keys: group2
VPN	vpn1	<ul style="list-style-type: none"> IKE gateway reference: gw1 IPsec policy reference: ipsec_pol Bind to interface: st0.1 Establish tunnels immediately

See [Table 64 on page 572](#) through [Table 66 on page 573](#) for specific configuration parameters used for the responder in the examples.

Table 64: Interface, Routing Options, Zones, and Security Policies for the Responder

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/2	71.1.1.1/24
	ge-0/0/3	32.1.1.1/24
	st0.1 (tunnel interface)	31.1.1.1/24
Static routes	0.0.0.0/0 (default route)	The next hop is 71.1.1.2.
	33.1.1.0/24	The next hop is st0.1.
Security zones	untrust	<ul style="list-style-type: none"> Only IKE system service is allowed. The ge-0/0/2.0 and the st0.1 interfaces are bound to this zone.
	trust	<ul style="list-style-type: none"> All system services are allowed. All protocols are allowed. The ge-0/0/3.0 interface is bound to this zone.

Table 64: Interface, Routing Options, Zones, and Security Policies for the Responder (continued)

Feature	Name	Configuration Parameters
Security policies	to-chicago	Permit traffic from 32.1.1.1/24 in the trust zone to 33.1.1.1/24 in the untrust zone.
	from-chicago	Permit traffic from 33.1.1.1/24 in the untrust zone to 32.1.1.1/24 in the trust zone.

Table 65: IKE Phase 1 Configuration Parameters for the Responder

Feature	Name	Configuration Parameters
Proposal	ike_prop	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: 3des-cbc
Policy	ike_pol	<ul style="list-style-type: none"> Mode: main Proposal reference: ike_prop IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gw1	<ul style="list-style-type: none"> IKE policy reference: ike_pol External interface: ge-0/0/2.0 Gateway address: 1.0.0.1 Local peer (responder): responder_natt1@example.net Remote peer (initiator): branch_natt1@example.net

Table 66: IPsec Phase 2 Configuration Parameters for the Responder

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: 3des-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop PFS keys: group2
VPN	vpn1	<ul style="list-style-type: none"> IKE gateway reference: gw1 IPsec policy reference: ipsec_pol Bind to interface: st0.1 Establish tunnels immediately

Configuration

- [Configuring Interface, Routing Options, Security Zones, and Security Policies for the Initiator on page 574](#)
- [Configuring IKE for the Initiator on page 578](#)

- [Configuring IPsec for the Initiator on page 581](#)
- [Configuring Interfaces, Routing Options, Security Zones, and Security Policies for the Responder on page 583](#)
- [Configuring IKE for the Responder on page 587](#)
- [Configuring IPsec for the Responder on page 590](#)

Configuring Interface, Routing Options, Security Zones, and Security Policies for the Initiator

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family inet address 1.0.0.1/24
set interfaces ge-0/0/3 unit 0 family inet address 33.1.1.1/24
set interfaces st0 unit 1 family inet address 31.1.1.2/24
set routing-options static route 32.1.1.0/24 next-hop st0.1
set routing-options static route 1.1.1.1/32 next-hop 1.0.0.2
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone untrust interfaces st0.1
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0
set security address-book book1 address Chicago-lan 33.1.1.1/24
set security address-book book1 attach zone trust
set security address-book book2 address Sunnyvale-lan 32.1.1.1/24
set security address-book book2 attach zone untrust
set security policies from-zone trust to-zone untrust policy to-sunnyvale match
  source-address Chicago-lan
set security policies from-zone trust to-zone untrust policy to-sunnyvale match
  destination-address Sunnyvale-lan
set security policies from-zone trust to-zone untrust policy to-sunnyvale match application
  any
set security policies from-zone trust to-zone untrust policy to-sunnyvale then permit
set security policies from-zone untrust to-zone trust policy from-sunnyvale match
  source-address Sunnyvale-lan
set security policies from-zone untrust to-zone trust policy from-sunnyvale match
  destination-address Chicago-lan
set security policies from-zone untrust to-zone trust policy from-sunnyvale match
  application any
set security policies from-zone untrust to-zone trust policy from-sunnyvale then permit
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interface, static route, security zone, and security policy information:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/1 unit 0 family inet address 1.0.0.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 33.1.1.1/24
user@host# set interfaces st0 unit 1 family inet address 31.1.1.2/24
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 32.1.1.0/24 next-hop st0.1
user@host# set routing-options static route 1.1.1.1/32 next-hop 1.0.0.2
```

3. Configure the untrust security zone.

```
[edit ]
user@host# set security zones security-zone untrust
```

4. Assign interfaces to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.1
```

5. Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@host# set security zones security-zone trust host-inbound-traffic protocols
all
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/3.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

9. Configure address books.

```
[edit security address-book]
```

```

user@host# set book1 address Chicago-lan 33.1.1.1/24
user@host# set book1 attach zone trust
user@host# set book2 address Sunnyvale-lan 32.1.1.1/24
user@host# set book2 attach zone untrust

```

10. Create security policies.

```

[edit security security-policies from-zone trust to-zone untrust]
user@host# set policy to-sunnyvale match source-address Chicago-lan
user@host# set policy to-sunnyvale match destination-address Sunnyvale-lan
user@host# set policy to-sunnyvale match application any
user@host# set policy to-sunnyvale then permit

[edit security security-policies from-zone untrust to-zone trust]
user@host# set policy from-sunnyvale match source-address Sunnyvale-lan
user@host# set policy from-sunnyvale match destination-address Chicago-lan
user@host# set policy from-sunnyvale match application any
user@host# set policy from-sunnyvale then permit

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, **show security address-book**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 1.0.0.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
    family inet {
      address 33.1.1.1/24;
    }
  }
}
st0 {
  unit 1 {
    family inet {
      address 31.1.1.2/24
    }
  }
}

```

```

[edit]
user@host# show routing-options

```

```
static {  
  route 32.1.1.0/24 next-hop st0.1;  
  route 1.1.1.1/32 next-hop 1.0.0.2;  
}
```

```
[edit]  
user@host# show security zones  
security-zone untrust {  
  host-inbound-traffic {  
    system-services {  
      ike;  
    }  
  }  
  interfaces {  
    st0.1;  
    ge-0/0/1.0;  
  }  
}  
security-zone trust {  
  host-inbound-traffic {  
    system-services {  
      all;  
    }  
    protocols {  
      all;  
    }  
  }  
  interfaces {  
    ge-0/0/3.0;  
  }  
} [edit]  
[edit]  
user@host# show security address-book  
book1 {  
  address Chicago-lan 33.1.1.1/24;  
  attach {  
    zone trust;  
  }  
}  
book2 {  
  address Sunnyvale-lan 32.1.1.1/24;  
  attach {  
    zone untrust;  
  }  
}  
[edit]  
user@host# show security policies  
from-zone trust to-zone untrust {  
  policy to-sunnyvale {  
    match {  
      source-address Chicago-lan;  
      destination-address Sunnyvale-lan;  
      application any;  
    }  
  }  
}
```

```

        then {
            permit;
        }
    }
}
from-zone untrust to-zone trust {
    policy from-sunnyvale {
        match {
            source-address Sunnyvale-lan;
            destination-address Chicago-lan;
            application any;
        }
        then {
            permit;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Initiator

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike_prop authentication-method pre-shared-keys
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm sha1
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_pol mode main
set security ike policy ike_pol proposals ike_prop
set security ike policy ike_pol pre-shared-key ascii-text "$ABC123"
set security ike gateway gw1 ike-policy ike_pol
set security ike gateway gw1 address 1.1.1.1
set security ike gateway gw1 local-identity user-at-hostname branch_natt1@example.net
set security ike gateway gw1 remote-identity user-at-hostname
responder_natt1@example.net
set security ike gateway gw1 external-interface ge-0/0/1.0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@host# set proposal ike_prop

```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike_prop]  
user@host# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike_prop]  
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike_prop]  
user@host# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike_prop]  
user@host# set encryption-algorithm 3des-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]  
user@host# set policy ike_pol
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike_pol]  
user@host# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike_pol]  
user@host# set proposals ike_prop
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike_pol]  
user@host# set pre-shared-key ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike gateway gw1]  
user@host# set external-interface ge-0/0/1.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway gw1]
user@host# set ike-policy ike_pol
```

12. Define the IKE Phase 1 gateway address.

```
[edit security ike gateway gw1]
user@host# set address 1.1.1.1
```

13. Set **local-identity** of the local peer.

```
[edit security ike gateway gw1]
user@host# set local-identity user-at-hostname branch_natt1@example.net
```

14. Set **remote-identity** of the responder. This is the IKE identifier.

```
[edit security ike gateway gw1]
user@host# set remote-identity user-at-hostname responder_natt1@example.net
```

15. Define the external interface.

```
[edit security ike gateway gw1]
user@host# set external-interface ge-0/0/1.0
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ike
proposal ike_prop {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm 3des-cbc;
}
policy ike_pol {
  mode main;
  proposals ike_prop;
  pre-shared-key ascii-text "$ABC123";
}
gateway gw1 {
  ike-policy ike_pol;
  address 1.1.1.1;
  local-identity user-at-hostname branch_natt1@example.net;
  remote-identity user-at-hostname responder_natt1@example.net;
  external-interface ge-0/0/1.0;
```



```
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Initiator

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec policy ipsec_pol perfect-forward-secrecy keys group2
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn vpn1 bind-interface st0.1
set security ipsec vpn vpn1 ike gateway gw1
set security ipsec vpn vpn1 ike ipsec-policy ipsec_pol
set security ipsec vpn vpn1 establish-tunnels immediately
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@host# set security ipsec proposal ipsec_prop
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security ipsec proposal ipsec_prop]
user@host# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set encryption-algorithm 3des-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set policy ipsec_pol
```

6. Specify IPsec Phase 2 to use perfect forward secrecy (PFS).

```
[edit security ipsec policy ipsec_pol]
user@host# set perfect-forward-secrecy keys group2
```

7. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec_pol]
user@host# set proposals ipsec_prop
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set vpn vpn1 ike gateway gw1
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn vpn1 ike ipsec-policy ipsec_pol
```

10. Specify the interface to bind.

```
[edit security ipsec]
user@host# set vpn vpn1 bind-interface st0.1
```

11. Specify that the tunnel be brought up immediately without waiting for a verification packet to be sent.

```
[edit security ipsec]
user@host# set vpn vpn1 establish-tunnels immediately
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ipsec
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm 3des-cbc;
}
```

```

policy ipsec_pol {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec_prop;
}
vpn vpn1 {
  bind-interface st0.1;
  ike {
    gateway gw1;
    ipsec-policy ipsec_pol;
  }
  establish-tunnels immediately;
}
proposals ipsec_prop;
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Interfaces, Routing Options, Security Zones, and Security Policies for the Responder

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/2 unit 0 family inet address 71.1.1.1/24
set interfaces ge-0/0/3 unit 0 family inet address 32.1.1.1/24
set interfaces st0 unit 1 family inet address 31.1.1.1/24
set routing-options static route 0.0.0.0/0 next-hop 71.1.1.2
set routing-options static route 33.1.1.0/24 next-hop st0.1
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone untrust interfaces ge-0/0/2.0
set security zones security-zone untrust interfaces st0.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0
set security address-book book1 address Sunnyvale-lan 32.1.1.1/24
set security address-book book1 attach zone trust
set security address-book book2 address Chicago-lan 33.1.1.1/24
set security address-book book2 attach zone untrust
set security policies from-zone trust to-zone untrust policy to-chicago match
  source-address Sunnyvale-lan
set security policies from-zone trust to-zone untrust policy to-chicago match
  destination-address Chicago-lan
set security policies from-zone trust to-zone untrust policy to-chicago match application
  any
set security policies from-zone trust to-zone untrust policy to-chicago then permit
set security policies from-zone untrust to-zone trust policy from-chicago match
  source-address Chicago-lan

```

```
set security policies from-zone untrust to-zone trust policy from-chicago match
destination-address Sunnyvale-lan
set security policies from-zone untrust to-zone trust policy from-chicago match application
any
set security policies from-zone untrust to-zone trust policy from-chicago then permit
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interface, static route, security zones, policies and gateways:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/2 unit 0 family inet address 71.1.1.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 32.1.1.1/24
user@host# set interfaces st0 unit 1 family inet address 31.1.1.1/24
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 71.1.1.2
user@host# set routing-options static route 33.1.1.0/24 next-hop st0.1
```

3. Configure the untrust security zone.

```
[edit ]
user@host# set security zones security-zone untrust
```

4. Assign interfaces to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set security zones security-zone untrust interfaces ge-0/0/2.0
user@host# set security zones security-zone untrust interfaces st0.1
```

5. Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
```

6. Configure the trust security zone.

```
[edit]
user@host# set security zones security-zone trust host-inbound-traffic protocols
all
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/3.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

9. Configure address books.

```
[edit security address-book]
user@host# set book1 address Sunnyvale-lan 32.1.1.1/24
user@host# set book1 attach zone trust
user@host# set book2 address Chicago-lan 33.1.1.1/24
user@host# set book2 attach zone untrust
```

10. Create security policies.

```
[edit security security-policies from-zone trust to-zone untrust]
user@host# set policy to-chicago match source-address Sunnyvale-lan
user@host# set policy to-chicago match destination-address Chicago-lan
user@host# set policy to-chicago match application any
user@host# set policy to-chicago then permit

[edit security security-policies from-zone untrust to-zone trust]
user@host# set policy from-chicago match source-address Chicago-lan
user@host# set policy from-chicago match destination-address Sunnyvale-lan
user@host# set policy from-chicago match application any
user@host# set policy from-chicago then permit
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, **show security address-book**, and **show security policies** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/2 {
  unit 0 {
    family inet {
      address 71.1.1.1/24;
    }
  }
}
ge-0/0/3 {
  unit 0 {
```

```
family inet {  
    address 32.1.1.1/24;  
}  
}  
st0 {  
    unit 1 {  
        family inet {  
            address 31.1.1.1/24  
        }  
    }  
}
```

```
[edit]  
user@host# show routing-options  
static {  
    route 0.0.0.0/0 next-hop 71.1.1.2;  
    route 33.1.1.0/24 next-hop st0.1;  
}
```

```
[edit]  
user@host# show security zones  
security-zone untrust {  
    host-inbound-traffic {  
        system-services {  
            ike;  
        }  
    }  
    interfaces {  
        ge-0/0/2.0;  
        st0.1;  
    }  
}  
security-zone trust {  
    host-inbound-traffic {  
        system-services {  
            all;  
        }  
        protocols {  
            all;  
        }  
    }  
    interfaces {  
        ge-0/0/3.0;  
    }  
}  
[edit]  
user@host# show security address-book  
book1 {  
    address Sunnyvale-lan 32.1.1.1/24;  
    attach {  
        zone trust;  
    }  
}
```

```

book2 {
    address Chicago-lan 33.1.1.1/24;
    attach {
        zone untrust;
    }
}
[edit]
user@host# show security policies
from-zone trust to-zone untrust {
    policy to-chicago {
        match {
            source-address Sunnyvale-lan;
            destination-address Chicago-lan;
            application any;
        }
        then {
            permit;
        }
    }
}
from-zone untrust to-zone trust {
    policy from-chicago {
        match {
            source-address Chicago-lan;
            destination-address Sunnyvale-lan;
            application any;
        }
        then {
            permit;
        }
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Responder

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike_prop authentication-method pre-shared-keys
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm sha1
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_pol mode main
set security ike policy ike_pol proposals ike_prop
set security ike policy ike_pol pre-shared-key ascii-text "$ABC123"
set security ike gateway gw1 ike-policy ike_pol
set security ike gateway gw1 address 1.0.0.1
set security ike gateway gw1 local-identity user-at-hostname
responder_natt1@example.net

```

```
set security ike gateway gw1 remote-identity user-at-hostname branch_natt1@example.net
set security ike gateway gw1 external-interface ge-0/0/2.0
```

**Step-by-Step
Procedure**

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```
[edit security ike]
user@host# set proposal ike_prop
```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ike_prop]
user@host# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ike_prop]
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike_prop]
user@host# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike_prop]
user@host# set encryption-algorithm 3des-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]
user@host# set policy ike_pol
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike_pol]
user@host# set mode main
```

8. Specify a reference to the IKE proposal.


```
[edit security ike policy ike_pol]
user@host# set proposals ike_prop
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike_pol]
user@host# set pre-shared-key ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike gateway gw1]
user@host# set external-interface ge-0/0/2.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway gw1]
user@host# set ike-policy ike_pol
```

12. Define the IKE Phase 1 gateway address.

```
[edit security ike gateway gw1]
user@host# set address 1.0.0.1
```

13. Set **local-identity** of the responder.

```
[edit security ike gateway gw1]
user@host# set local-identity user-at-hostname responder_natt1@example.net
```

14. Set **remote-identity** of the responder. This is the IKE identifier.

```
[edit security ike gateway gw1]
user@host# set remote-identity user-at-hostname branch_natt1@example.net
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ike
proposal ike_prop {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm 3des-cbc;
}
```

```

policy ike_pol {
  mode main;
  proposals ike_prop;
  pre-shared-key ascii-text "$ABC123";
}
gateway gw1 {
  ike-policy ike_pol;
  address 1.0.0.1;
  local-identity user-at-hostname "responder_natt1@example.net";
  remote-identity user-at-hostname "branch_natt1@example.net";
  external-interface ge-0/0/2.0;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Responder

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec policy ipsec_pol perfect-forward-secrecy keys group2
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn vpn1 bind-interface st0.1
set security ipsec vpn vpn1 ike gateway gw1
set security ipsec vpn vpn1 ike ipsec-policy ipsec_pol
set security ipsec vpn vpn1 establish-tunnels immediately

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```

[edit]
user@host# set security ipsec proposal ipsec_prop

```

2. Specify the IPsec Phase 2 proposal protocol.

```

[edit security ipsec proposal ipsec_prop]
user@host# set protocol esp

```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec_prop ]
user@host# set encryption-algorithm 3des-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set policy ipsec_pol
```

6. Specify IPsec Phase 2 to use perfect forward secrecy (PFS).

```
[edit security ipsec policy ipsec_pol]
user@host# set perfect-forward-secrecy keys group2
```

7. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec_pol]
user@host# set proposals ipsec_prop
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set security ipsec vpn vpn1 ike gateway gw1
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn vpn1 ike ipsec-policy ipsec_pol
```

10. Specify the interface to bind.

```
[edit security ipsec]
user@host# set vpn vpn1 bind-interface st0.1
```

11. Specify that the tunnel be brought up immediately without waiting for a verification packet to be sent.

```
[edit security ipsec]
user@host# set vpn vpn1 establish-tunnels immediately
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ipsec
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm 3des-cbc;
}
policy ipsec_pol {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec_prop;
}
vpn vpn1 {
  bind-interface st0.1;
  ike {
    gateway gw1;
    ipsec-policy ipsec_pol;
  }
  establish-tunnels immediately;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Phase 1 Status for the Initiator on page 592](#)
- [Verifying IPsec Security Associations for the Initiator on page 594](#)
- [Verifying the IKE Phase 1 Status for the Responder on page 595](#)
- [Verifying IPsec Security Associations for the Responder on page 597](#)

Verifying the IKE Phase 1 Status for the Initiator

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you must send traffic from a host in the 33.1.1.0 network to a host in the 32.1.1.0 network. For route-based VPNs, traffic can be initiated by the SRX Series device through the tunnel. We recommend that when testing IPsec tunnels, test traffic be sent from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate a ping operation from 33.1.1.2 to 32.1.1.2.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
106321	UP	d31d6833108fd69f	9ddfe2ce133086aa	Main	1.1.1.1

```
user@host> show security ike security-associations index 1 detail
```

```
IKE peer 1.1.1.1, Index
Initiator cookie: d31d6833108fd69f, Responder cookie: 9ddfe2ce133086aa
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 1.0.0.1:500, Remote: 1.1.1.1:500
Lifetime: Expires in 28785 seconds
Peer ike-id: responder_natt1@example.net
Xauth assigned IP: responder_natt1@example.net
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : 3des-cbc
Pseudo random function: hmac-sha1
Traffic statistics:
Input bytes  :          0
Output bytes :          0
Input packets:          0
Output packets:         0
Flags: IKE SA is created
IPsec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 0

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 1.0.0.1:500, Remote: 1.1.1.1:500
Local identity: branch_natt1@example.net
Remote identity: responder_natt1@example.net
Flags: IKE SA is created
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote address—Verify that the remote IP address is correct and that port 500 is being used for peer-to-peer communication.
- Role initiator state
 - Up—The Phase 1 SA has been established.
 - Down—There was a problem establishing the Phase 1 SA.
 - Both peers in the IPsec SA pair are using port 500.

- Peer IKE ID—Verify the remote address is correct.
- Local identity and remote identity—Verify these are correct.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations** command lists additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the Initiator

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<131073 ESP:3des/sha1  ac23df79  2532/ unlim  -   root 500  1.1.1.1
>131073 ESP:3des/sha1  cbc9281a  2532/ unlim  -   root 500  1.1.1.1
```

```
user@host> show security ipsec security-associations detail
```

```

Virtual-system: root
Local Gateway: 1.0.0.1, Remote Gateway: 1.1.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv1
DF-bit: clear
Direction: inbound, SPI: ac23df79, AUX-SPI: 0
                , VPN Monitoring: -
Hard lifetime: Expires in 3186 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2578 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: cbc9281a, AUX-SPI: 0
                , VPN Monitoring: -
Hard lifetime: Expires in 3186 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2578 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The remote gateway has a NAT address of 1.1.1.1.
- Both peers in the IPsec SA pair are using port 500.
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 2532/ unlim value indicates that the Phase 2 lifetime expires in 2532 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

Verifying the IKE Phase 1 Status for the Responder

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
5802591	UP	d31d6833108fd69f	9ddfe2ce133086aa	Main	1.0.0.1

```
user@host> show security ike security-associations index 1 detail
```

```
IKE peer 1.0.0.1, Index 5802591,
  Role: Responder, State: UP
  Initiator cookie: d31d6833108fd69f, Responder cookie: 9ddfe2ce133086aa
  Exchange type: Main, Authentication method: Pre-shared-keys
  Local: 71.1.1.1:500, Remote: 1.0.0.1:500
  Lifetime: Expires in 25704 seconds
  Peer ike-id: branch_natt1@example.net
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication      : hmac-sha1-96
    Encryption          : 3des-cbc
    Pseudo random function: hmac-sha1
  Traffic statistics:
    Input bytes  : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  Flags: IKE SA is created
  IPsec security associations: 8 created, 2 deleted
  Phase 2 negotiations in progress: 0

  Negotiation type: Quick mode, Role: Responder, Message ID: 0
  Local: 71.1.1.1:500, Remote: 1.0.0.1:500
  Local identity: responder_natt1@example.net
  Remote identity: branch_natt1@example.net
  Flags: IKE SA is created
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- **Index**—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- **Remote address**—Verify that the remote IP address is correct and that port 500 is being used for peer-to-peer communication.
- **Role responder state**
 - **Up**—The Phase 1 SA has been established.
 - **Down**—There was a problem establishing the Phase 1 SA.
 - **Peer IKE ID**—Verify the address is correct.
 - **Local identity and remote identity**—Verify these addresses are correct.
- **Mode**—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations** command lists additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the Responder

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
ID      Algorithm  SPI      Life:sec/kb  Mon vsys Port  Gateway
<131073 ESP:3des/sha1 a5224cd9 3571/ unlim -   root 500  1.0.0.1
>131073 ESP:3des/sha1 82a86a07 3571/ unlim -   root 500  1.0.0.1
```

```
user@host> show security ipsec security-associations detail
```

```
Virtual-system: root
Local Gateway: 71.1.1.1, Remote Gateway: 1.0.0.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv1
DF-bit: clear
Direction: inbound, SPI: a5224cd9, AUX-SPI: 0
```

```

, VPN Monitoring: -
Hard lifetime: Expires in 3523 seconds
Lifeseize Remaining: Unlimited
Soft lifetime: Expires in 2923 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: 82a86a07, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3523 seconds
Lifeseize Remaining: Unlimited
Soft lifetime: Expires in 2923 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The remote gateway has an ip address of 1.0.0.1.
- Both peers in the IPsec SA pair are using port 500.
- The SPIs, lifetime (in seconds), and usage limits (or lifeseize in KB) are shown for both directions. The 3571/ unlim value indicates that the Phase 2 lifetime expires in 3571 seconds, and that no lifeseize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index *index_id* detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a Phase 2 failure. If no IPsec SA is listed, confirm that Phase 2 proposals, including the proxy ID settings, are correct for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Another common reason for Phase 2 failure is not specifying the ST interface binding. If IPsec cannot complete, check the kmd log or set trace options.

See Also • [IPsec VPN Overview on page 31](#)

- [Example: Configuring a Policy-Based VPN on page 518](#)

Example: Configuring a Policy-Based VPN with Both an Initiator and a Responder Behind a NAT Device

This example shows how to configure a policy-based VPN with both an initiator and a responder behind a NAT device to allow data to be securely transferred between a branch office and the corporate office.

- [Requirements on page 599](#)
- [Overview on page 599](#)
- [Configuration on page 604](#)
- [Verification on page 622](#)

Requirements

Before you begin, read [“IPsec VPN Overview” on page 31](#).

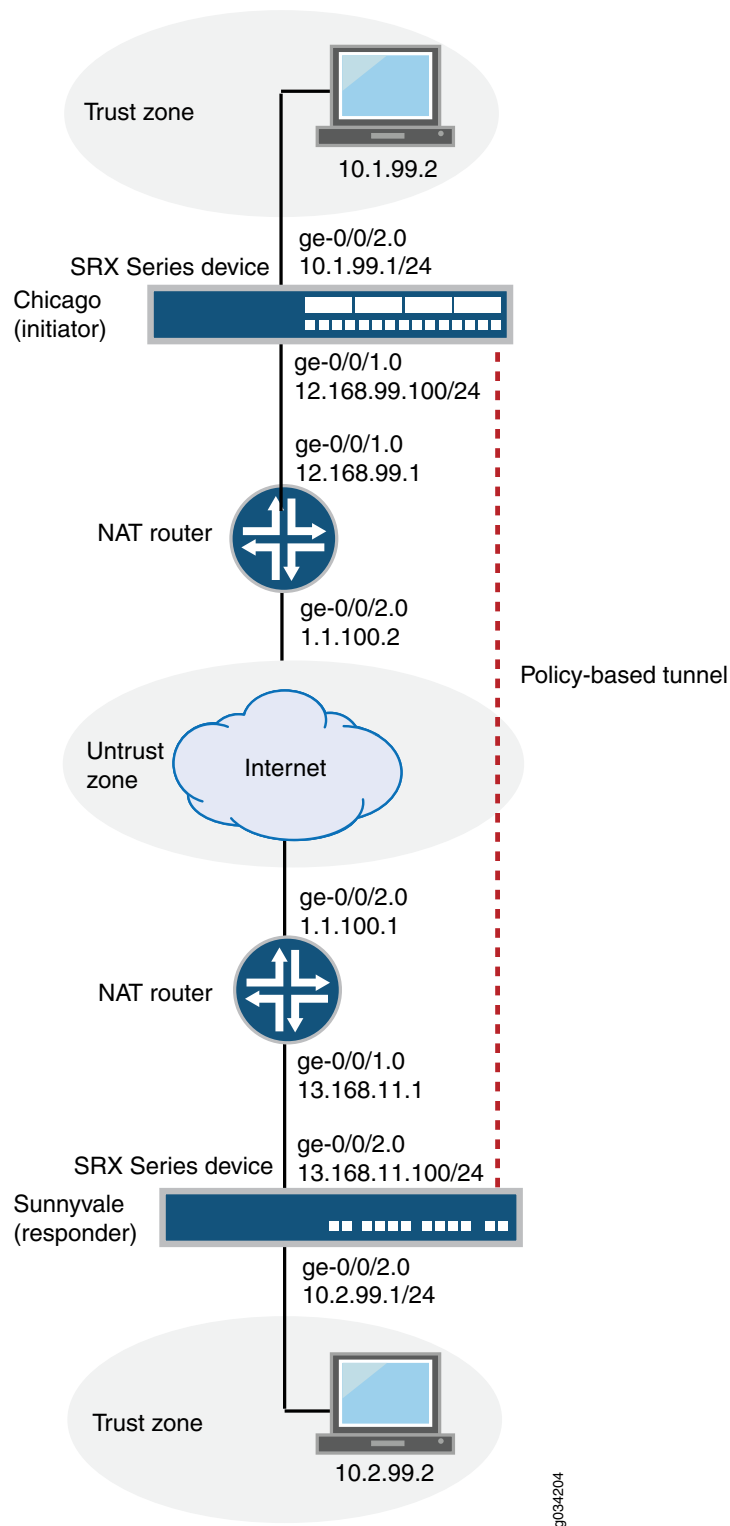
Overview

In this example, you configure a policy-based VPN for a branch office in Chicago, Illinois, because you want to conserve tunnel resources but still get granular restrictions on VPN traffic. Users in the branch office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

In this example, you configure interfaces, routing options, security zones, security policies for both an initiator and a responder.

[Figure 37 on page 600](#) shows an example of a topology for a VPN with both an initiator and a responder behind a NAT device.

Figure 37: Policy-Based VPN Topology with Both an Initiator and a Responder Behind a NAT Device



In this example, you configure interfaces, an IPv4 default route, and security zones. Then you configure IKE Phase 1, including local and remote peers, IPsec Phase 2, and the security policy. Note in the example above, the responder's private IP address 13.168.11.1 is hidden by the NAT device and mapped to public IP address 1.1.100.1.

See [Table 67 on page 601](#) through [Table 70 on page 602](#) for specific configuration parameters used for the initiator in the examples.

Table 67: Interface, Routing Options, and Security Zones for the Initiator

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/1	12.168.99.100/24
	ge-0/0/2	10.1.99.1/24
Static routes	10.2.99.0/24 (default route)	The next hop is 12.168.99.1.
	13.168.11.0/24	The next hop is 12.168.99.1.
	1.1.100.0/24	12.168.99.1
Security zones	trust	<ul style="list-style-type: none"> • All system services are allowed. • All protocols are allowed. • The ge-0/0/2.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> • All system services are allowed. • All protocols are allowed. • The ge-0/0/1.0 interface is bound to this zone.

Table 68: IKE Phase 1 Configuration Parameters for the Initiator

Feature	Name	Configuration Parameters
Proposal	ike_prop	<ul style="list-style-type: none"> • Authentication method: pre-shared-keys • Diffie-Hellman group: group2 • Authentication algorithm: md5 • Encryption algorithm: 3des-cbc
Policy	ike_pol	<ul style="list-style-type: none"> • Mode: main • Proposal reference: ike_prop • IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gate	<ul style="list-style-type: none"> • IKE policy reference: ike_pol • External interface: ge-0/0/1.0 • Gateway address: 1.1.100.23 • Local peer is hostname chicago • Remote peer is hostname sunnyvale

Table 69: IPsec Phase 2 Configuration Parameters for the Initiator

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-md5-96 Encryption algorithm: 3des-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop Perfect forward secrecy (PFS): group1
VPN	first_vpn	<ul style="list-style-type: none"> IKE gateway reference: gate IPsec policy reference: ipsec_pol

Table 70: Security Policy Configuration Parameters for the Initiator

Purpose	Name	Configuration Parameters
The security policy permits tunnel traffic from the trust zone to the untrust zone.	pol1	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any destination-address any application any Action: permit tunnel ipsec-vpn first_vpn
The security policy permits tunnel traffic from the untrust zone to the trust zone.	pol1	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any destination-address any application any Action: permit tunnel ipsec-vpn first_vpn

See [Table 71 on page 602](#) through [Table 74 on page 604](#) for specific configuration parameters used for the responder in the examples.

Table 71: Interface, Routing Options, and Security Zones for the Responder

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/2	13.168.11.100/24
	ge-0/0/3	10.2.99.1/24
Static routes	10.1.99.0/24 (default route)	The next hop is 13.168.11.1.
	12.168.99.0/24	The next hop is 13.168.11.1.
	1.1.100.0/24	13.168.11.1

Table 71: Interface, Routing Options, and Security Zones for the Responder (continued)

Feature	Name	Configuration Parameters
Security zones	trust	<ul style="list-style-type: none"> All system services are allowed. All protocols are allowed. The ge-0/0/3.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> All system services are allowed. All protocols are allowed. The ge-0/0/2.0 interface is bound to this zone.

Table 72: IKE Phase 1 Configuration Parameters for the Responder

Feature	Name	Configuration Parameters
Proposal	ike_prop	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: md5 Encryption algorithm: 3des-cbc
Policy	ike_pol	<ul style="list-style-type: none"> Mode: main Proposal reference: ike_prop IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gate	<ul style="list-style-type: none"> IKE policy reference: ike_pol External interface: ge-0/0/2.0 Gateway address: 1.1.100.22 Always send dead-peer detection Local peer is hostname sunnyvale Remote peer is hostname chicago

Table 73: IPsec Phase 2 Configuration Parameters for the Responder

Feature	Name	Configuration Parameters
Proposal	ipsec_prop	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-md5-96 Encryption algorithm: 3des-cbc
Policy	ipsec_pol	<ul style="list-style-type: none"> Proposal reference: ipsec_prop Perfect forward secrecy (PFS): group1
VPN	first_vpn	<ul style="list-style-type: none"> IKE gateway reference: gate IPsec policy reference: ipsec_pol Establish tunnels immediately

Table 74: Security Policy Configuration Parameters for the Responder

Purpose	Name	Configuration Parameters
The security policy permits tunnel traffic from the trust zone to the untrust zone.	pol1	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any destination-address any application any Action: permit tunnel ipsec-vpn first_vpn
The security policy permits tunnel traffic from the untrust zone to the trust zone.	pol1	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any destination-address any application any Action: permit tunnel ipsec-vpn first_vpn

Configuration

- [Configuring Interface, Routing Options, and Security Zones for the Initiator on page 604](#)
- [Configuring IKE for the Initiator on page 607](#)
- [Configuring IPsec for the Initiator on page 609](#)
- [Configuring Security Policies for the Initiator on page 611](#)
- [Configuring Interface, Routing Options, and Security Zones for the Responder on page 613](#)
- [Configuring IKE for the Responder on page 615](#)
- [Configuring IPsec for the Responder on page 618](#)
- [Configuring Security Policies for the Responder on page 620](#)

Configuring Interface, Routing Options, and Security Zones for the Initiator

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
[edit]
set interfaces ge-0/0/1 unit 0 family inet address 12.168.99.100/24
set interfaces ge-0/0/2 unit 0 family inet address 10.1.99.1/24
set routing-options static route 10.2.99.0/24 next-hop 12.168.99.1
set routing-options static route 13.168.11.0/24 next-hop 12.168.99.1
set routing-options static route 1.1.100.0/24 next-hop 12.168.99.1
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/2.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0
```


Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interfaces, static routes, and security zones:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/1 unit 0 family inet address 12.168.99.100/24
user@host# set interfaces ge-0/0/2 unit 0 family inet address 10.1.99.1/24
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 10.2.99.0/24 next-hop 12.168.99.1
user@host# set routing-options static route 13.168.11.0/24 next-hop 12.168.99.1
```

3. Configure the trust security zone.

```
[edit ]
user@host# set security zones security-zone trust host-inbound-traffic protocols
all
```

4. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/2.0
```

5. Specify system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

6. Configure the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic protocols all
```

7. Assign an interface to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/1.0
```

8. Specify system services for the untrust security zone.

```
[edit security zones security-zone untrust]
```

```
user@host# set host-inbound-traffic system-services all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 12.168.99.100/24;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 10.1.99.1/24;
    }
  }
}
```

```
[edit]
user@host# show routing-options
static {
  route 10.2.99.0/24 next-hop 12.168.99.1;
  route 13.168.11.0/24 next-hop 12.168.99.1;
  route 1.1.100.0/24 next-hop 12.168.99.1;
}
```

```
[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/1.0.;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
  }
}
```

```

    }
    protocols {
    all;
    }
  }
  interfaces {
    ge-0/0/2.0;
  }

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Initiator

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike_prop authentication-method pre-shared-keys
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm md5
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_pol mode main
set security ike policy ike_pol proposals ike_prop
set security ike policy ike_pol pre-shared-key ascii-text "$ABC123"
set security ike gateway gate ike-policy ike_pol
set security ike gateway gate address 1.1.100.23
set security ike gateway gate external-interface ge-0/0/1.0
set security ike gateway gate local-identity hostname chicago
set security ike gateway gate remote-identity hostname sunnyvale

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@host# set proposal ike_prop

```

2. Define the IKE proposal authentication method.

```

[edit security ike proposal ike_prop]
user@host# set authentication-method pre-shared-keys

```

3. Define the IKE proposal Diffie-Hellman group.

```

[edit security ike proposal ike_prop]

```

```
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ike_prop]  
user@host# set authentication-algorithm md5
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ike_prop]  
user@host# set encryption-algorithm 3des-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike policy ]  
user@host# set policy ike_pol
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike_pol]  
user@host# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike_pol]  
user@host# set proposals ike_prop
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike_pol pre-shared-key]  
user@host# set ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike ]  
user@host# set gateway gate external-interface ge-0/0/1.0
```

11. Create an IKE Phase 1 gateway address.

```
[edit security ike gateway]  
set gate address 1.1.100.23
```

12. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway]
set gate ike-policy ike_pol
```

13. Set **local-identity** for the local peer.

```
[edit security ike gateway gate]
user@host# set local-identity hostname chicago
```

14. Set **remote-identity** for the responder. This is the responder's local identity.

```
[edit security ike gateway gate ]
user@host# set remote-identity hostname sunnyvale
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ike
proposal ike_prop {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm md5;
  encryption-algorithm 3des-cbc;
}
policy ike_pol {
  mode main;
  proposals ike_prop;
  pre-shared-key ascii-text "$ABC123";
}
gateway gate {
  ike-policy ike_pol;
  address 1.1.100.23;
  local-identity hostname chicago;
  remote-identity hostname sunnyvale;
  external-interface ge-0/0/1.0;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Initiator

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec_prop protocol esp
```

```

set security ipsec proposal ipsec_prop authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec policy ipsec_pol perfect-forward-secrecy keys group1
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn first_vpn ike gateway gate
set security ipsec vpn first_vpn ike ipsec-policy ipsec_pol

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```

[edit]
user@host# set security ipsec proposal ipsec_prop

```

2. Specify the IPsec Phase 2 proposal protocol.

```

[edit security ipsec proposal ipsec_prop]
user@host# set protocol esp

```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```

[edit security ipsec proposal ipsec_prop]
user@host# set authentication-algorithm hmac-md5-96

```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```

[edit security ipsec proposal ipsec_prop]
user@host# set encryption-algorithm 3des-cbc

```

5. Specify the IPsec Phase 2 proposal reference.

```

[edit security ipsec policy ipsec_pol]
user@host# set proposals ipsec_prop

```

6. Specify IPsec Phase 2 to use perfect forward secrecy (PFS) group1.

```

[edit security ipsec policy ipsec_pol ]
user@host# set perfect-forward-secrecy keys group1

```

7. Specify the IKE gateway.

```

[edit security ipsec]
user@host# set vpn first_vpn ike gateway gate

```

8. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn first_vpn ike ipsec-policy ipsec_pol
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ipsec
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm 3des-cbc;
}
policy ipsec_pol {
  perfect-forward-secrecy {
    keys group1;
    proposals ipsec_prop;
  }
}
vpn first_vpn {
  ike {
    gateway gate;
    ipsec-policy ipsec_pol;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies for the Initiator

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone untrust policy pol1 match source-address
any
set security policies from-zone trust to-zone untrust policy pol1 match destination-address
any
set security policies from-zone trust to-zone untrust policy pol1 match application any
set security policies from-zone trust to-zone untrust policy pol1 then permit tunnel
ipsec-vpn first_vpn
set security policies from-zone untrust to-zone trust policy pol1 match source-address
any
set security policies from-zone untrust to-zone trust policy pol1 match destination-address
any
set security policies from-zone untrust to-zone trust policy pol1 match application any
```

```
set security policies from-zone untrust to-zone trust policy pol1 then permit tunnel
ipsec-vpn first_vpn
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the untrust zone.

```
[edit security policies from-zone trust to-zone untrust]
user@host# set policy pol1 match source-address any
user@host# set policy pol1 match destination-address any
user@host# set policy pol1 match application any
user@host# set policy pol1 then permit tunnel ipsec-vpn first_vpn
```

2. Create the security policy to permit traffic from the untrust zone to the trust zone.

```
[edit security policies from-zone untrust to-zone trust]
user@host# set policy pol1 match source-address any
user@host# set policy pol1 match destination-address any
user@host# set policy pol1 match application any
user@host# set policy pol1 then permit tunnel ipsec-vpn first_vpn
```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security policies
from-zone trust to-zone untrust {
  policy pol1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
      tunnel {
        ipsec-vpn first_vpn;
      }
    }
  }
}
from-zone untrust to-zone trust {
  policy pol1 {
    match {
      source-address any;
      destination-address any;
```



```

    application any;
  }
  then {
    permit;
    tunnel {
      ipsec-vpn first_vpn;
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Interface, Routing Options, and Security Zones for the Responder

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/2 unit 0 family inet address 13.168.11.100/24
set interfaces ge-0/0/3 unit 0 family inet address 10.2.99.1/24
set routing-options static route 10.1.99.0/24 next-hop 13.168.11.1
set routing-options static route 12.168.99.0/24 next-hop 13.168.11.1
set routing-options static route 1.1.100.0/24 next-hop 13.168.11.1
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/2.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/3.0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure interfaces, static routes, security zones, and security policies:

1. Configure Ethernet interface information.

```

[edit]
user@host# set interfaces ge-0/0/2 unit 0 family inet address 13.168.11.100/24
user@host# set interfaces ge-0/0/3 unit 0 family inet address 10.2.99.1/24

```

2. Configure static route information.

```

[edit]
user@host# set routing-options static route 10.1.99.0/24 next-hop 13.168.11.1
user@host# set routing-options static route 12.168.99.0/24 next-hop 13.168.11.1
user@host# set routing-options static route 1.1.100.0/24 next-hop 13.168.11.1

```

3. Configure the untrust security zone.

```
[edit ]
user@host# set security zones security-zone untrust host-inbound-traffic protocols
all
```

4. Assign an interface to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/2.0
```

5. Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
```

6. Configure the trust security zone.

```
[edit]
user@host# set security zones security-zone trust host-inbound-traffic protocols
all
```

7. Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/3.0
```

8. Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/2 {
  unit 0 {
    family inet {
      address 13.168.11.100/24;
    }
  }
}
```

```

ge-0/0/3 {
  unit 0 {
    family inet {
      address 10.2.99.1/244;
    }
  }
}

```

```

[edit]
user@host# show routing-options
static {
  route 10.1.99.0/24 next-hop 13.168.11.1;
  route 12.168.99.0/24 next-hop 13.168.11.1;
  route 1.1.100.0/24 next-hop 13.168.11.1;
}

```

```

[edit]
user@host# show security zones
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/2.0;
  }
}
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/3.0;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE for the Responder

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike proposal ike_prop authentication-method pre-shared-keys
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm md5
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_pol mode main
set security ike policy ike_pol proposals ike_prop
set security ike policy ike_pol pre-shared-key ascii-text "$ABC123"
set security ike gateway gate ike-policy ike_pol
set security ike gateway gate address 1.1.100.22
set security ike gateway gate dead-peer-detection probe-idle-tunnel
set security ike gateway gate external-interface ge-0/0/2.0
set security ike gateway gate local-identity hostname sunnyvale
set security ike gateway gate remote-identity hostname chicago

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```

[edit security ike]
user@host# set proposal ike-phase1-proposal

```

2. Define the IKE proposal authentication method.

```

[edit security ike proposal ike_prop]
user@host# set authentication-method pre-shared-key

```

3. Define the IKE proposal Diffie-Hellman group.

```

[edit security ike proposal ike_prop]
user@host# set dh-group group2

```

4. Define the IKE proposal authentication algorithm.

```

[edit security ike proposal ike_prop]
user@host# set authentication-algorithm md5

```

5. Define the IKE proposal encryption algorithm.

```

[edit security ike proposal ike_prop]
user@host# set encryption-algorithm 3des-cbc

```

6. Create an IKE Phase 1 policy.

```

[edit security ike]

```

```
user@host# set policy ike_pol
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ike_pol]  
user@host# set mode main
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ike_pol]  
user@host# set proposals ike_prop
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ike_pol proposals ike_prop set security ike policy ike_pol  
pre-shared-key]  
user@host# set ascii-text "$ABC123"
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]  
user@host# set security ike gateway gate external-interface ge-0/0/2.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway]  
user@host# set gate ike-policy ike_pol
```

12. Create an IKE Phase 1 gateway address.

```
[edit security ike gateway]  
user@host# set gate address 1.1.100.22
```

13. Set **local-identity** for the local peer (initiator).

```
[edit security ike gateway gate]  
user@host# set local-identity hostname sunnyvale
```

14. Set **remote-identity** for the responder. This is the responder's local identity.

```
[edit security ike gateway gate]  
user@host# set remote-identity hostname chicago
```

15. Set dead peer detection to detect whether the peer is up or down.

```
[edit security ike gateway gate]
user@host# set dead-peer-detection probe-idle-tunnel
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ike
proposal ike_prop {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm md5;
  encryption-algorithm 3des-cbc;
}
policy ike_pol {
  mode main;
  proposals ike_prop;
  pre-shared-key ascii-text "$ABC123";
}
gateway gate {
  ike-policy ike_pol;
  address 1.1.100.22;
  dead-peer-detection probe-idle-tunnel;
  external-interface ge-0/0/2.0;
  local-identity hostname sunnyvale;
  remote-identity hostname chicago;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec for the Responder

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-md5-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec policy ipsec_pol perfect-forward-secrecy keys group1
set security ipsec policy ipsec_pol proposals ipsec_prop
set security ipsec vpn first_vpn ike gateway gate
set security ipsec vpn first_vpn ike ipsec-policy ipsec_pol
set security ipsec vpn first_vpn establish-tunnels immediately
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```
[edit]
user@host# set security ipsec proposal ipsec_prop
```

2. Specify the IPsec Phase 2 proposal protocol.

```
[edit security security ipsec proposal ipsec_prop]
user@host# set protocol esp
```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set authentication-algorithm hmac-md5-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipsec_prop]
user@host# set encryption-algorithm 3des-cbc
```

5. Set IPsec Phase 2 to use perfect forward secrecy (PFS) group1.

```
[edit security ipsec policy ipsec_pol]
user@host# set perfect-forward-secrecy keys group1
```

6. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set policy ipsec_pol
```

7. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipsec_pol]
user@host# set proposals ipsec_prop
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set vpn first_vpn ike gateway gate
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn first_vpn ike ipsec-policy ipsec_pol
```

10. Specify that the tunnel be brought up immediately without a verification packet.

```
[edit security ipsec]
user@host# set security ipsec vpn first_vpn establish-tunnels immediately
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show security ipsec
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-md5-96;
  encryption-algorithm 3des-cbc;
}
policy ipsec_pol {
  perfect-forward-secrecy {
    keys group1;
  }
  proposals ipsec_prop;
}
vpn first_vpn {
  ike {
    gateway gate;
    ipsec-policy ipsec_pol;
    establish-tunnels immediately;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies for the Responder

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone trust to-zone untrust policy pol1 match source-address any
set security policies from-zone trust to-zone untrust policy pol1 match destination-address any
set security policies from-zone trust to-zone untrust policy pol1 match application any
```



```

set security policies from-zone trust to-zone untrust policy pol1 then permit tunnel
  ipsec-vpn first_vpn
set security policies from-zone untrust to-zone trust policy pol1 match source-address
  any
set security policies from-zone untrust to-zone trust policy pol1 match destination-address
  any
set security policies from-zone untrust to-zone trust policy pol1 match application any
set security policies from-zone untrust to-zone trust policy pol1 then permit tunnel
  ipsec-vpn first_vpn

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the untrust zone.

```

[edit security policies from-zone trust to-zone untrust]
user@host# set policy pol1 match source-address any
user@host# set policy pol1 match destination-address any
user@host# set policy pol1 match application any
user@host# set policy pol1 then permit tunnel ipsec-vpn first_vpn

```

2. Create the security policy to permit traffic from the untrust zone to the trust zone.

```

[edit security policies from-zone untrust to-zone trust]
user@host# set policy pol1 match source-address any
user@host# set policy pol1 match destination-address any
user@host# set policy pol1 match application any
user@host# set policy pol1 then permit tunnel ipsec-vpn first_vpn

```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show security policies
from-zone trust to-zone untrust {
  policy pol1 {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
      tunnel {
        ipsec-vpn first_vpn;
      }
    }
  }
}

```

```

    }
  }
  from-zone untrust to-zone trust {
    policy pol1 {
      match {
        source-address any;
        destination-address any;
        application any;
      }
      then {
        permit;
        tunnel {
          ipsec-vpn first_vpn;
        }
      }
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Phase 1 Status for the Initiator on page 622](#)
- [Verifying IPsec Security Associations for the Initiator on page 624](#)
- [Verifying the IKE Phase 1 Status for the Responder on page 625](#)
- [Verifying IPsec Security Associations for the Responder on page 627](#)

Verifying the IKE Phase 1 Status for the Initiator

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you must send traffic from a host in the 10.1.99.0 network to a host in the 10.2.99.0 network. For route-based VPNs, traffic can be initiated by the SRX Series device through the tunnel. We recommend that when testing IPsec tunnels, test traffic be sent from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate a ping operation from 10.1.99.2 to 10.2.99.2.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
5137403	UP	b3a24bc00e963c51	7bf96bcc6230e484	Main	1.1.100.23

```
user@host> show security ike security-associations index 1 detail
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
1400579286	UP	487cfb570908425c	7710c8487f9ff20c	Main	1.1.100.22

```
{primary:node0}[edit]
```

```
root@poway# run show security ike security-associations detail
node0:
```

```
IKE peer 1.1.100.22, Index 1400579286,
  Location: FPC 5, PIC 0, KMD-Instance 4
  Role: Initiator, State: UP
  Initiator cookie: 487cfb570908425c, Responder cookie: 7710c8487f9ff20c
  Exchange type: Main, Authentication method: Pre-shared-keys
  Local: 13.168.11.100:4500, Remote: 1.1.100.22:4500
  Lifetime: Expires in 28622 seconds
  Peer ike-id: sunnyvale
  Xauth user-name: not available
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication      : hmac-md5-96
    Encryption          : 3des-cbc
    Pseudo random function: hmac-md5
  Traffic statistics:
    Input bytes      : 0
    Output bytes     : 0
    Input packets    : 0
    Output packets   : 0
  IPSec security associations: 0 created, 0 deleted
  Phase 2 negotiations in progress: 0
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote address—Verify that the remote IP address is correct and that port 4500 is being used for peer-to-peer communication.
- Role initiator state
 - Up—The Phase 1 SA has been established.
 - Down—There was a problem establishing the Phase 1 SA.
 - Both peers in the IPsec SA pair are using port 4500, which indicates that NAT-T is implemented. (NAT-T uses port 4500 or another random high-numbered port.)

- Peer IKE ID—Verify the remote (responder) ID is correct. In this example, the hostname is sunnyvale.
- Local identity and remote identity—Verify these are correct.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations** command lists additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the Initiator

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
```

ID	Algorithm	SPI	Life:sec/kb	Mon	vsys	Port	Gateway
<2	ESP:3des/md5	2bf24122	3390/ unlim	-	root	4500	1.1.100.23
>2	ESP:3des/md5	2baef146	3390/ unlim	-	root	4500	1.1.100.23

```
user@host> show security ipsec security-associations detail
```

```
Local Gateway: 12.168.99.100, Remote Gateway: 1.1.100.23
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv1
DF-bit: clear
Policy-name: poll

Location: FPC 5, PIC 0, KMD-Instance 4
Direction: inbound, SPI: 2bf24122, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3388 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2801 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-md5-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Location: FPC 5, PIC 0, KMD-Instance 4
Direction: outbound, SPI: 2baef146, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3388 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2801 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-md5-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
```

Meaning The output from the `show security ipsec security-associations` command lists the following information:

- The remote gateway has a NAT address of 1.1.100.23.
- Both peers in the IPsec SA pair are using port 4500, which indicates that NAT-T is implemented. (NAT-T uses port 4500 or another random high-numbered port.).
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3390/ unlimited value indicates that the Phase 2 lifetime expires in 3390 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

Verifying the IKE Phase 1 Status for the Responder

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
5802591	UP	d31d6833108fd69f	9ddfe2ce133086aa	Main	1.0.0.1

```
user@host> show security ike security-associations index 1 detail
```

```
IKE peer 1.1.100.23, Index 1400579287,
Location: FPC 5, PIC 0, KMD-Instance 4
Role: Responder, State: UP
Initiator cookie: 487cfb570908425c, Responder cookie: 7710c8487f9ff20c
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 12.168.99.100:4500, Remote: 1.1.100.23:4500
Lifetime: Expires in 28587 seconds
Peer ike-id: chicago
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-md5-96
  Encryption          : 3des-cbc
  Pseudo random function: hmac-md5
Traffic statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets: 0
  Output packets: 0
IPSec security associations: 0 created, 0 deleted
Phase 2 negotiations in progress: 0

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 71.1.1.1:4500, Remote: 1.0.0.1:4500
Local identity: branch_natt1@example.net
Remote identity: limits_natt1@example.net
Flags: IKE SA is created
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index detail** command to get more information about the SA.
- Remote address—Verify that the remote IP address is correct and that port 4500 is being used for peer-to-peer communication.
- Role responder state
 - Up—The Phase 1 SA has been established.
 - Down—There was a problem establishing the Phase 1 SA.

- Peer IKE ID—Verify the local ID for the peer is correct. In this example, the hostname is chicago.
- Local identity and remote identity—Verify these are correct.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations** command lists additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the Responder

Purpose Verify the IPsec status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
  ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<131073  ESP:3des/sha1  a5224cd9  3571/ unlim  -   root 4500  1.0.0.1
>131073  ESP:3des/sha1  82a86a07  3571/ unlim  -   root 4500  1.0.0.1
```

```
user@host> show security ipsec security-associations detail
```

```

Virtual-system: root
Local Gateway: 71.1.1.1, Remote Gateway: 1.0.0.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv1
DF-bit: clear
Direction: inbound, SPI: a5224cd9, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3523 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2923 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: 82a86a07, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3523 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 2923 seconds
Mode: Tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output from the `show security ipsec security-associations` command lists the following information:

- The remote gateway has a NAT address of 1.0.0.1.
- Both peers in the IPsec SA pair are using port 4500, which indicates that NAT-T is implemented. (NAT-T uses port 4500 or another random high-numbered port.)
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The 3571/ unlim value indicates that the Phase 2 lifetime expires in 3571 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U indicates that monitoring is up, and D indicates that monitoring is down.
- The virtual system (vsys) is the root system, and it always lists 0.

See Also

- [IPsec VPN Overview on page 31](#)
- [Understanding Policy-Based IPsec VPNs on page 517](#)

Example: Configuring NAT-T with Dynamic Endpoint VPN

This example shows how to configure a route-based VPN where the IKEv2 initiator is a dynamic endpoint behind a NAT device.

- [Requirements on page 629](#)
- [Overview on page 629](#)
- [Configuration on page 631](#)
- [Verification on page 643](#)

Requirements

This example uses the following hardware and software components:

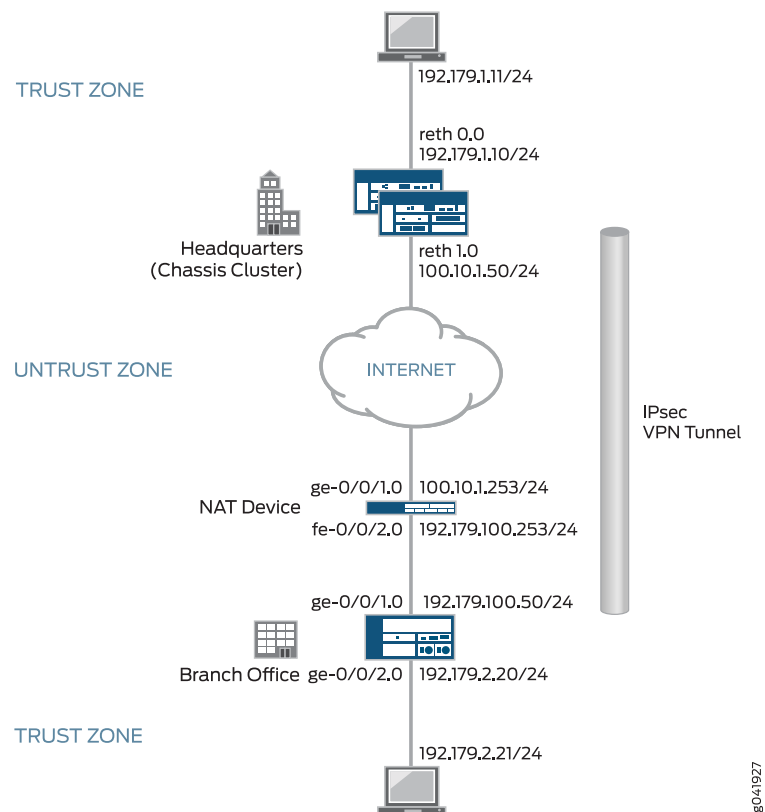
- Two SRX Series devices configured in a chassis cluster
- One SRX Series device providing NAT
- One SRX Series device providing branch office network access
- Junos OS Release 12.1X46-D10 or later for IKEv2 NAT-T support

Overview

In this example, an IPsec VPN is configured between the branch office (IKEv2 initiator) and headquarters (IKEv2 responder) to secure network traffic between the two locations. The branch office is located behind the NAT device. The branch office address is assigned dynamically and is unknown to the responder. The initiator is configured with the remote identity of the responder for tunnel negotiation. This configuration establishes a dynamic endpoint VPN between the peers across the NAT device.

[Figure 38 on page 630](#) shows an example of a topology with NAT-Traversal (NAT-T) and dynamic endpoint VPN.

Figure 38: NAT-T with Dynamic Endpoint VPN



In this example, the initiator's IP address, 192.179.100.50, which has been dynamically assigned to the device, is hidden by the NAT device and translated to 100.10.1.253.

The following configuration options apply in this example:

- The local identity configured on the initiator must match the remote gateway identity configured on the responder.
- Phase 1 and Phase 2 options must match between the initiator and responder.



NOTE: In this example, the default security policy that permits all traffic is used for all devices. More restrictive security policies should be configured for production environments. See *Security Policies Overview*.



NOTE: Starting with Junos OS Release 12.1X46-D10 and Junos OS Release 17.3R1, the default value for the nat-keepalive option configured at the [edit security ike gateway *gateway-name*] hierarchy level has been changed from 5 seconds to 20 seconds.



NOTE: In SRX1400, SRX3400, SRX3600, SRX5600, and SRX5800 devices, IKE negotiations involving NAT traversal do not work if the IKE peer is behind a NAT device that will change the source IP address of the IKE packets during the negotiation. For example, if the NAT device is configured with DIP, it changes the source IP because the IKE protocol switches the UDP port from 500 to 4500. (Platform support depends on the Junos OS release in your installation.)

Configuration

- [Configuring the Branch Office Device \(IKEv2 Initiator\) on page 631](#)
- [Configuring the NAT Device on page 635](#)
- [Configuring the Headquarters Device \(IKEv2 Responder\) on page 638](#)

Configuring the Branch Office Device (IKEv2 Initiator)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family inet address 192.179.100.50/24
set interfaces ge-0/0/2 unit 0 family inet address 192.179.2.20/24
set interfaces st0 unit 0 family inet address 172.168.100.1/16
set routing-options static route 192.179.1.0/24 next-hop st0.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/2.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces st0.0
set security ike proposal IKE_PROP authentication-method pre-shared-keys
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL pre-shared-key ascii-text "$ABC123"
set security ike gateway HQ_GW ike-policy IKE_POL
set security ike gateway HQ_GW address 100.10.1.50
set security ike gateway HQ_GW local-identity hostname branch.example.net
set security ike gateway HQ_GW external-interface ge-0/0/1.0
set security ike gateway HQ_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc
set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn HQ_VPN bind-interface st0.0
set security ipsec vpn HQ_VPN ike gateway HQ_GW
```

```
set security ipsec vpn HQ_VPN ike ipsec-policy IPSEC_POL
set security ipsec vpn HQ_VPN establish-tunnels immediately
set security policies default-policy permit-all
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the branch office device:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 192.179.100.50/24
user@host# set ge-0/0/2 unit 0 family inet address 192.179.2.20/24
user@host# set st0 unit 0 family inet address 172.168.100.1/16
```

2. Configure routing options.

```
[edit routing-options]
user@host# set static route 192.179.1.0/24 next-hop st0.0
```

3. Configure zones.

```
[edit security zones security-zones trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/2.0
```

```
[edit security zones security-zones untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
user@host# set interfaces st0.0
```

4. Configure Phase 1 options.

```
[edit security ike proposal IKE_PROP]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security ike gateway HQ_GW]
user@host# set ike-policy IKE_POL
```

```

user@host# set address 100.10.1.50
user@host# set local-identity hostname branch.example.net
user@host# set external-interface ge-0/0/1.0
user@host# set version v2-only

```

5. Configure Phase 2 options.

```

[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy IPSEC_POL]
user@host# set proposals IPSEC_PROP
user@host# set perfect-forward-secrecy keys group5

[edit security ipsec vpn HQ_VPN]
user@host# set bind-interface st0.0
user@host# set ike gateway HQ_GW
user@host# set ike ipsec-policy IPSEC_POL
user@host# set establish-tunnels immediately

```

6. Configure the security policy.

```

[edit security policies]
user@host# set default-policy permit-all

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, **show security ike**, **show security ipsec**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 192.179.100.50/24;
    }
  }
}
ge-0/0/2 {
  unit 0 {
    family inet {
      address 192.179.2.20/24;
    }
  }
}
st0 {

```

```
unit 0 {
    family inet {
        address 172.168.100.1/16;
    }
}
[edit]
user@host# show routing-options
static {
    route 192.179.1.0/24 next-hop st0.0;
}
[edit]
user@host# show security zones
security-zone trust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-0/0/2.0;
    }
}
security-zone untrust {
    host-inbound-traffic {
        system-services {
            all;
        }
        protocols {
            all;
        }
    }
    interfaces {
        ge-0/0/1.0;
        st0.0;
    }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
    authentication-method pre-shared-keys;
    dh-group group5;
    authentication-algorithm sha1;
    encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
    proposals IKE_PROP;
    pre-shared-key ascii-text "$ABC123"
}
gateway HQ_GW{
    ike-policy IKE_POL;
    address 100.10.1.50;
```

```

local-identity hostname branch.example.net;
external-interface ge-0/0/1.0;
version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm aes-256-cbc;
}
policy IPSEC_POL {
    perfect-forward-secrecy {
        keys group5;
    }
    proposals IPSEC_PROP;
}
vpn HQ_VPN {
    bind-interface st0.0;
    ike {
        gateway HQ_GW;
        ipsec-policy IPSEC_POL;
    }
    establish-tunnels immediately;
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the NAT Device

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/1 unit 0 family inet address 100.10.1.253/24
set interfaces fe-0/0/2 unit 0 family inet address 192.179.100.253/24
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces ge-0/0/1.0
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces fe-0/0/2.0
set security nat source rule-set DYNAMIC from zone untrust
set security nat source rule-set DYNAMIC to zone trust
set security nat source rule-set DYNAMIC rule R2R3 match source-address 0.0.0.0/0
set security nat source rule-set DYNAMIC rule R2R3 then source-nat interface
set security policies default-policy permit-all

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the intermediate router providing NAT:

1. Configure interfaces.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 100.10.1.253/24
user@host# set fe-0/0/2 unit 0 family inet address 192.179.100.253/24
```

2. Configure zones.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces ge-0/0/1.0
```

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces fe-0/0/2.0
```

3. Configure NAT.

```
[edit security nat source rule-set DYNAMIC]
user@host# set from zone untrust
user@host# set to zone trust
user@host# set rule R2R3 match source-address 0.0.0.0/0
user@host# set rule R2R3 then source-nat interface
```

4. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security zones**, **show security nat source**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 100.10.1.253/24;
```



```

    }
  }
}
fe-0/0/2 {
  unit 0 {
    family inet {
      address 192.179.100.253/24;
    }
  }
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    ge-0/0/1.0;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    fe-0/0/2.0;
  }
}
[edit]
user@host# show security nat source
rule-set DYNAMIC {
  from zone untrust;
  to zone trust;
  rule R2R3 {
    match {
      source-address 0.0.0.0/0;
    }
    then {
      source-nat {
        interface;
      }
    }
  }
}
[edit]

```

```

user@host# show security policies
default-policy {
    permit-all;
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the Headquarters Device (IKEv2 Responder)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set chassis cluster reth-count 5
set chassis cluster redundancy-group 1 node 0 priority 220
set chassis cluster redundancy-group 1 node 1 priority 149
set chassis cluster redundancy-group 1 interface-monitor ge-0/0/1 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/0/1 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-0/0/2 weight 255
set chassis cluster redundancy-group 1 interface-monitor ge-8/0/2 weight 255
set interfaces ge-0/0/1 gigether-options redundant-parent reth0
set interfaces ge-0/0/2 gigether-options redundant-parent reth1
set interfaces ge-8/0/1 gigether-options redundant-parent reth0
set interfaces ge-8/0/2 gigether-options redundant-parent reth1
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 family inet address 192.179.1.10/24
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 100.10.1.50/24
set interfaces st0 unit 0 family inet address 172.168.100.2/16
set routing-options static route 192.179.2.0/24 next-hop st0.0
set routing-options static route 192.179.100.0/24 next-hop 100.10.1.253
set security zones security-zone untrust host-inbound-traffic system-services all
set security zones security-zone untrust host-inbound-traffic protocols all
set security zones security-zone untrust interfaces st0.0
set security zones security-zone untrust interfaces reth1.0
set security zones security-zone trust host-inbound-traffic system-services all
set security zones security-zone trust host-inbound-traffic protocols all
set security zones security-zone trust interfaces reth0.0
set security ike proposal IKE_PROP authentication-method pre-shared-keys
set security ike proposal IKE_PROP dh-group group5
set security ike proposal IKE_PROP authentication-algorithm sha1
set security ike proposal IKE_PROP encryption-algorithm aes-256-cbc
set security ike policy IKE_POL proposals IKE_PROP
set security ike policy IKE_POL pre-shared-key ascii-text "$ABC123"
set security ike gateway Branch_GW ike-policy IKE_POL
set security ike gateway Branch_GW dynamic hostname branch.example.net
set security ike gateway Branch_GW dead-peer-detection optimized
set security ike gateway Branch_GW external-interface reth1.0
set security ike gateway Branch_GW version v2-only
set security ipsec proposal IPSEC_PROP protocol esp
set security ipsec proposal IPSEC_PROP authentication-algorithm hmac-sha1-96
set security ipsec proposal IPSEC_PROP encryption-algorithm aes-256-cbc

```

```

set security ipsec policy IPSEC_POL perfect-forward-secrecy keys group5
set security ipsec policy IPSEC_POL proposals IPSEC_PROP
set security ipsec vpn Branch_VPN bind-interface st0.0
set security ipsec vpn Branch_VPN ike gateway Branch_GW
set security ipsec vpn Branch_VPN ike ipsec-policy IPSEC_POL
set security policies default-policy permit-all

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

1. Configure two nodes as the chassis cluster.

```

[edit chassis cluster]
user@host# set reth-count 5
user@host# set redundancy-group 1 node 0 priority 220
user@host# set redundancy-group 1 node 1 priority 149
user@host# set redundancy-group 1 interface-monitor ge-0/0/1 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/0/1 weight 255
user@host# set redundancy-group 1 interface-monitor ge-0/0/2 weight 255
user@host# set redundancy-group 1 interface-monitor ge-8/0/2 weight 255

```

2. Configure interfaces.

```

[edit interfaces]
user@host# set ge-0/0/1 gigether-options redundant-parent reth0
user@host# set ge-0/0/2 gigether-options redundant-parent reth1
user@host# set ge-8/0/1 gigether-options redundant-parent reth0
user@host# set ge-8/0/2 gigether-options redundant-parent reth1
user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth0 unit 0 family inet address 192.179.1.10/24
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 100.10.1.50/24
user@host# set st0 unit 0 family inet address 172.168.100.2/16

```

3. Configure routing options.

```

[edit routing-options]
user@host# set static route 192.179.2.0/24 next-hop st0.0
user@host# set static route 192.179.100.0/24 next-hop 100.10.1.253

```

4. Configure zones.

```

[edit security zones security-zone untrust]
user@host# set host-inbound-traffic protocols all
user@host# set host-inbound-traffic system-services all
user@host# set interfaces st0.0
user@host# set interfaces reth1.0

[edit security zones security-zone trust]

```

```
user@host# set host-inbound-traffic system-services all
user@host# set host-inbound-traffic protocols all
user@host# set interfaces reth0.0
```

5. Configure Phase 1 options.

```
[edit security ike proposal IKE_PROP]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group5
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm aes-256-cbc

[edit security ike policy IKE_POL]
user@host# set proposals IKE_PROP
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security ike gateway Branch_GW]
user@host# set ike-policy IKE_POL
user@host# set dynamic hostname branch.example.net
user@host# set dead-peer-detection optimized
user@host# set external-interface reth1.0
user@host# set version v2-only
```

6. Configure Phase 2 options.

```
[edit security ipsec proposal IPSEC_PROP]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm aes-256-cbc

[edit security ipsec policy IPSEC_POL]
user@host# set perfect-forward-secrecy keys group5
user@host# set proposals IPSEC_PROP

[edit security ipsec vpn Branch_VPN]
user@host# set bind-interface st0.0
user@host# set ike gateway Branch_GW
user@host# set ike ipsec-policy IPSEC_POL
```

7. Configure the default security policy.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show chassis cluster**, **show interfaces**, **show routing-options**, **show security zones**, **show security ike**, **show security ipsec**, and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show chassis cluster
reth-count 5;
redundancy-group 1 {
    node 0 priority 220;
    node 1 priority 149;
    interface-monitor {
        ge-0/0/1 weight 255;
        ge-8/0/1 weight 255;
        ge-0/0/2 weight 255;
        ge-8/0/2 weight 255;
    }
}
[edit]
user@host# show interfaces
ge-0/0/1 {
    gigether-options {
        redundant-parent reth0;
    }
}
ge-0/0/2 {
    gigether-options {
        redundant-parent reth1;
    }
}
ge-8/0/1 {
    gigether-options {
        redundant-parent reth0;
    }
}
ge-8/0/2 {
    gigether-options {
        redundant-parent reth1;
    }
}
reth0 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 192.179.1.10/24;
        }
    }
}
reth1 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 100.10.1.50/24;
        }
    }
}
```

```
st0 {
  unit 0 {
    family inet {
      address 172.168.100.2/16;
    }
  }
}
[edit]
user@host# show routing-options
static {
  route 192.179.2.0/24 next-hop st0.0;
  route 192.179.100.0/24 next-hop 100.10.1.253;
}
[edit]
user@host# show security zones
security-zone trust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    reth0.0;
  }
}
security-zone untrust {
  host-inbound-traffic {
    system-services {
      all;
    }
    protocols {
      all;
    }
  }
  interfaces {
    st0.0;
    reth1.0;
  }
}
[edit]
user@host# show security ike
proposal IKE_PROP {
  authentication-method pre-shared-keys;
  dh-group group5;
  authentication-algorithm sha1;
  encryption-algorithm aes-256-cbc;
}
policy IKE_POL {
  proposals IKE_PROP;
  pre-shared-key ascii-text "$ABC123"
}
gateway Branch_GW {
```

```

ike-policy IKE_POL;
dynamic hostname branch.example.net;
dead-peer-detection optimized;
external-interface reth1.0;
version v2-only;
}
[edit]
user@host# show security ipsec
proposal IPSEC_PROP {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm aes-256-cbc;
}
policy IPSEC_POL {
    perfect-forward-secrecy {
        keys group5;
    }
    proposals IPSEC_PROP;
}
vpn Branch_VPN {
    bind-interface st0.0;
    ike {
        gateway Branch_GW;
        ipsec-policy IPSEC_POL;
    }
}
[edit]
user@host# show security policies
default-policy {
    permit-all;
}

```

Verification

Confirm that the configuration is working properly.

- [Verifying the IKE Phase 1 Status for the Responder on page 643](#)
- [Verifying IPsec Security Associations for the Responder on page 645](#)

Verifying the IKE Phase 1 Status for the Responder

Purpose Verify the IKE Phase 1 status.

Action From operational mode on node 0, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations detail** command.

```
user@host# show security ike security-associations
```

```
node0:
Index      State  Initiator cookie  Responder cookie  Mode  Remote Address
1367024684 UP    f82c54347e2f3fb1  020e28e1e4cae003  IKEv2  100.10.1.253
```

```

user@host# show security ike security-associations detail

node0:
IKE peer 100.10.1.253, Index 1367024684, Gateway Name: Branch_GW
  Location: FPC 5, PIC 0, KMD-Instance 2
  Role: Responder, State: UP
  Initiator cookie: f82c54347e2f3fb1, Responder cookie: 020e28e1e4cae003
  Exchange type: IKEv2, Authentication method: Pre-shared-keys
  Local: 100.10.1.50:4500, Remote: 100.10.1.253:2541
  Lifetime: Expires in 3593 seconds
  Peer ike-id: branch.example.net
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication      : hmac-sha1-96
    Encryption          : aes256-cbc
    Pseudo random function: hmac-sha1
    Diffie-Hellman group : DH-group-5
  Traffic statistics:
    Input bytes :          683
    Output bytes :          400
    Input packets:           2
    Output packets:          1
  IPsec security associations: 0 created, 0 deleted
  Phase 2 negotiations in progress: 1

```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- Index—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index *index_id* detail** command to get more information about the SA.
- Remote address—Verify that the local IP address is correct and that port 4500 is being used for peer-to-peer communication.
- Role responder state
 - Up—The Phase 1 SA has been established.
 - Down—There was a problem establishing the Phase 1 SA.
 - Peer IKE ID—Verify the address is correct.
 - Local identity and remote identity—Verify these addresses are correct.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that sends IKE packets)
- IKE policy parameters

- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations** command lists additional information about security associations:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Initiator and responder information
- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying IPsec Security Associations for the Responder

Purpose Verify the IPsec status.

Action From operational mode on node 0, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations detail** command.

```
user@host# show security ipsec security-associations
```

```
node0
Total active tunnels: 1
ID          Algorithm          SPI          Life:sec/kb  Mon lsys Port Gateway
<77856771 ESP:aes-cbc-256/sha1 4ad5af40 7186/unlim - root 2541 100.10.1.253
>77856771 ESP:aes-cbc-256/sha1 5bb0a5ee 7186/unlim - root 2541 100.10.1.253
```

```
user@host# show security ipsec security-associations detail
```

```
node0
ID: 77856771 Virtual-system: root, VPN Name: Branch_VPN
Local Gateway: 100.10.1.50, Remote Gateway: 100.10.1.253
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear
Bind-interface: st0.0

Port: 2541, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 608a29
Tunnel Down Reason: SA not initiated
```

```

Location: FPC 5, PIC 0, KMD-Instance 2
Direction: inbound, SPI: 4ad5af40, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 7182 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 6587 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (256 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The remote gateway has an IP address of 100.10.1.253.
- The SPIs, lifetime (in seconds), and usage limits (or lifesize in KB) are shown for both directions. The lifetime value indicates that the Phase 2 lifetime expires in 7186 seconds, and that no lifesize has been specified, which indicates that it is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index *index_id* detail** command lists the following information:

- The local identity and remote identity make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common causes for a Phase 2 failure. If no IPsec SA is listed, confirm that Phase 2 proposals, including the proxy ID settings, match for both peers. For route-based VPNs, the default proxy ID is local=0.0.0.0/0, remote=0.0.0.0/0, and service=any. Issues can occur with multiple route-based VPNs from the same peer IP. In this case, a unique proxy ID for each IPsec SA must be specified. For some third-party vendors, the proxy ID must be manually entered to match.

- Another common reason for Phase 2 failure is not specifying the ST interface binding. If IPsec cannot complete, check the kmd log or set trace options.

See Also

- [IPsec VPN Overview on page 31](#)
- [Security Policies Overview](#)

Release History Table

Release	Description
12.1X46-D10	Starting with Junos OS Release 12.1X46-D10 and Junos OS Release 17.3R1, the default value for the nat-keepalive option configured at the [edit security ike gateway gateway-name] hierarchy level has been changed from 5 seconds to 20 seconds.

Related
Documentation

- [Traffic Selectors in Route-Based VPNs on page 204](#)

Configuring IPsec VPN Tunnels

- [Dual Stack Tunnels over an External Interface on page 649](#)
- [IPsec VPN Tunnels with Chassis Clusters on page 662](#)

Dual Stack Tunnels over an External Interface

Dual-stack tunnels—parallel IPv4 and IPv6 tunnels over a single physical interface to a peer—are supported for route-based site-to-site VPNs. A physical interface configured with both IPv4 and IPv6 addresses can be used as an external interface for IPv4 and IPv6 gateways on the same peer or on different peers at the same time.

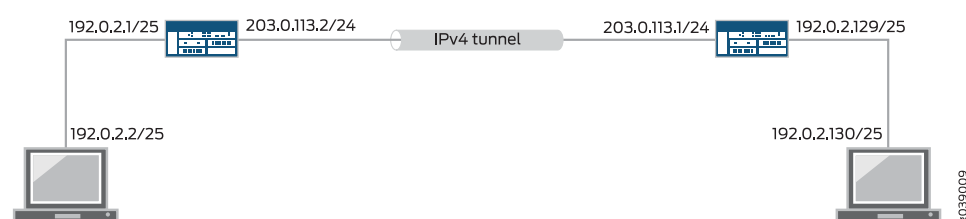
- [Understanding VPN Tunnel Modes on page 649](#)
- [Example: Configuring Dual-Stack Tunnels over an External Interface on page 652](#)

Understanding VPN Tunnel Modes

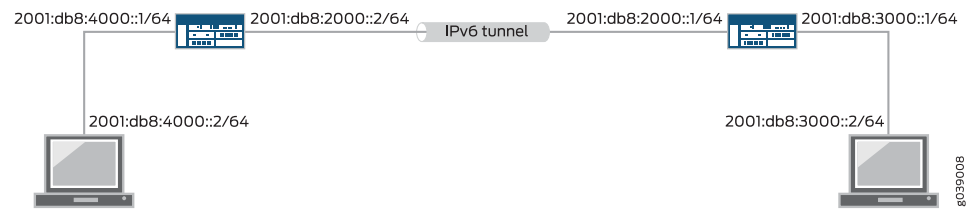
In VPN tunnel mode, IPsec encapsulates the original IP datagram—including the original IP header—within a second IP datagram. The outer IP header contains the IP address of the gateway, while the inner header contains the ultimate source and destination IP addresses. The outer and inner IP headers can have a protocol field of IPv4 or IPv6. SRX Series devices support four tunnel modes for route-based site-to-site VPNs.

IPv4-in-IPv4 tunnels encapsulate IPv4 packets inside IPv4 packets, as shown in [Figure 39 on page 649](#). The protocol fields for both the outer and the inner headers are IPv4.

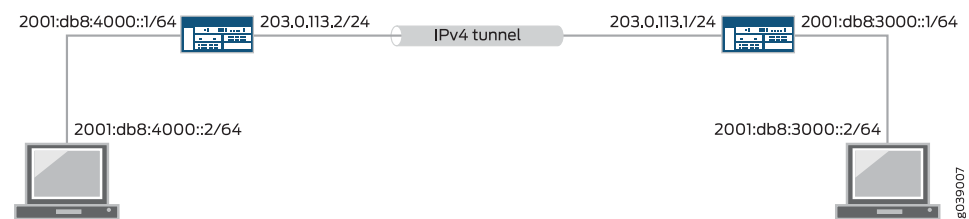
Figure 39: IPv4-in-IPv4 Tunnel



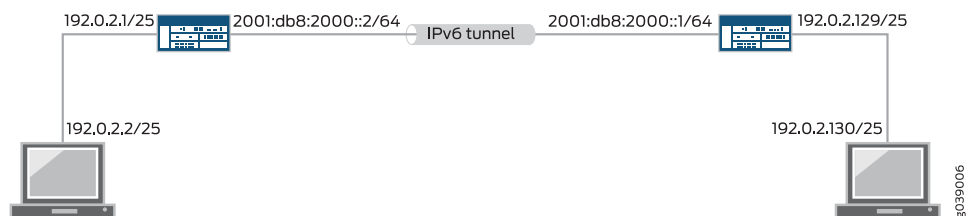
IPv6-in-IPv6 tunnels encapsulate IPv6 packets inside IPv6 packets, as shown in [Figure 40 on page 650](#). The protocol fields for both the outer and inner headers are IPv6.

Figure 40: IPv6-in-IPv6 Tunnel

IPv6-in-IPv4 tunnels encapsulate IPv6 packets inside IPv4 packets, as shown in [Figure 41 on page 650](#). The protocol field for the outer header is IPv4 and the protocol field for the inner header is IPv6.

Figure 41: IPv6-in-IPv4 Tunnel

IPv4-in-IPv6 tunnels encapsulate IPv4 packets inside IPv6 packets, as shown in [Figure 42 on page 650](#). The protocol field for the outer header is IPv6 and the protocol field for the inner header is IPv4.

Figure 42: IPv4-in-IPv6 Tunnel

A single IPsec VPN tunnel can carry both IPv4 and IPv6 traffic. For example, an IPv4 tunnel can operate in both IPv4-in-IPv4 and IPv6-in-IPv4 tunnel modes at the same time. To allow both IPv4 and IPv6 traffic over a single IPsec VPN tunnel, the st0 interface bound to that tunnel must be configured with both **family inet** and **family inet6**.

A physical interface configured with both IPv4 and IPv6 addresses can be used as the external interface for parallel IPv4 and IPv6 tunnels to a peer in a route-based site-to-site VPN. This feature is known as dual-stack tunnels and requires separate st0 interfaces for each tunnel.

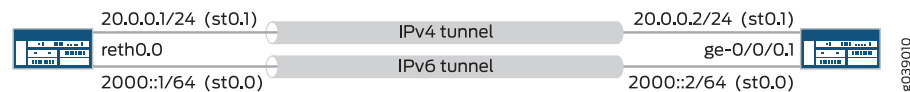


NOTE: For policy-based VPNs, IPv6-in-IPv6 is the only tunnel mode supported and it is only supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

Understanding Dual-Stack Tunnels over an External Interface

Dual-stack tunnels—parallel IPv4 and IPv6 tunnels over a single physical interface to a peer—are supported for route-based site-to-site VPNs. A physical interface configured with both IPv4 and IPv6 addresses can be used as the external interface to IPv4 and IPv6 gateways on the same peer or on different peers at the same time. In [Figure 43 on page 651](#), the physical interfaces reth0.0 and ge-0/0/0.1 support parallel IPv4 and IPv6 tunnels between two devices.

Figure 43: Dual-Stack Tunnels



NOTE: In [Figure 43 on page 651](#), separate secure tunnel (st0) interfaces must be configured for each IPsec VPN tunnel. Parallel IPv4 and IPv6 tunnels that are bound to the same st0 interface are not supported.

A single IPsec VPN tunnel can carry both IPv4 and IPv6 traffic. For example, an IPv4 tunnel can operate in both IPv4-in-IPv4 and IPv6-in-IPv4 tunnel modes at the same time. To allow both IPv4 and IPv6 traffic over a single IPsec VPN tunnel, the st0 interface bound to that tunnel must be configured with both **family inet** and **family inet6**.

If multiple addresses in the same address family are configured on the same external interface to a VPN peer, we recommend that you configure **local-address** at the `[edit security ike gateway gateway-name]` hierarchy level.

If **local-address** is configured, the specified IPv4 or IPv6 address is used as the local gateway address. If only one IPv4 and one IPv6 address is configured on a physical external interface, **local-address** configuration is not required.



NOTE: The **local-address** value must be an IP address that is configured on an interface on the SRX Series device. We recommend that **local-address** belong to the external interface of the IKE gateway. If **local-address** does not belong to the external interface of the IKE gateway, the interface must be in the same zone as the external interface of the IKE gateway and an intra-zone security policy must be configured to permit traffic.

The **local-address** value and the remote IKE gateway address must be in the same address family, either IPv4 or IPv6.

If **local-address** is not configured, the local gateway address is based on the remote gateway address. If the remote gateway address is an IPv4 address, the local gateway address is the primary IPv4 address of the external physical interface. If the remote gateway address is an IPv6 address, the local gateway address is the primary IPv6 address of the external physical interface.

- See Also**
- [VPN Feature Support for IPv6 Addresses on page 671](#)
 - [Understanding IPv6 IKE and IPsec Packet Processing on page 675](#)
 - [VPN Feature Support for IPv6 Addresses on page 671](#)

Example: Configuring Dual-Stack Tunnels over an External Interface

This example shows how to configure parallel IPv4 and IPv6 tunnels over a single external physical interface to a peer for route-based site-to-site VPNs.

- [Requirements on page 652](#)
- [Overview on page 652](#)
- [Configuration on page 655](#)
- [Verification on page 660](#)

Requirements

Before you begin, read “Understanding VPN Tunnel Modes” on page 649.



NOTE: The configuration shown in this example is only supported with route-based site-to-site VPNs.

Overview

In this example, a redundant Ethernet interface on the local device supports parallel IPv4 and IPv6 tunnels to a peer device:

- The IPv4 tunnel carries IPv6 traffic; it operates in IPv6-in-IPv4 tunnel mode. The secure tunnel interface st0.0 bound to the IPv4 tunnel is configured with family inet6 only.
- The IPv6 tunnel carries both IPv4 and IPv6 traffic; it operates in both IPv4-in-IPv6 and IPv6-in-IPv6 tunnel modes. The secure tunnel interface st0.1 bound to the IPv6 tunnel is configured with both family inet and family inet6.

[Table 75 on page 652](#) shows the Phase 1 options used in this example. The Phase 1 option configuration includes two IKE gateway configurations, one to the IPv6 peer and the other to the IPv4 peer.

Table 75: Phase 1 Options for Dual-Stack Tunnel Configuration

Option	Value
IKE proposal	ike_proposal

Table 75: Phase 1 Options for Dual-Stack Tunnel Configuration (continued)

Option	Value
Authentication method	Preshared keys
Authentication algorithm	MD5
Encryption algorithm	3DES CBC
Lifetime	3600 seconds
IKE policy	ike_policy
Mode	Aggressive
IKE proposal	ike_proposal
Preshared key	ASCII text
IPv6 IKE gateway	ike_gw_v6
IKE policy	ike_policy
Gateway address	2000::2
External interface	reth1.0
IKE version	IKEv2
IPv4 IKE gateway	ike_gw_v4
IKE policy	ike_policy
Gateway address	20.0.0.2
External interface	reth1.0

[Table 76 on page 653](#) shows the Phase 2 options used in this example. The Phase 2 option configuration includes two VPN configurations, one for the IPv6 tunnel and the other for the IPv4 tunnel.

Table 76: Phase 2 Options for Dual-Stack Tunnel Configuration

Option	Value
IPsec proposal	ipsec_proposal
Protocol	ESP
Authentication algorithm	HMAC SHA-1 96

Table 76: Phase 2 Options for Dual-Stack Tunnel Configuration (continued)

Option	Value
Encryption algorithm	3DES CBC
IPsec policy	ipsec_policy
Proposal	ipsec_proposal
IPv6 VPN	test_s2s_v6
Bind interface	st0.1
IKE gateway	ike_gw_v6
IKE IPsec policy	ipsec_policy
Establish tunnels	Immediately
IPv4 VPN	test_s2s_v4
Bind interface	st0.0
IKE gateway	ike_gw_4
IKE IPsec policy	ipsec_policy

The following static routes are configured in the IPv6 routing table:

- Route IPv6 traffic to 3000::1/128 through st0.0.
- Route IPv6 traffic to 3000::2/128 through st0.1.

A static route is configured in the default (IPv4) routing table to route IPv4 traffic to 30.0.0.0/24 through st0.1.

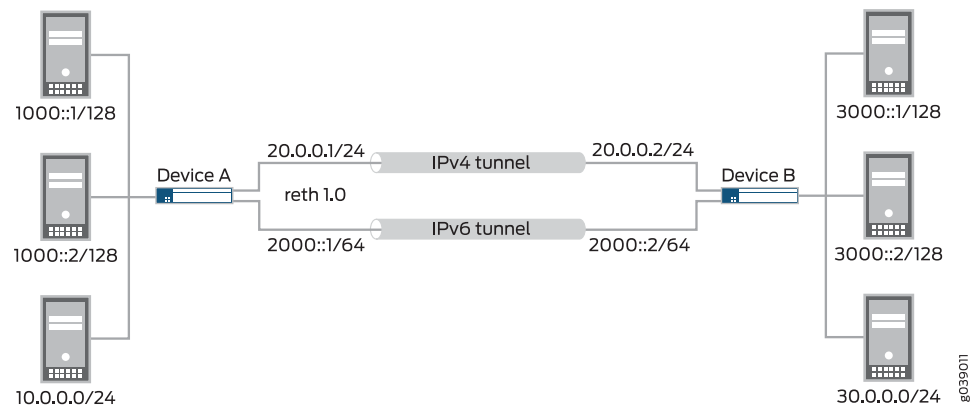


NOTE: Flow-based processing of IPv6 traffic must be enabled with the mode **flow-based** configuration option at the [edit security forwarding-options family inet6] hierarchy level.

Topology

In [Figure 44 on page 655](#), the SRX Series device A supports IPv4 and IPv6 tunnels to device B. IPv6 traffic to 3000::1/128 is routed through the IPv4 tunnel, while IPv6 traffic to 3000::2/128 and IPv4 traffic to 30.0.0.0/24 are routed through the IPv6 tunnel.

Figure 44: Dual-Stack Tunnel Example



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 gigether-options redundant-parent reth1
set interfaces ge-8/0/1 gigether-options redundant-parent reth1
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 20.0.0.1/24
set interfaces reth1 unit 0 family inet6 address 2000::1/64
set interfaces st0 unit 0 family inet6
set interfaces st0 unit 1 family inet
set interfaces st0 unit 1 family inet6
set security ike proposal ike_proposal authentication-method pre-shared-keys
set security ike proposal ike_proposal authentication-algorithm md5
set security ike proposal ike_proposal encryption-algorithm 3des-cbc
set security ike proposal ike_proposal lifetime-seconds 3600
set security ike policy ike_policy mode aggressive
set security ike policy ike_policy proposals ike_proposal
set security ike policy ike_policy pre-shared-key ascii-text "$ABC123"
set security ike gateway ike_gw_v6 ike-policy ike_policy
set security ike gateway ike_gw_v6 address 2000::2
set security ike gateway ike_gw_v6 external-interface reth1.0
set security ike gateway ike_gw_v6 version v2-only
set security ike gateway ike_gw_v4 ike-policy ike_policy
set security ike gateway ike_gw_v4 address 20.0.0.2
set security ike gateway ike_gw_v4 external-interface reth1.0
set security ipsec proposal ipsec_proposal protocol esp
set security ipsec proposal ipsec_proposal authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_proposal encryption-algorithm 3des-cbc
set security ipsec policy ipsec_policy proposals ipsec_proposal
set security ipsec vpn test_s2s_v6 bind-interface st0.1
set security ipsec vpn test_s2s_v6 ike gateway ike_gw_v6
set security ipsec vpn test_s2s_v6 ike ipsec-policy ipsec_policy
```

```

set security ipsec vpn test_s2s_v6 establish-tunnels immediately
set security ipsec vpn test_s2s_v4 bind-interface st0.0
set security ipsec vpn test_s2s_v4 ike gateway ike_gw_v4
set security ipsec vpn test_s2s_v4 ike ipsec-policy ipsec_policy
set routing-options rib inet6.0 static route 3000::1/128 next-hop st0.0
set routing-options rib inet6.0 static route 3000::2/128 next-hop st0.1
set routing-options static route 30.0.0.0/24 next-hop st0.1
set security forwarding-options family inet6 mode flow-based

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure dual-stack tunnels:

1. Configure the external interface.

```

[edit interfaces]
user@host# set ge-0/0/1 gigether-options redundant-parent reth1
user@host# set ge-8/0/1 gigether-options redundant-parent reth1
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 family inet address 20.0.0.1/24
user@host# set reth1 unit 0 family inet6 address 2000::1/64

```

2. Configure the secure tunnel interfaces.

```

[edit interfaces]
user@host# set st0 unit 0 family inet6
user@host# set st0 unit 1 family inet
user@host# set st0 unit 1 family inet6

```

3. Configure Phase 1 options.

```

[edit security ike proposal ike_proposal]
user@host# set authentication-method pre-shared-keys
user@host# set authentication-algorithm md5
user@host# set encryption-algorithm 3des-cbc
user@host# set lifetime-seconds 3600

```

```

[edit security ike policy ike_policy]
user@host# set mode aggressive
user@host# set proposals ike_proposal
user@host# set pre-shared-key ascii-text "$ABC123"

```

```

[edit security ike gateway ike_gw_v6]
user@host# set ike-policy ike_policy
user@host# set address 2000::2
user@host# set external-interface reth1.0
user@host# set version v2-only

```

```
[edit security ike gateway ike_gw_v4]
user@host# set ike-policy ike_policy
user@host# set address 20.0.0.2
user@host# set external-interface reth1.0
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec_proposal]
user@host# set protocol esp
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm 3des-cbc

[edit security ipsec policy ipsec_policy]
user@host# set proposals ipsec_proposal

[edit security ipsec vpn test_s2s_v6 ]
user@host# set bind-interface st0.1
user@host# set ike gateway ike_gw_v6
user@host# set ike ipsec-policy ipsec_policy
user@host# set establish-tunnels immediately

[edit security ipsec vpn test_s2s_v4]
user@host# set bind-interface st0.0
user@host# set ike gateway ike_gw_v4
user@host# set ike ipsec-policy ipsec_policy
```

5. Configure static routes.

```
[edit routing-options rib inet6.0]
user@host# set static route 3000::1/128 next-hop st0.0
user@host# set static route 3000::2/128 next-hop st0.1

[edit routing-options]
user@host# set static route 30.0.0.0/24 next-hop st0.1
```

6. Enable IPv6 flow-based forwarding.

```
[edit security forwarding-options]
user@host# set family inet6 mode flow-based
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security ike**, **show security ipsec**, **show routing-options**, and **show security forwarding-options** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
```

```
user@host# show interfaces
ge-0/0/1 {
  gige-ther-options {
    redundant-parent reth1;
  }
}
ge-8/0/1 {
  gige-ther-options {
    redundant-parent reth1;
  }
}
reth1 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 20.0.0.1/24;
    }
    family inet6 {
      address 2000::1/64;
    }
  }
}
st0 {
  unit 0 {
    family inet;
    family inet6;
  }
  unit 1 {
    family inet6;
  }
}
[edit]
user@host# show security ike
proposal ike_proposal {
  authentication-method pre-shared-keys;
  authentication-algorithm md5;
  encryption-algorithm 3des-cbc;
  lifetime-seconds 3600;
}
policy ike_policy {
  mode aggressive;
  proposals ike_proposal;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway ike_gw_v6 {
  ike-policy ike_policy;
  address 2000::2;
  external-interface reth1.0;
  version v2-only;
}
gateway ike_gw_4 {
  ike-policy ike_policy;
  address 20.0.0.2;
```

```

    external-interface reth1.0;
}
[edit]
user@host# show security ipsec
proposal ipsec_proposal {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm 3des-cbc;
}
policy ipsec_policy {
    proposals ipsec_proposal;
}
}
vpn test_s2s_v6 {
    bind-interface st0.1;
    ike {
        gateway ike_gw_v6;
        ipsec-policy ipsec_policy;
    }
    establish-tunnels immediately;
}
vpn test_s2s_v4 {
    bind-interface st0.0;
    ike {
        gateway ike_gw_4;
        ipsec-policy ipsec_policy;
    }
}
[edit]
user@host# show routing-options
rib inet6.0 {
    static {
        route 3000::1/128 next-hop st0.0;
        route 3000::2/128 next-hop st0.1;
    }
}
static {
    route 30.0.0.0/24 next-hop st0.1;
}
[edit]
user@host# show security forwarding-options
family {
    inet6 {
        mode flow-based;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying IKE Phase 1 Status on page 660](#)
- [Verifying IPsec Phase 2 Status on page 660](#)
- [Verifying Routes on page 661](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
1081812113	UP	51d9e6df8a929624	7bc15bb40781a902	IKEv2	2000::2
1887118424	UP	d80b55b949b54f0a	b75ecc815529ae8f	Aggressive	20.0.0.2

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration. Phase 1 proposal parameters must match on the peer devices.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<131074 ESP:3des/sha1  8828bd36  3571/  unlim    -   root 500   20.0.0.2
>131074 ESP:3des/sha1  c968afd8  3571/  unlim    -   root 500   20.0.0.2
<131073 ESP:3des/sha1  8e9e695a  3551/  unlim    -   root 500   2000::2
>131073 ESP:3des/sha1  b3a254d1  3551/  unlim    -   root 500   2000::2
```

Meaning The **show security ipsec security-associations** command lists all active IKE Phase 2 SAs. If no SAs are listed, there was a problem with Phase 2 establishment. Check the IKE policy

parameters and external interface settings in your configuration. Phase 2 proposal parameters must match on the peer devices.

Verifying Routes

Purpose Verify active routes.

Action From operational mode, enter the **show route** command.

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

```
inet.0: 20 destinations, 20 routes (20 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.5.0.0/16      *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.10.0.0/16     *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.150.0.0/16    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.150.48.0/21   *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.155.0.0/16    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.157.64.0/19   *[Direct/0] 3d 01:43:23
                 > via fxp0.0
10.157.72.36/32  *[Local/0] 3d 01:43:23
                 Local via fxp0.0
10.204.0.0/16    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.206.0.0/16    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
10.209.0.0/16    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
20.0.0.0/24      *[Direct/0] 03:45:41
                 > via reth1.0
20.0.0.1/32      *[Local/0] 03:45:41
                 Local via reth1.0
30.0.0.0/24      *[Static/5] 00:07:49
                 > via st0.1
50.0.0.0/24      *[Direct/0] 03:45:42
                 > via reth0.0
50.0.0.1/32      *[Local/0] 03:45:42
                 Local via reth0.0
172.16.0.0/12    *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
192.168.0.0/16   *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
192.168.102.0/23 *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
207.17.136.0/24  *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0
207.17.136.192/32 *[Static/5] 3d 01:43:23
                 > to 10.157.64.1 via fxp0.0

inet6.0: 10 destinations, 14 routes (10 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```

```

2000::/64          *[Direct/0] 03:45:41
                   > via reth1.0
2000::1/128        *[Local/0] 03:45:41
                   Local via reth1.0
3000::1/128        *[Static/5] 00:03:45
                   > via st0.0
3000::2/128        *[Static/5] 00:03:45
                   > via st0.1
5000::/64          *[Direct/0] 03:45:42
                   > via reth0.0
5000::1/128        *[Local/0] 03:45:42
                   Local via reth0.0
fe80::/64          *[Direct/0] 03:45:42
                   > via reth0.0
                   [Direct/0] 03:45:41
                   > via reth1.0
                   [Direct/0] 03:45:41
                   > via st0.0
                   [Direct/0] 03:45:13
                   > via st0.1
fe80::210:dbff:feff:1000/128
                   *[Local/0] 03:45:42
                   Local via reth0.0
fe80::210:dbff:feff:1001/128
                   *[Local/0] 03:45:41
                   Local via reth1.0

```

Meaning The **show route** command lists active entries in the routing tables.

See Also

- Related Documentation**
- [IPv6 IPsec VPNs on page 671](#)
 - [IPsec VPN Overview on page 31](#)

IPsec VPN Tunnels with Chassis Clusters

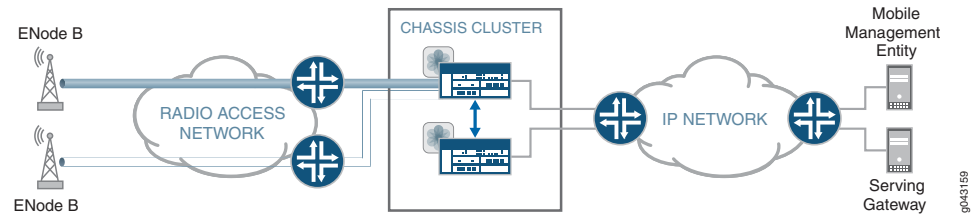
SRX Series devices support IPsec VPN tunnels in a chassis cluster setup. In an active/passive chassis cluster, all VPN tunnels terminate on the same node. In an active/active chassis cluster, VPN tunnels can terminate on either node.

- [Understanding Dual Active-Backup IPsec VPN Chassis Clusters on page 662](#)
- [Example: Configuring Redundancy Groups for Loopback Interfaces on page 664](#)

Understanding Dual Active-Backup IPsec VPN Chassis Clusters

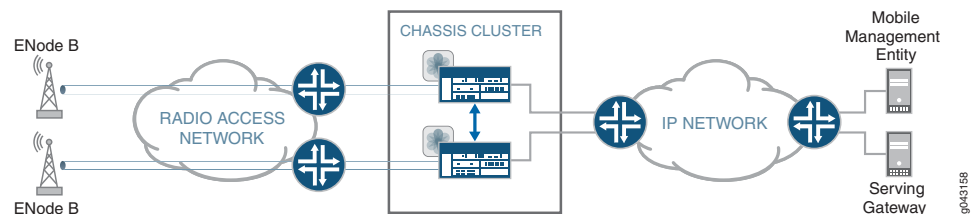
In an active/passive chassis cluster, all VPN tunnels terminate on the same node, as shown in [Figure 45 on page 663](#).

Figure 45: Active/Passive Chassis Cluster with IPsec VPN Tunnels



In an active/active chassis cluster, VPN tunnels can terminate on either node. Both nodes in the chassis cluster can actively pass traffic through VPN tunnels on both nodes at the same time, as shown in [Figure 46 on page 663](#). This deployment is known as *dual active-backup IPsec VPN chassis clusters*.

Figure 46: Dual Active-Backup IPsec VPN Chassis Clusters



The following features are supported with dual active-backup IPsec VPN chassis clusters:

- Route-based VPNs only. Policy-based VPNs are not supported.
- IKEv1 and IKEv2.
- Digital certificate or preshared key authentication.
- IKE and secure tunnel interfaces (st0) in virtual routers.
- Network Address Translation-Traversal (NAT-T).
- VPN monitoring.
- Dead peer detection.
- In-service software upgrade (ISSU).
- Insertion of Services Processing Cards (SPCs) on a chassis cluster device without disrupting the traffic on the existing VPN tunnels. See [“Understanding VPN Support for Inserting Services Processing Cards” on page 52](#).
- Dynamic routing protocols.
- Secure tunnel interfaces (st0) configured in point-to-multipoint mode.
- AutoVPN with st0 interfaces in point-to-point mode with traffic selectors.
- IPv4-in-IPv4, IPv6-in-IPv4, IPv6-in-IPv6 and IPv4-in-IPv6 tunnel modes.

- Fragmented traffic.
- The loopback interface can be configured as the external interface for the VPN.

Dual active-backup IPsec VPN chassis clusters cannot be configured with Z-mode flows. Z-mode flows occur when traffic enters an interface on a chassis cluster node, passes through the fabric link, and exits through an interface on the other cluster node.

See Also • *Chassis Cluster Feature Guide for SRX Series Devices*

Example: Configuring Redundancy Groups for Loopback Interfaces

This example shows how to configure a redundancy group (RG) for a loopback interface in order to prevent VPN failure. Redundancy groups are used to bundle interfaces into a group for failover purpose in a chassis cluster setup.

- [Requirements on page 664](#)
- [Overview on page 664](#)
- [Configuration on page 666](#)
- [Verification on page 670](#)

Requirements

This example uses the following hardware and software:

- A pair of supported chassis cluster SRX Series devices
- An SSG140 device or equivalent
- Two switches
- Junos OS Release 12.1x44-D10 or later for SRX Series Services Gateways

Before you begin:

Understand chassis cluster redundant Ethernet interfaces. See *Chassis Cluster Feature Guide for SRX Series Devices*.

Overview

An Internet Key Exchange (IKE) gateway needs an external interface to communicate with a peer device. In a chassis cluster setup, the node on which the external interface is active selects a Services Processing Unit (SPU) to support the VPN tunnel. IKE and IPsec packets are processed on that SPU. Therefore, the active external interface decides the anchor SPU.

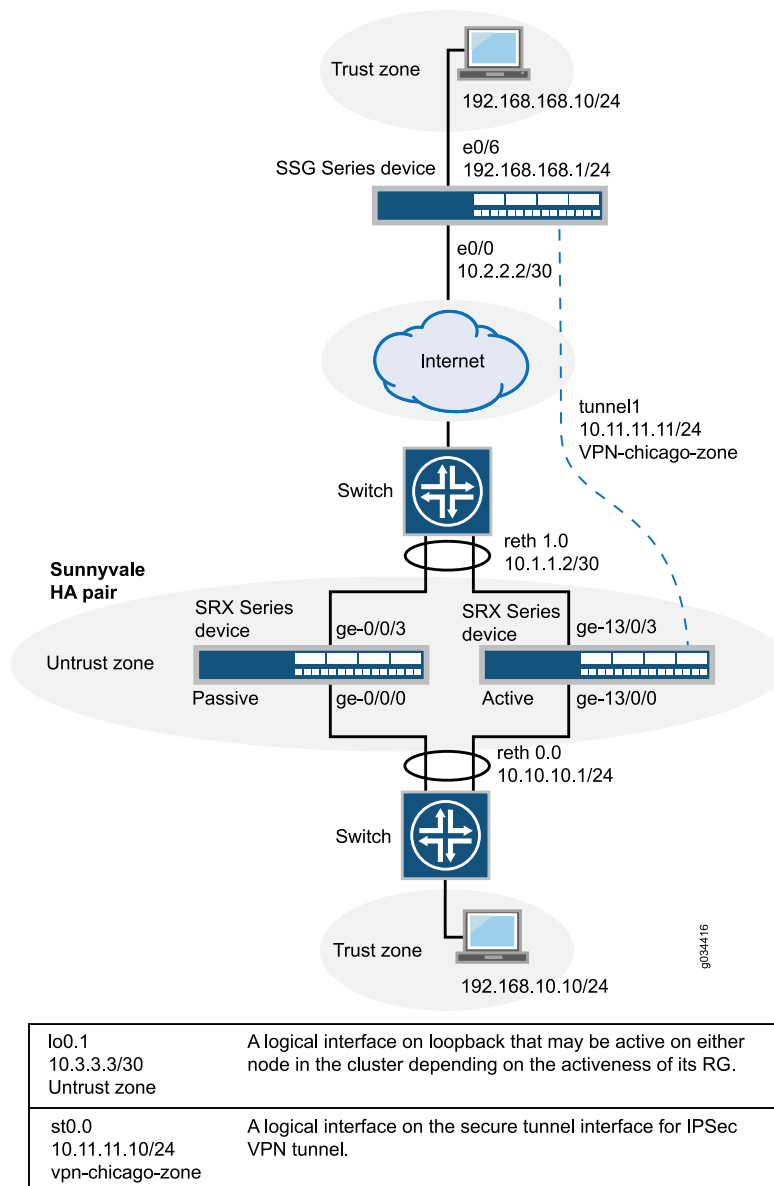
In a chassis cluster setup, the external interface is a redundant Ethernet interface. A redundant Ethernet interface can go down when its physical (child) interfaces are down. You can configure a loopback interface as an alternative physical interface to reach the peer gateway. Loopback interfaces can be configured on any redundancy group. This redundancy group configuration is only checked for VPN packets, because only VPN packets must find the anchor SPU through the active interface.



NOTE: You must configure lo0.x in a custom virtual router, since lo0.0 is in the default virtual router and only one loopback interface is allowed in a virtual router.

Figure 47 on page 666 shows an example of a loopback chassis cluster VPN topology. In this topology, the SRX Series chassis cluster device is located in Sunnyvale, California. The SRX Series chassis cluster device works as a single gateway in this setup. The SSG Series device (or a third-party device) is located in Chicago, Illinois. This device acts as a peer device to the SRX chassis cluster and it helps to build a VPN tunnel.

Figure 47: Loopback Interface for Chassis Cluster VPN



Configuration

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces lo0 redundant-pseudo-interface-options redundancy-group 1
```

```

set interfaces lo0 unit 1 family inet address 10.3.3.3/30
set routing-instances vr1 instance-type virtual-router
set routing-instances vr1 interface lo0.1
set routing-instances vr1 interface reth0.0
set routing-instances vr1 interface reth1.0
set routing-instances vr1 interface st0.0
set routing-instances vr1 routing-options static route 192.168.168.1/24 next-hop st0.0
set security ike policy ike-policy1 mode main
set security ike policy ike-policy1 proposal-set standard
set security ike policy ike-policy1 pre-shared-key ascii-text "$ABC123"
set security ike gateway t-ike-gate ike-policy ike-policy1
set security ike gateway t-ike-gate address 10.2.2.2
set security ike gateway t-ike-gate external-interface lo0.1
set security ipsec proposal p2-std-p1 authentication-algorithm hmac-sha1-96
set security ipsec proposal p2-std-p1 encryption-algorithm 3des-cbc
set security ipsec proposal p2-std-p1 lifetime-seconds 180
set security ipsec proposal p2-std-p2 authentication-algorithm hmac-sha1-96
set security ipsec proposal p2-std-p2 encryption-algorithm aes-128-cbc
set security ipsec proposal p2-std-p2 lifetime-seconds 180
set security ipsec policy vpn-policy1 perfect-forward-secrecy keys group2
set security ipsec policy vpn-policy1 proposals p2-std-p1
set security ipsec policy vpn-policy1 proposals p2-std-p2
set security ipsec vpn t-ike-vpn bind-interface st0.0
set security ipsec vpn t-ike-vpn ike gateway t-ike-gate
set security ipsec vpn t-ike-vpn ike proxy-identity local 10.10.10.1/24
set security ipsec vpn t-ike-vpn ike proxy-identity remote 192.168.168.1/24
set security ipsec vpn t-ike-vpn ike ipsec-policy vpn-policy1

```

Step-by-Step Procedure To configure a redundancy group for a loopback interface:

1. Configure the loopback interface in one redundancy group.

```

[edit interfaces]
user@host# set lo0 redundant-pseudo-interface-options redundancy-group 1

```

2. Configure the IP address for the loopback interface.

```

[edit interfaces]
user@host# set lo0 unit 1 family inet address 10.3.3.3/30

```

3. Configure routing options.

```

[edit routing-instances]
user@host# set vr1 instance-type virtual-router
user@host# set vr1 interface lo0.1
user@host# set vr1 interface reth0.0
user@host# set vr1 interface reth1.0
user@host# set vr1 interface st0.0
user@host# set vr1 routing-options static route 192.168.168.1/24 next-hop st0.0

```

4. Configure the loopback interface as an external interface for the IKE gateway.

```
[edit security ike]
user@host# set policy ike-policy1 mode main
user@host# set policy ike-policy1 proposal-set standard
user@host# set policy ike-policy1 pre-shared-key ascii-text "$ABC123"
user@host# set gateway t-ike-gate ike-policy ike-policy1
user@host# set gateway t-ike-gate address 10.2.2.2
user@host# set gateway t-ike-gate external-interface lo0.1
```

5. Configure an IPsec proposal.

```
[edit security ipsec]
user@host# set proposal p2-std-p1 authentication-algorithm hmac-sha1-96
user@host# set proposal p2-std-p1 encryption-algorithm 3des-cbc
user@host# set proposal p2-std-p1 lifetime-seconds 180
user@host# set proposal p2-std-p2 authentication-algorithm hmac-sha1-96
user@host# set proposal p2-std-p2 encryption-algorithm aes-128-cbc
user@host# set proposal p2-std-p2 lifetime-seconds 180
user@host# set policy vpn-policy1 perfect-forward-secrecy keys group2
user@host# set policy vpn-policy1 proposals p2-std-p1
user@host# set policy vpn-policy1 proposals p2-std-p2
user@host# set vpn t-ike-vpn bind-interface st0.0
user@host# set vpn t-ike-vpn ike gateway t-ike-gate
user@host# set vpn t-ike-vpn ike proxy-identity local 10.10.10.1/24
user@host# set vpn t-ike-vpn ike proxy-identity remote 192.168.168.1/24
user@host# set vpn t-ike-vpn ike ipsec-policy vpn-policy1
```

Results From configuration mode, confirm your configuration by entering the **show interfaces lo0**, **show routing-instances**, **show security ike**, and **show security ipsec** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces lo0
unit 1 {
  family inet {
    address 10.3.3.3/30;
  }
}
redundant-pseudo-interface-options {
  redundancy-group 1;
}
```

```
[edit]
user@host# show routing-instances
vr1 {
  instance-type virtual-router;
  interface lo0.1;
  interface reth0.0;
  interface reth1.0;
  interface st0.0;
```



```

routing-options {
  static {
    route 192.168.168.1/24 next-hop st0.0;
  }
}

```

```

[edit]
user@host# show security ike
policy ike-policy1 {
  mode main;
  proposal-set standard;
  pre-shared-key ascii-text "$ABC123";
}
gateway t-ike-gate {
  ike-policy ike-policy1;
  address 10.2.2.2;
  external-interface lo0.1;
}

```

```

[edit]
user@host# show security ipsec
proposal p2-std-p1 {
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm 3des-cbc;
  lifetime-seconds 180;
}
proposal p2-std-p2 {
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-128-cbc;
  lifetime-seconds 180;
}
policy vpn-policy1 {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals [ p2-std-p1 p2-std-p2 ];
}
policy vpn-policy2 {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals [ p2-std-p1 p2-std-p2 ];
}
vpn t-ike-vpn {
  bind-interface st0.0;
  ike {
    gateway t-ike-gate;
    proxy-identity {
      local 10.10.10.1/24;
      remote 192.168.168.1/24;
    }
    ipsec-policy vpn-policy1;
  }
}

```

```
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying the Configuration

Purpose Verify that the configuration for redundancy groups for loopback interfaces is correct.

Action From operational mode, enter the **show chassis cluster interfaces** command.

```
user@host> show chassis cluster interfaces
Control link status: Up
Control interfaces:
Index Interface Status
0 em0 Up
1 em1 Down
Fabric link status: Up
Fabric interfaces:
Name Child-interface Status
fab0 ge-0/0/7 Up / Up
fab0
fab1 ge-13/0/7 Up / Up
fab1
Redundant-ethernet Information:
Name Status Redundancy-group
reth0 Up 1
reth1 Up 1
reth2 Up 1
reth3 Down Not configured
reth4 Down Not configured
Redundant-pseudo-interface Information:
Name Status Redundancy-group
lo0 Up 1
```

Meaning The **show chassis cluster interfaces** command displays the chassis cluster interfaces information. If the status of the Redundant-pseudo-interface Information field shows the lo0 interface as Up and the status of the Redundant-ethernet Information field shows reth0, reth1, and reth2 fields as Up then your configuration is correct.

See Also • [Understanding the Loopback Interface for a High Availability VPN on page 971](#)

Related Documentation • [Chassis Cluster Feature Guide for SRX Series Devices](#)

CHAPTER 7

Configuring IPv6 IPsec VPNs

- [IPv6 IPsec VPNs on page 671](#)

IPv6 IPsec VPNs

Juniper Networks supports manual and autokey IKE with preshared keys configurations for IPv6 IPsec VPN.

- [VPN Feature Support for IPv6 Addresses on page 671](#)
- [Understanding IPv6 IKE and IPsec Packet Processing on page 675](#)
- [IPv6 IPsec Configuration Overview on page 681](#)
- [Example: Configuring an IPv6 IPsec Manual VPN on page 681](#)
- [Example: Configuring an IPv6 AutoKey IKE Policy-Based VPN on page 684](#)

VPN Feature Support for IPv6 Addresses

A route-based site-to-site VPN tunnel with a point-to-point secure tunnel interface can operate in IPv4-in-IPv4, IPv6-in-IPv6, IPv6-in-IPv4, or IPv4-in-IPv6 tunnel modes. IPv6 addresses can be in the outer IP header, which represents the tunnel endpoint, or in the inner IP header, which represents the final source and destination addresses for a packet.

[Table 77 on page 671](#) defines the support for IPv6 addresses in VPN features.

Table 77: IPv6 Address Support in VPN Features

Feature	Supported	Exceptions
IKE and IPsec Support:		
IKEv1 and IKEv2	Yes	Unless specified, all supported features are applicable for IKEv1 and IKEv2.
Route-based VPN	Yes	—
Policy-based VPN	Yes	IPv6 policy-based VPNs are not supported on SRX Series devices in chassis cluster configurations. IPv6 policy-based VPNs are only supported with IPv6-in-IPv6 tunnels on standalone SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

Table 77: IPv6 Address Support in VPN Features (continued)

Feature	Supported	Exceptions
Site-to-site VPN	Yes	Only one-to-one, site-to-site VPN is supported. Many-to-one, site-to-site VPN (NHTB) is not supported. NHTB configuration cannot be committed for tunnel modes other than IPv4-in-IPv4 tunnels.
Dynamic endpoint VPN	Yes	—
Dialup VPN	Yes	—
AutoVPN	Yes	AutoVPN networks that use secure tunnel interfaces in point-to-point mode support IPv6 addresses for traffic selectors and for IKE peers. AutoVPN in point-to-multipoint mode does not support IPv6 traffic.
Group VPN	No	—
Point-to-point tunnel interfaces	Yes	—
Point-to-multipoint tunnel interfaces	No	—
Hub-and-spoke scenario for site-to-site VPNs	Yes	—
Numbered and unnumbered tunnel interfaces	Yes	—
Unicast static and dynamic (RIP, OSPF, BGP) routing	Yes	—
Multicast dynamic routing (PIM)	No	—
Virtual router	Yes	—
Logical system	No	—
Automatic and manual SA and key management	Yes	—
Multiple SPUs	Yes	—
Chassis cluster	Yes	IPsec VPN with active-active mode is supported only on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices for route-based IPv6 tunnels. IPsec VPN with active-active mode is not supported on SRX5400, SRX5600, and SRX5800 devices.
Statistics, logs, per-tunnel debugging	Yes	—
SNMP MIB	Yes	—

Table 77: IPv6 Address Support in VPN Features (continued)

Feature	Supported	Exceptions
Local address selection	Yes	When multiple addresses in the same address family are configured on a physical external interface to a VPN peer, we recommend that you also configure local-address at the [edit security ike gateway gateway-name] hierarchy level.
Loopback address termination	Yes	—
Xauth or modecfg over IPv6	No	—
SPC insert	Yes	—
ISSU	Yes	—
DNS name as IKE gateway address	Yes	As with IPv4 tunnels, peer gateway address changes in the DNS name are not supported with IPv6 tunnels.
Preshared key or certificate authentication	Yes	—
NAT-Traversal (NAT-T) for IPv4 IKE peers	Yes	NAT-T is supported only for IPv6-in-IPv4 and IPv4-in-IPv4 tunnel modes with IKEv1. IPv6-in-IPv6 and IPv4-in-IPv6 tunnel modes are not supported. IKEv2 is not supported for NAT-T. NAT-T from IPv6 to IPv4 or from IPv4 to IPv6 is not supported.
Dead peer detection (DPD) and DPD gateway failover	Yes	DPD gateway failover is only supported for different gateway addresses within the same family. Failover from an IPv6 gateway address to an IPv4 gateway address, or vice versa, is not supported.
Encryption sets, authentication algorithms, and DH groups supported in Junos OS Release 12.1X45-D10 release for SRX Series devices.	Yes	—
Generic proposals and policies for IPv6 and IPv4	Yes	—
General IKE ID	Yes	—
ESP and AH transport modes	No	These modes are not supported for IPv4.
ESP and AH tunnel modes	Yes	AH tunnel mode with mutable extension headers and options is not supported.
Extended sequence number	No	—
Single proxy ID pairs	Yes	—
Multiple traffic selector pairs	Yes	Supported with IKEv1 only.
Lifetime of IKE or IPsec SA, in seconds	Yes	—

Table 77: IPv6 Address Support in VPN Features (continued)

Feature	Supported	Exceptions
Lifetime of IKE SA, in kilobytes	Yes	—
VPN monitoring	No	Configuration with IPv6 tunnels cannot be committed.
DF bit	Yes	For IPv6-in-IPv6 tunnels, the DF bit is set only if configured at the <code>[edit security ipsec vpn vpn-name]</code> hierarchy level. df-bit clear is the default.
Dual-stack (parallel IPv4 and IPv6 tunnels) over a single physical interface	Yes	For route-based site-to-site VPNs. A single IPv4 tunnel can operate in both IPv4-in-IPv4 and IPv6-in-IPv4 tunnel modes and a single IPv6 tunnel can operate in both IPv4-in-IPv6 and IPv6-in-IPv6 tunnel modes.
IPv6 extension headers	Yes	IPv6 extension headers and IPv4 options for IKE and IPsec packets are accepted but are not processed. AH with mutable EHs and options is not supported.
Fragmentation and reassembly	Yes	—
VPN session affinity	Yes	—
Multicast traffic	No	—
Tunnel IP services (Screen, NAT, ALG, IPS, AppSecure)	Yes	—
Packet reordering for IPv6 fragments over tunnel	No	—
Bidirectional Forwarding Detection (BFD) over OSPFv3 routes on st0 interface	No	—
Neighbor Discovery Protocol (NDP) over st0 interfaces	No	—
PKI Support:		
PKI in virtual router	Yes	—
RSA signature authentication (512-, 1024-, 2048-, or 4096-bit key size)	Yes	—
DSA signature authentication (1024-, 2048-, or 4096-bit key size)	Yes	—
ECDSA signatures	Yes	—
Certificate chain authentication	No	—
Automatic or manual enrollment over IPv4	Yes	—

Table 77: IPv6 Address Support in VPN Features (continued)

Feature	Supported	Exceptions
Automatic or manual revocation over IPv4	Yes	–
Automatic or manual enrollment over IPv6	No	–
Automatic or manual revocation over IPv6	No	–
IPv6 addresses within PKI certificate fields	No	–

- See Also**
- [Understanding VPN Tunnel Modes on page 649](#)
 - [IPsec VPN Overview on page 31](#)

Understanding IPv6 IKE and IPsec Packet Processing

This topic includes the following sections:

- [IPv6 IKE Packet Processing on page 675](#)
- [IPv6 IPsec Packet Processing on page 677](#)

IPv6 IKE Packet Processing

Internet Key Exchange (IKE) is part of the IPsec suite of protocols. It automatically enables two tunnel endpoints to set up security associations (SAs) and negotiate secret keys with each other. There is no need to manually configure the security parameters. IKE also provides authentication for communicating peers.

IKE packet processing in IPv6 networks involves the following elements:

- Internet Security Association and Key Management Protocol (ISAKMP) Identification Payload

ISAKMP identification payload is used to identify and authenticate the communicating IPv6 peers. Two ID types (ID_IPV6_ADDR and ID_IPV6_ADDR_SUBNET) are enabled for IPv6. The ID type indicates the type of identification to be used. The ID_IPV6_ADDR type specifies a single 16-octet IPv6 address. This ID type represents an IPv6 address. The ID_IPV6_ADDR_SUBNET type specifies a range of IPv6 addresses represented by two 16-octet values. This ID type represents an IPv6 network mask. [Table 78 on page 675](#) lists the ID types and their assigned values in the identification payload.

Table 78: ISAKMP ID Types and Their Values

ID Type	Value
RESERVED	0
ID_IPV4_ADDR	1
ID_FQDN	2

Table 78: ISAKMP ID Types and Their Values (continued)

ID Type	Value
ID_USER_FQDN	3
ID_IPV4_ADDR_SUBNET	4
ID_IPV6_ADDR	5
ID_IPV6_ADDR_SUBNET	6
ID_IPV4_ADDR_RANGE	7
ID_IPV6_ADDR_RANGE	8
ID_DER_ASN1_DN	9
ID_DER_ASN1_GN	10
ID_KEY_ID	11
ID_LIST	12

The ID_IPV6_ADDR_RANGE type specifies a range of IPv6 addresses represented by two 16-octet values. The first octet value represents the starting IPv6 address and the second octet value represents the ending IPv6 address in the range. All IPv6 addresses falling between the first and last IPv6 addresses are considered to be part of the list.



NOTE: Two ID types in ISAKMP identification payload (ID_IPV6_ADDR_RANGE and ID_IPV4_ADDR_RANGE) are not supported in this release.

- Proxy ID

A proxy ID is used during Phase 2 of IKE negotiation. It is generated before an IPsec tunnel is established. A proxy ID identifies the SA to be used for the VPN. Two proxy IDs are generated—local and remote. The local proxy ID refers to the local IPv4 or IPv6 address/network and subnet mask. The remote proxy ID refers to the remote IPv4 or IPv6 address/network and subnet mask.

- Security Association

An SA is an agreement between VPN participants to support secure communication. SAs are differentiated based on three parameters—security parameter index (SPI), destination IPv6 address, and security protocol (either AH or ESP). The SPI is a unique value assigned to an SA to help identify an SA among multiple SAs. In an IPv6 packet, the SA is identified from the destination address in the outer IPv6 header and the security protocol is identified from either the AH or the ESP header.

IPv6 IPsec Packet Processing

After IKE negotiations are completed and the two IKE gateways have established Phase 1 and Phase 2 SAs, IPv6 IPsec employs authentication and encryption technologies to secure the IPv6 packets. Because IPv6 addresses are 128 bits long compared to IPv4 addresses, which are 32-bits long, IPv6 IPsec packet processing requires more resources.



NOTE: Packet reordering for IPv6 fragments over a tunnel is not supported.

Devices with IPv6 addressing do not perform fragmentation. IPv6 hosts should either perform path MTU discovery or send packets smaller than the IPv6 minimum MTU size of 1280 bytes.

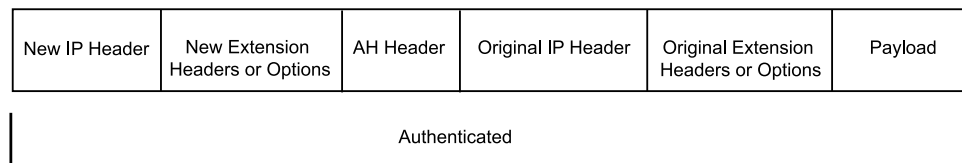
This topic includes the following sections:

- [AH Protocol in IPv6 on page 677](#)
- [ESP Protocol in IPv6 on page 678](#)
- [IPv4 Options and IPv6 Extension Headers with AH and ESP on page 678](#)
- [Integrity Check Value Calculation in IPv6 on page 678](#)
- [Header Construction in Tunnel Modes on page 679](#)

AH Protocol in IPv6

The AH protocol provides data integrity and data authentication for IPv6 packets. IPv6 IPsec uses extension headers (for example, hop-by-hop and routing options) that must be arranged in a particular way in the IPv6 datagram. In AH tunnel mode, the AH header immediately follows the new outer IPv6 header similar to that in IPv4 AH tunnel mode. The extension headers are placed after the original inner header. Therefore, in AH tunnel mode, the entire packet is encapsulated by adding a new outer IPv6 header, followed by an authentication header, an inner header, extension headers, and the rest of the original datagram as shown in [Figure 48 on page 677](#).

Figure 48: IPv6 AH Tunnel Mode



Unlike ESP, the AH authentication algorithm covers the outer header as well as any new extension headers and options.

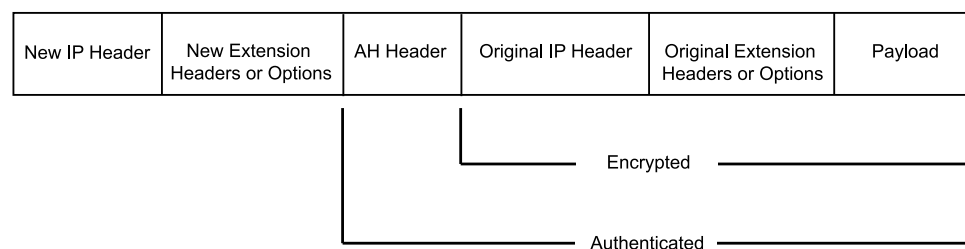


NOTE: AH tunnel mode on SRX Series devices does not support IPv4 mutable options or IPv6 mutable extension headers. See [Table 79 on page 678](#).

ESP Protocol in IPv6

ESP protocol provides both encryption and authentication for IPv6 packets. Because IPv6 IPsec uses extension headers (for example, hop-by-hop and routing options) in the IPv6 datagram, the most important difference between IPv6 ESP tunnel mode and IPv4 ESP tunnel mode is the placement of extension headers in the packet layout. In ESP tunnel mode, the ESP header immediately follows the new outer IPv6 header similar to that in IPv4 ESP tunnel mode. Therefore, in ESP tunnel mode, the entire packet is encapsulated by adding a new outer IPv6 header, followed by an ESP header, an inner header, extension headers, and the rest of the original datagram as shown in [Figure 49 on page 678](#).

Figure 49: IPv6 ESP Tunnel Mode



IPv4 Options and IPv6 Extension Headers with AH and ESP

IPsec packets with IPv4 options or IPv6 extension headers can be received for decapsulation on SRX Series devices. [Table 79 on page 678](#) shows the IPv4 options or IPv6 extension headers that are supported with the ESP or AH protocol on SRX Series devices. If an unsupported IPsec packet is received, ICV calculation fails and the packet is dropped.

Table 79: Support for IPv4 Options or IPv6 Extension Headers

Options or Extension Headers	SRX300, SRX320, SRX340, SRX345, and SRX550HM Devices	SRX5400, SRX5600, and SRX5800 Devices
ESP with IPv4 options	Supported	Supported
ESP with IPv6 extension headers	Supported	Supported
AH with IPv4 immutable options	Supported	Supported
AH with IPv6 immutable extension headers	Supported	Supported
AH with IPv4 mutable options	Not supported	Not supported
AH with IPv6 mutable extension headers	Not supported	Not supported

Integrity Check Value Calculation in IPv6

The AH protocol verifies the integrity of the IPv6 packet by computing an Integrity Check Value (ICV) on the packet contents. ICV is usually built over an authentication algorithm

such as MD5 or SHA-1. The IPv6 ICV calculations differ from that in IPv4 in terms of two header fields—mutable header and optional extension header.

You can calculate the AH ICV over the IPv6 header fields that are either immutable in transit or predictable in value upon arrival at the tunnel endpoints. You can also calculate the AH ICV over the AH header and the upper level protocol data (considered to be immutable in transit). You can calculate the ESP ICV over the entire IPv6 packet, excluding the new outer IPv6 header and the optional extension headers.



NOTE: Unlike IPv4, IPv6 has a method for tagging options as mutable in transit. IPv6 optional extension headers contain a flag that indicates mutability. This flag determines the appropriate processing.

IPv4 mutable options and IPv6 extension headers are not supported with the AH protocol.

Header Construction in Tunnel Modes

In tunnel mode, the source and destination addresses of the outer IPv4 or IPv6 header represent the tunnel endpoints, while the source and destination addresses of the inner IPv4 or IPv6 header represent the final source and destination addresses.

[Table 80 on page 679](#) summarizes how the outer IPv6 header relates to the inner IPv6 or IPv4 header for IPv6-in-IPv6 or IPv4-in-IPv6 tunnel modes. In outer header fields, “Constructed” means that the value of the outer header field is constructed independently of the value in the inner header field.

Table 80: IPv6 Header Construction for IPv6-in-IPv6 and IPv4-in-IPv6 Tunnel Modes

Header Fields	Outer Header at Encapsulator	Inner Header at Decapsulator
version	6.	No change.
DS field	Copied from the inner header.	No change.
ECN field	Copied from the inner header.	Constructed.
flow label	0.	No change.
payload length	Constructed.	No change.
next header	AH, ESP, and routing header.	No change.
hop limit	64.	Decrement.
src address	Constructed.	No change.
dest address	Constructed.	No change.
Extension headers	Never copied.	No change.

[Table 81 on page 680](#) summarizes how the outer IPv4 header relates to the inner IPv6 or IPv4 header for IPv6-in-IPv4 or IPv4-in-IPv4 tunnel modes. In outer header fields, “Constructed” means that the value of the outer header field is constructed independently of the value in the inner header field.

Table 81: IPv4 Header Construction for IPv6-in-IPv4 and IPv4-in-IPv4 Tunnel Modes

Header Fields	Outer Header	Inner Header
version	4.	No change.
header length	Constructed.	No change.
DS field	Copied from the inner header.	No change.
ECN field	Copied from the inner header.	Constructed.
total length	Constructed.	No change.
ID	Constructed.	No change.
flags (DF, MF)	Constructed.	No change.
fragment offset	Constructed.	No change.
TTL	64.	Decrement.
protocol	AH, ESP	No change.
checksum	Constructed.	Constructed.
src address	Constructed.	No change.
dest address	Constructed.	No change.
options	Never copied.	No change.

For IPv6-in-IPv4 tunnel mode, the Don't Fragment (DF) bit is cleared by default. If the **df-bit set** or **df-bit copy** options are configured at the `[edit security ipsec vpn vpn-name]` hierarchy level for the corresponding IPv4 VPN, the DF bit is set in the outer IPv4 header.

For IPv4-in-IPv4 tunnel mode, the DF bit in the outer IPv4 header is based on the **df-bit** option configured for the inner IPv4 header. If **df-bit** is not configured for the inner IPv4 header, the DF bit is cleared in the outer IPv4 header.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [IPv6 IPsec Configuration Overview on page 681](#)

IPv6 IPsec Configuration Overview

Juniper Networks supports manual and autokey IKE with preshared keys configurations for IPv6 IPsec VPN.

- **Manual VPN**—In a manual VPN configuration, the secret keys and security associations (SAs) are manually configured on the tunnel endpoints using the manual key mechanism. To create an IPv6 IPsec manual VPN, see [“Example: Configuring an IPv6 IPsec Manual VPN” on page 681](#).
- **AutoKey IKE VPN**—In an autoKey IKE VPN configuration, the secret keys and SAs are automatically created using the autoKey IKE mechanism. To set up an IPv6 autoKey IKE VPN, two phases of negotiations are required—Phase 1 and Phase 2.
 - **Phase 1**—In this phase, the participants establish a secure channel for negotiating the IPsec SAs. For more information on Phase 1 negotiations, see [“Understanding Phase 1 of IKE Tunnel Negotiation” on page 46](#).
 - **Phase 2**—In this phase, the participants negotiate the IPsec SAs for authenticating and encrypting the IPv6 data packets. For more information on Phase 2 negotiations, see [“Understanding Phase 2 of IKE Tunnel Negotiation” on page 48](#).

- See Also**
- [IPsec VPN with Autokey IKE Configuration Overview on page 55](#)
 - [Example: Configuring an IPv6 address as the Source Address for a CA Profile on page 995](#)

Example: Configuring an IPv6 IPsec Manual VPN

This example shows how to configure an IPv6 IPsec manual VPN.

- [Requirements on page 681](#)
- [Overview on page 681](#)
- [Configuration on page 682](#)
- [Verification on page 683](#)

Requirements

Before you begin:

- Understand how VPNs work. See [“IPsec VPN Overview” on page 31](#).
- Understand IPv6 IPsec packet processing. See [“Understanding IPv6 IKE and IPsec Packet Processing” on page 675](#).

Overview

In a Manual VPN configuration, the secret keys are manually configured on the two IPsec endpoints.

In this example, you:

- Configure the authentication parameters for a VPN named vpn-sunnyvale.
- Configure the encryption parameters for vpn-sunnyvale.
- Specify the outgoing interface for the SA.
- Specify the IPv6 address of the peer.
- Define the IPsec protocol. Select the ESP protocol because the configuration includes both authentication and encryption.
- Configure a security parameter index (SPI).

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ipsec vpn vpn-sunnyvale manual authentication algorithm hmac-md5-96
key ascii-text "$ABC123"
set security ipsec vpn vpn-sunnyvale manual encryption algorithm 3des-cbc key ascii-text
"$ABC123"
set security ipsec vpn vpn-sunnyvale manual external-interface ge-0/0/14.0
set security ipsec vpn vpn-sunnyvale manual gateway 2001:db8:1212::1112
set security ipsec vpn vpn-sunnyvale manual protocol esp
set security ipsec vpn vpn-sunnyvale manual spi 12435
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security algorithms:

1. Configure the authentication parameters.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set authentication algorithm hmac-md5-96 key ascii-text "$ABC123"
```

2. Configure the encryption parameters.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set encryption algorithm 3des-cbc key ascii-text "$ABC123"
```

3. Specify the outgoing interface for the SA.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set external-interface ge-0/0/14.0
```

4. Specify the IPv6 address of the peer.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set gateway 2001:db8:1212::1112
```

5. Define the IPsec protocol.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set protocol esp
```

6. Configure an SPI.

```
[edit security ipsec vpn vpn-sunnyvale manual]
user@host# set spi 12435
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec vpn vpn-sunnyvale** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
[user@host]show security ipsec vpn vpn-sunnyvale
manual {
  gateway 2001:db8:1212::1112 ;
  external-interface ge-0/0/14.0 ;
  protocol esp ;
  spi 12435 ;
  authentication {
    algorithm hmac-md5-96 ;
    key ascii-text $ABC123" ;## SECRET DATA
  }
  encryption {
    algorithm 3des-cbc ;
    key ascii-text $ABC123" ;## SECRET DATA
  }
}
```

Verification

To confirm that the configuration is working properly, perform this task:

- [Verifying Security Algorithms on page 683](#)

Verifying Security Algorithms

Purpose Determine if security algorithms are applied or not.

Action From operational mode, enter the **show security ipsec security-associations** command.

See Also • [IPv6 IPsec Configuration Overview on page 681](#)

Example: Configuring an IPv6 AutoKey IKE Policy-Based VPN

This example shows how to configure a policy-based IPv6 AutoKey IKE VPN to allow IPv6 data to be securely transferred between the branch office and the corporate office.



NOTE: IPv6 policy-based VPNs are supported only on standalone SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

- [Requirements on page 684](#)
- [Overview on page 684](#)
- [Configuration on page 688](#)
- [Verification on page 698](#)

Requirements

This example uses the following hardware:

- SRX300 device

Before you begin:

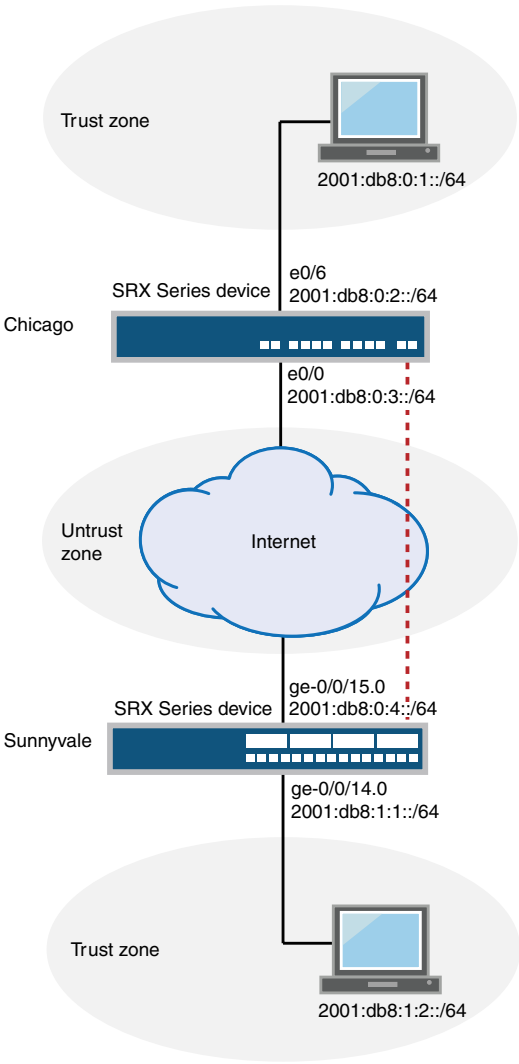
- Understand how VPNs work. See [“IPsec VPN Overview” on page 31](#).
- Understand IPv6 IKE and IPsec packet processing. See [“Understanding IPv6 IKE and IPsec Packet Processing” on page 675](#).

Overview

In this example, you configure an IPv6 IKE policy-based VPN for a branch office in Chicago, Illinois, because you do not need to conserve tunnel resources or configure many security policies to filter traffic through the tunnel. Users in the Chicago office will use the VPN to connect to their corporate headquarters in Sunnyvale, California.

[Figure 50 on page 685](#) shows an example of an IPv6 IKE policy-based VPN topology. In this topology, one SRX Series device is located in Sunnyvale, and another SRX Series device (this can be a second SRX Series device or a third-party device) is located in Chicago.

Figure 50: IPv6 IKE Policy-Based VPN Topology



In this example, you configure interfaces, an IPv6 default route, security zones, and address books. Then you configure IKE Phase 1, IPsec Phase 2, a security policy, and TCP-MSS parameters. See [Table 82 on page 685](#) through [Table 86 on page 687](#).

Table 82: Interface, Security Zone, and Address Book Information

Feature	Name	Configuration Parameters
Interfaces	ge-0/0/14.0	2001:db8:1:1::/64
	ge-0/0/15.0	2001:db8:0:4::/64

Table 82: Interface, Security Zone, and Address Book Information (continued)

Feature	Name	Configuration Parameters
Security zones	trust	<ul style="list-style-type: none"> All system services are allowed. The ge-0/0/14.0 interface is bound to this zone.
	untrust	<ul style="list-style-type: none"> IKE is the only allowed system service. The ge-0/0/15.0 interface is bound to this zone.
Address book entries	sunnyvale	<ul style="list-style-type: none"> This address is for the trust zone's address book. The address for this address book entry is 2001:db8:1:2::/64.
	chicago	<ul style="list-style-type: none"> This address is for the untrust zone's address book. The address for this address book entry is 2001:db8:0:1::/64.

Table 83: IPv6 IKE Phase 1 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipv6-ike-phase1-proposal	<ul style="list-style-type: none"> Authentication method: pre-shared-keys Diffie-Hellman group: group2 Authentication algorithm: sha1 Encryption algorithm: aes-128-cbc
Policy	ipv6-ike-phase1-policy	<ul style="list-style-type: none"> Mode: Aggressive Proposal reference: ipv6-ike-phase1-proposal IKE Phase 1 policy authentication method: pre-shared-key ascii-text
Gateway	gw-chicago	<ul style="list-style-type: none"> IKE policy reference: ipv6-ike-phase1-policy External interface: ge-0/0/15.0 Gateway address: 2001:db8:0:3::/64

Table 84: IPv6 IPsec Phase 2 Configuration Parameters

Feature	Name	Configuration Parameters
Proposal	ipv6-ipsec-phase2-proposal	<ul style="list-style-type: none"> Protocol: esp Authentication algorithm: hmac-sha1-96 Encryption algorithm: aes-128-cbc
Policy	ipv6-ipsec-phase2-policy	<ul style="list-style-type: none"> Proposal reference: ipv6-ipsec-phase2-proposal PFS: Diffie-Hellman group2
VPN	ipv6-ike-vpn-chicago	<ul style="list-style-type: none"> IKE gateway reference: gw-chicago IPsec policy reference: ipv6-ipsec-phase2-policy

Table 85: Security Policy Configuration Parameters

Purpose	Name	Configuration Parameters
This security policy permits traffic from the trust zone to the untrust zone.	ipv6-vpn-tr-untr	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address sunnyvale destination-address chicago application any Permit action: tunnel ipsec-vpn ipv6-ike-vpn-chicago Permit action: tunnel pair-policy ipv6-vpn-untr-tr
This security policy permits traffic from the untrust zone to the trust zone.	ipv6-vpn-untr-tr	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address chicago destination-address sunnyvale application any Permit action: tunnel ipsec-vpn ipv6-ike-vpn-chicago Permit action: tunnel pair-policy ipv6-vpn-tr-untr
<p>This security policy permits all traffic from the trust zone to the untrust zone.</p> <p>NOTE: You must put the ipv6-vpn-tr-untr policy before the permit-any security policy. Junos OS performs a security policy lookup starting at the top of the list. If the permit-any policy comes before the ipv6-vpn-tr-untr policy, all traffic from the trust zone will match the permit-any policy and be permitted. Thus, no traffic will ever match the ipv6-vpn-tr-untr policy.</p>	permit-any	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source-address any source-destination any application any Action: permit

Table 86: TCP-MSS Configuration Parameters

Purpose	Configuration Parameters
<p>TCP-MSS is negotiated as part of the TCP three-way handshake and limits the maximum size of a TCP segment to better fit the MTU limits on a network. This is especially important for VPN traffic, as the IPsec encapsulation overhead, along with the IP and frame overhead, can cause the resulting ESP packet to exceed the MTU of the physical interface, thus causing fragmentation. Fragmentation results in increased use of bandwidth and device resources.</p> <p>NOTE: We recommend a value of 1350 as the starting point for most Ethernet-based networks with an MTU of 1500 or greater. You might need to experiment with different TCP-MSS values to obtain optimal performance. For example, you might need to change the value if any device in the path has a lower MTU, or if there is any additional overhead such as PPP or Frame Relay.</p>	MSS value: 1350

Configuration

Configuring Basic Network, Security Zone, and Address Book Information

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/14 unit 0 family inet6 address 2001:db8:1:1::/64
set interfaces ge-0/0/15 unit 0 family inet6 address 2001:db8:0:4::/64
set routing-options static route 0.0.0.0/0 next-hop 1.1.1.1
set security zones security-zone untrust interfaces ge-0/0/15.0
set security zones security-zone untrust host-inbound-traffic system-services ike
set security zones security-zone trust interfaces ge-0/0/14.0
set security zones security-zone trust host-inbound-traffic system-services all
set security address-book book1 address sunnyvale 2001:db8:1:2::/64
set security address-book book1 attach zone trust
set security address-book book2 address chicago 2001:db8:0:1::/64
set security address-book book2 attach zone untrust
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure basic network, security zone, and address book information:

1. Configure Ethernet interface information.

```
[edit]
user@host# set interfaces ge-0/0/14 unit 0 family inet6 address 2001:db8:1:1::/64
user@host# set interfaces ge-0/0/15 unit 0 family inet6 address 2001:db8:0:4::/64
```

2. Configure static route information.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 1.1.1.1
```

3. Configure the untrust security zone.

```
[edit]
user@host# edit security zones security-zone untrust
```

4. Assign an interface to the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set interfaces ge-0/0/15.0
```

- Specify allowed system services for the untrust security zone.

```
[edit security zones security-zone untrust]
user@host# set host-inbound-traffic system-services ike
```

- Configure the trust security zone.

```
[edit]
user@host# edit security zones security-zone trust
```

- Assign an interface to the trust security zone.

```
[edit security zones security-zone trust]
user@host# set interfaces ge-0/0/14.0
```

- Specify allowed system services for the trust security zone.

```
[edit security zones security-zone trust]
user@host# set host-inbound-traffic system-services all
```

- Create an address book and attach a zone to it.

```
[edit security address-book book1]
user@host# set address sunnyvale 2001:db8:1:2::/64
user@host# set attach zone trust
```

- Create another address book and attach a zone to it.

```
[edit security address-book book2]
user@host# set address chicago 2001:db8:0:1::/64
user@host# set attach zone untrust
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security zones**, and **show security address-book** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/14 {
  unit 0 {
    family inet6 {
      address 2001:db8:1:1::/64;
    }
  }
}
```

```
ge-0/0/15 {  
  unit 0 {  
    family inet6 {  
      address 2001:db8:0:4::/64;  
    }  
  }  
}
```

```
[edit]  
user@host# show routing-options  
static {  
  route 0.0.0.0/0 next-hop 1.1.1.1;  
}
```

```
[edit]  
user@host# show security zones  
security-zone untrust {  
  host-inbound-traffic {  
    system-services {  
      ike;  
    }  
  }  
  interfaces {  
    ge-0/0/15.0;  
  }  
}  
security-zone trust {  
  host-inbound-traffic {  
    system-services {  
      all;  
    }  
  }  
  interfaces {  
    ge-0/0/14.0;  
  }  
}  
[edit]  
user@host# show security address-book  
book1 {  
  address sunnyvale 2001:db8:1:2::/64;  
  attach {  
    zone trust;  
  }  
}  
book2 {  
  address chicago 2001:db8:0:1::/64;  
  attach {  
    zone untrust;  
  }  
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IKE

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ike proposal ipv6-ike-phase1-proposal authentication-method pre-shared-keys
set security ike proposal ipv6-ike-phase1-proposal dh-group group2
set security ike proposal ipv6-ike-phase1-proposal authentication-algorithm sha1
set security ike proposal ipv6-ike-phase1-proposal encryption-algorithm aes-128-cbc
set security ike policy ipv6-ike-phase1-policy mode aggressive
set security ike policy ipv6-ike-phase1-policy proposals ipv6-ike-phase1-proposal
set security ike policy ipv6-ike-phase1-policy pre-shared-key ascii-text 1111111111111111
set security ike gateway gw-chicago external-interface ge-0/0/15.0
set security ike gateway gw-chicago ike-policy ipv6-ike-phase1-policy
set security ike gateway gw-chicago address 2001:db8:0:3::/64
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IKE:

1. Create the IKE Phase 1 proposal.

```
[edit security ike]
user@host# set proposal ipv6-ike-phase1-proposal
```

2. Define the IKE proposal authentication method.

```
[edit security ike proposal ipv6-ike-phase1-proposal]
user@host# set authentication-method pre-shared-keys
```

3. Define the IKE proposal Diffie-Hellman group.

```
[edit security ike proposal ipv6-ike-phase1-proposal]
user@host# set dh-group group2
```

4. Define the IKE proposal authentication algorithm.

```
[edit security ike proposal ipv6-ike-phase1-proposal]
user@host# set authentication-algorithm sha1
```

5. Define the IKE proposal encryption algorithm.

```
[edit security ike proposal ipv6-ike-phase1-proposal]
user@host# set encryption-algorithm aes-128-cbc
```

6. Create an IKE Phase 1 policy.

```
[edit security ike]
user@host# set policy ipv6-ike-phase1-policy
```

7. Set the IKE Phase 1 policy mode.

```
[edit security ike policy ipv6-ike-phase1-policy]
user@host# set mode aggressive
```

8. Specify a reference to the IKE proposal.

```
[edit security ike policy ipv6-ike-phase1-policy]
user@host# set proposals ipv6-ike-phase1-proposal
```

9. Define the IKE Phase 1 policy authentication method.

```
[edit security ike policy ipv6-ike-phase1-policy]
user@host# set pre-shared-key ascii-text 1111111111111111
```

10. Create an IKE Phase 1 gateway and define its external interface.

```
[edit security ike]
user@host# set gateway gw-chicago external-interface ge-0/0/15.0
```

11. Define the IKE Phase 1 policy reference.

```
[edit security ike gateway gw-chicago]
user@host# set ike-policy ipv6-ike-phase1-policy
```

12. Assign an IP address to the IKE Phase 1 gateway.

```
[edit security ike gateway gw-chicago]
user@host# set address 2001:db8:0:3::
```

Results From configuration mode, confirm your configuration by entering the **show security ike** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
proposal ipv6-ike-phase1-proposal {
  authentication-method pre-shared-keys;
  dh-group group2;
  authentication-algorithm sha1;
```



```

    encryption-algorithm aes-128-cbc;
  }
  policy ipv6-ike-phase1-policy {
    mode ;
    proposals ipv6-ike-phase1-proposal;
    pre-shared-key ascii-text "$9$jHP5QFn/ApPfBIEhr1Yg4aDik.P5z3Dj9Apu1l7—dbgJGD";
    ## SECRET-DATA
  }
  gateway gw-chicago {
    ike-policy ipv6-ike-phase1-policy;
    address 2001:db8:0:3::;
    external-interface ge-0/0/15.0;
  }

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring IPsec

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ipsec proposal ipv6-ipsec-phase2-proposal protocol esp
set security ipsec proposal ipv6-ipsec-phase2-proposal authentication-algorithm
  hmac-sha1-96
set security ipsec proposal ipv6-ipsec-phase2-proposal encryption-algorithm aes-128-cbc
set security ipsec policy ipv6-ipsec-phase2-policy proposals ipv6-ipsec-phase2-proposal
set security ipsec policy ipv6-ipsec-phase2-policy perfect-forward-secrecy keys group2
set security ipsec vpn ipv6-ike-vpn-chicago ike gateway gw-chicago
set security ipsec vpn ipv6-ike-vpn-chicago ike ipv6-ipsec-policy ipsec-phase2-policy

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure IPsec:

1. Create an IPsec Phase 2 proposal.

```

[edit]
user@host# set security ipsec proposal ipv6-ipsec-phase2-proposal

```

2. Specify the IPsec Phase 2 proposal protocol.

```

[edit security ipsec proposal ipv6- ipsec-phase2-proposal]
user@host# set protocol esp

```

3. Specify the IPsec Phase 2 proposal authentication algorithm.

```
[edit security ipsec proposal ipv6-ipsec-phase2-proposal]
user@host# set authentication-algorithm hmac-sha1-96
```

4. Specify the IPsec Phase 2 proposal encryption algorithm.

```
[edit security ipsec proposal ipv6-ipsec-phase2-proposal]
user@host# set encryption-algorithm aes-128-cbc
```

5. Create the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set policy ipv6-ipsec-phase2-policy
```

6. Specify the IPsec Phase 2 proposal reference.

```
[edit security ipsec policy ipv6-ipsec-phase2-policy]
user@host# set proposals ipv6-ipsec-phase2-proposal
```

7. Specify IPsec Phase 2 PFS to use Diffie-Hellman group 2.

```
[edit security ipsec policy ipv6-ipsec-phase2-policy]
user@host# set perfect-forward-secrecy keys group2
```

8. Specify the IKE gateway.

```
[edit security ipsec]
user@host# set vpn ipv6-ike-vpn-chicago ike gateway gw-chicago
```

9. Specify the IPsec Phase 2 policy.

```
[edit security ipsec]
user@host# set vpn ipv6-ike-vpn-chicago ike ipsec-policy ipv6-ipsec-phase2-policy
```

Results From configuration mode, confirm your configuration by entering the **show security ipsec** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ipsec
proposal ipv6-ipsec-phase2-proposal {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm aes-128-cbc;
}
policy ipv6-ipsec-phase2-policy {
```

```

perfect-forward-secrecy {
    keys group2;
}
proposals ipv6-ipsec-phase2-proposal;
}
vpn ipv6-ike-vpn-chicago {
    ike {
        gateway gw-chicago;
        ipsec-policy ipv6-ipsec-phase2-policy;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Security Policies

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr match
source-address sunnyvale
set security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr match
destination-address chicago
set security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr match
application any
set security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr then permit
tunnel ipsec-vpn ipv6-ike-vpn-chicago
set security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr then permit
tunnel pair-policy ipv6-vpn-untr-tr
set security policies from-zone untrust to-zone trust policy ipv6-vpn-untr-tr match
source-address chicago
set security policies from-zone untrust to-zone trust policy ipv6-vpn-untr-tr match
destination-address sunnyvale
set security policies from-zone untrust to-zone trust policy ipv6-vpn-untr-tr match
application any
set security policies from-zone untrust to-zone trust policy ipv6-vpn-untr-tr then permit
tunnel ipsec-vpn ipv6-ike-vpn-chicago
set security policies from-zone untrust to-zone trust policy ipv6-vpn-untr-tr then permit
tunnel pair-policy ipv6-vpn-tr-untr
set security policies from-zone trust to-zone untrust policy permit-any match
source-address any
set security policies from-zone trust to-zone untrust policy permit-any match
destination-address any
set security policies from-zone trust to-zone untrust policy permit-any match application
any
set security policies from-zone trust to-zone untrust policy permit-any then permit
insert security policies from-zone trust to-zone untrust policy ipv6-vpn-tr-untr before
policy permit-any

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies:

1. Create the security policy to permit traffic from the trust zone to the untrust zone.

```
[edit security policies from-zone trust to-zone untrust]
user@host# set policy ipv6-vpn-tr-untr match source-address sunnyvale
user@host# set policy ipv6-vpn-tr-untr match destination-address chicago
user@host# set policy ipv6-vpn-tr-untr match application any
user@host# set policy ipv6-vpn-tr-untr then permit tunnel ipsec-vpn
            ipv6-ike-vpn-chicago
user@host# set policy ipv6-vpn-tr-untr then permit tunnel pair-policy
            ipv6-vpn-untr-tr
```

2. Create the security policy to permit traffic from the untrust zone to the trust zone.

```
[edit security policies from-zone untrust to-zone trust]
user@host# set policy ipv6-vpn-untr-tr match source-address sunnyvale
user@host# set policy ipv6-vpn-untr-tr match destination-address chicago
user@host# set policy ipv6-vpn-untr-tr match application any
user@host# set policy ipv6-vpn-untr-tr then permit tunnel ipsec-vpn
            ipv6-ike-vpn-chicago
user@host# set policy ipv6-vpn-untr-tr then permit tunnel pair-policy
            ipv6-vpn-tr-untr
```

3. Create the security policy to permit traffic from the trust zone to the untrust zone.

```
[edit security policies from-zone trust to-zone untrust]
user@host# set policy permit-any match source-address any
user@host# set policy permit-any match destination-address any
user@host# set policy permit-any match application any
user@host# set policy permit-any then permit
```

4. Reorder the security policies so that the vpn-tr-untr security policy is placed above the permit-any security policy.

```
[edit security policies from-zone trust to-zone untrust]
user@host# insert policy ipv6-vpn-tr-untr before policy permit-any
```

Results From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security policies
from-zone trust to-zone untrust {
```

```

policy ipv6-vpn-tr-untr {
  match {
    source-address sunnyvale;
    destination-address chicago;
    application any;
  }
  then {
    permit {
      tunnel {
        ipsec-vpn ipv6-ike-vpn-chicago;
        pair-policy ipv6-vpn-untr-tr;
      }
    }
  }
}
policy permit-any {
  match {
    source-address any;
    destination-address any;
    application any;
  }
  then {
    permit
  }
}
}
from-zone untrust to-zone trust {
  policy ipv6-vpn-untr-tr {
    match {
      source-address chicago;
      destination-address sunnyvale;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn ipv6-ike-vpn-chicago;
          pair-policy ipv6-vpn-tr-untr;
        }
      }
    }
  }
}
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring TCP-MSS

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow tcp-mss ipsec-vpn mss 1350
```

Step-by-Step Procedure To configure TCP-MSS information:

- Configure TCP-MSS information.

```
[edit]
user@host# set security flow tcp-mss ipsec-vpn mss 1350
```

Results From configuration mode, confirm your configuration by entering the **show security flow** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security flow
tcp-mss {
  ipsec-vpn {
    mss 1350;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the IKE Phase 1 Status on page 698](#)
- [Verifying the IPsec Phase 2 Status on page 700](#)

Verifying the IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status.

Action



NOTE: Before starting the verification process, you need to send traffic from a host in Sunnyvale to a host in Chicago. For policy-based VPNs, a separate host must generate the traffic; traffic initiated from the SRX Series device will not match the VPN policy. We recommend that the test traffic be from a separate device on one side of the VPN to a second device on the other side of the VPN. For example, initiate ping from 2001:db8:1:2::/64 to 2001:db8:0:1::/64.

From operational mode, enter the **show security ike security-associations** command. After obtaining an index number from the command, use the **show security ike security-associations index *index_number* detail** command.

```
user@host> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
5	2001:db8:0:3::	UP	e48efd6a444853cf	0d09c59aafb720be	Aggressive

```
user@host> show security ike security-associations index 5 detail
```

```
IKE peer 2001:db8:0:3::, Index 5,
Role: Initiator, State: UP
Initiator cookie: e48efd6a444853cf, Responder cookie: 0d09c59aafb720be
Exchange type: Aggressive, Authentication method: Pre-shared-keys
Local: 2001:db8:0:4::500, Remote: 2001:db8:0:3::500
Lifetime: Expires in 19518 seconds
Peer ike-id: not valid
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : sha1
  Encryption          : aes-128-cbc
  Pseudo random function: hmac-sha1
Traffic statistics:
  Input bytes  :          1568
  Output bytes :          2748
  Input packets:           6
  Output packets:         23
Flags: Caller notification sent
IPSec security associations: 5 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 2900338624
Local: 2001:db8:0:4::500, Remote: 2001:db8:0:3::500
Local identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Flags: Caller notification sent, Waiting for done
```

Meaning The **show security ike security-associations** command lists all active IKE Phase 1 security associations (SAs). If no SAs are listed, there was a problem with Phase 1 establishment. Check the IKE policy parameters and external interface settings in your configuration.

If SAs are listed, review the following information:

- **Index**—This value is unique for each IKE SA, which you can use in the **show security ike security-associations index *index_number* detail** command to get more information about the SA.
- **Remote Address**—Verify that the remote IP address is correct.
- **State**
 - **UP**—The Phase 1 SA has been established.

- DOWN—There was a problem establishing the Phase 1 SA.
- Mode—Verify that the correct mode is being used.

Verify that the following are correct in your configuration:

- External interfaces (the interface must be the one that receives IKE packets)
- IKE policy parameters
- Preshared key information
- Phase 1 proposal parameters (must match on both peers)

The **show security ike security-associations index 5 detail** command lists additional information about the security association with an index number of 5:

- Authentication and encryption algorithms used
- Phase 1 lifetime
- Traffic statistics (can be used to verify that traffic is flowing properly in both directions)
- Initiator and responder role information



NOTE: Troubleshooting is best performed on the peer using the responder role.

- Number of IPsec SAs created
- Number of Phase 2 negotiations in progress

Verifying the IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status.

Action From operational mode, enter the **show security ipsec security-associations** command. After obtaining an index number from the command, use the **show security ipsec security-associations index *index_number* detail** command.

```
user@host> show security ipsec security-associations
```

```
total configured sa: 2
ID   Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
2    ESP:aes-128/sha1 14caf1d9 3597/ unlim  -   root 500    2001:db8:0:3::
2    ESP:aes-128/sha1 9a4db486 3597/ unlim  -   root 500    2001:db8:0:3::
```

```
user@host> show security ipsec security-associations index 2 detail
```

```
Virtual-system: Root
Local Gateway: 2001:db8:0:4::, Remote Gateway: 2001:db8:0:3::
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
```



```

Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
DF-bit: clear
Direction: inbound, SPI: 14caf1d9, AUX-SPI: 0
                , VPN Monitoring: -
Hard lifetime: Expires in 3440 seconds
Lifeseize Remaining: Unlimited
Soft lifetime: Expires in 2813 seconds
Mode: tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: 9a4db486, AUX-SPI: 0
                , VPN Monitoring: -
Hard lifetime: Expires in 3440 seconds
Lifeseize Remaining: Unlimited
Soft lifetime: Expires in 2813 seconds
Mode: tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output from the **show security ipsec security-associations** command lists the following information:

- The ID number is 2. Use this value with the **show security ipsec security-associations index** command to get more information about this particular SA.
- There is one IPsec SA pair using port 500, which indicates that no NAT-traversal is implemented. (NAT-traversal uses port 4500 or another random high-number port.)
- The SPIs, lifetime (in seconds), and usage limits (or lifeseize in KB) are shown for both directions. The 3597/unlim value indicates that the Phase 2 lifetime expires in 3597 seconds, and that no lifeseize has been specified, which indicates that the lifetime is unlimited. Phase 2 lifetime can differ from Phase 1 lifetime, as Phase 2 is not dependent on Phase 1 after the VPN is up.
- VPN monitoring is not enabled for this SA, as indicated by a hyphen in the Mon column. If VPN monitoring is enabled, U (up) or D (down) is listed.
- The virtual system (vsys) is the root system, and it always lists 0.

The output from the **show security ipsec security-associations index 2 detail** command lists the following information:

- The local and remote identities make up the proxy ID for the SA.

A proxy ID mismatch is one of the most common reasons for a Phase 2 failure. For policy-based VPNs, the proxy ID is derived from the security policy. The local and remote addresses are derived from the address book entries, and the service is derived from the application configured for the policy. If Phase 2 fails because of a proxy ID mismatch, you can use the policy to confirm which address book entries are configured. Verify that the addresses match the information being sent. Check the service to ensure that the ports match the information being sent.



NOTE: For some third-party vendors, the proxy ID must be manually entered to match.

See Also • [Understanding IKE and IPsec Packet Processing on page 38](#)

Related Documentation • [IPsec VPN Configuration Overview on page 54](#)

CHAPTER 8

Configuring Group VPNs

- [Group VPNv1 on page 703](#)
- [Group VPNv2 on page 746](#)
- [Group VPNv2 Server Clusters on page 795](#)

Group VPNv1

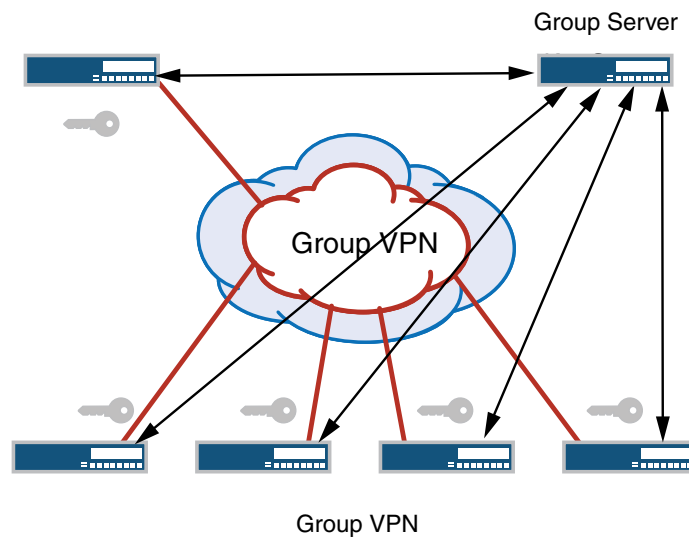
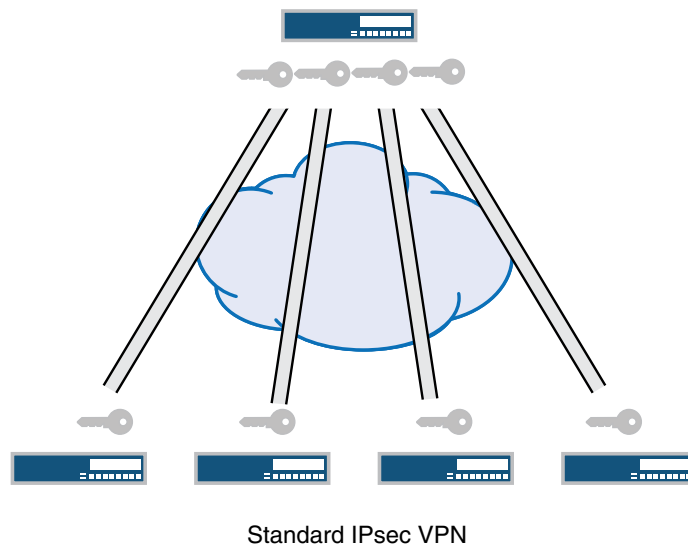
Group VPN is a set of features that are necessary to secure IP multicast group traffic or unicast traffic over a private WAN that originates on or flows through a device.

- [Group VPNv1 Overview on page 703](#)
- [Group VPNv1 Configuration Overview on page 712](#)
- [Understanding IKE Phase 1 Configuration for Group VPNv1 on page 713](#)
- [Understanding IPsec SA Configuration for Group VPNv1 on page 714](#)
- [Understanding Dynamic Policies for Group VPNv1 on page 715](#)
- [Understanding Antireplay for Group VPNv1 on page 716](#)
- [Example: Configuring Group VPNv1 Server and Members on page 716](#)
- [Example: Configuring Group VPNv1 Server-Member Communication for Unicast Rekey Messages on page 733](#)
- [Example: Configuring Group VPNv1 Server-Member Communication for Multicast Rekey Messages on page 734](#)
- [Example: Configuring Group VPNv1 with Server-Member Colocation on page 736](#)

Group VPNv1 Overview

An IPsec security association (SA) is a unidirectional agreement between virtual private network (VPN) participants that defines the rules to use for authentication and encryption algorithms, key exchange mechanisms, and secure communications. With current VPN implementations, the SA is a point-to-point tunnel between two security devices. Group VPNv1 extends IPsec architecture to support SAs that are shared by a group of security devices (see [Figure 51 on page 704](#)).

Figure 51: Standard IPsec VPN and Group VPNv1



Server distributes IPsec SA. All members that belong to the group share the same IPsec SA.

Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices. With Group VPNv1, any-to-any connectivity is achieved by preserving the original

source and destination IP addresses in the outer header. Secure multicast packets are replicated in the same way as cleartext multicast packets in the core network.



NOTE: Starting with Junos OS Release 12.3X48-D30, Group VPNv1 members can interoperate with Group VPNv2 servers.



NOTE: Group VPNv1 has some propriety limitations regarding RFC 6407, *The Group Domain of Interpretation (GDOI)*. To use Group VPN without proprietary limitations, upgrade to Group VPNv2. Group VPNv2 is supported on vSRX instances starting with Junos OS Release 15.1X49-D30, SRX Series devices starting with Junos OS Release 15.1X49-D40, and MX Series devices starting with Junos OS Release 15.1r2.

Understanding the GDOI Protocol for Group VPNv1

Group VPNv1 is based on RFC 3547, *The Group Domain of Interpretation (GDOI)*. This RFC describes the protocol between group members and a group server to establish SAs among group members. GDOI messages create, maintain, or delete SAs for a group of devices. The GDOI protocol runs on port 848.

The Internet Security Association and Key Management Protocol (ISAKMP) defines two negotiation phases to establish SAs for an AutoKey IKE IPsec tunnel. Phase 1 allows two devices to establish an ISAKMP SA. Phase 2 establishes SAs for other security protocols, such as GDOI.

With group VPN, Phase 1 ISAKMP SA negotiation is performed between a group server and a group member. The server and member must use the same ISAKMP policy. In Phase 2, GDOI exchanges between the server and member establish the SAs that are shared with other group members. A group member does not need to negotiate IPsec with other group members. GDOI exchanges in Phase 2 must be protected by ISAKMP Phase 1 SAs.

There are two types of GDOI exchanges:

- The **groupkey-pull** exchange allows a member to request SAs and keys shared by the group from the server.
- The **groupkey-push** exchange is a single rekey message that allows the server to send group SAs and keys to members before existing group SAs expire. Rekey messages are unsolicited messages sent from the server to members.

Understanding Group VPNv1 Limitations

The following are not supported in this release for group VPNv1:

- Non-default routing instances
- Chassis cluster

- Server clusters
- Route-based group VPN
- Public Internet-based deployment
- SNMP
- Deny policy from Cisco GET VPN server
- J-Web interface for configuration and monitoring

Starting with Junos OS Release 12.3X48-D30, Group VPNv1 members on SRX100, SRX110, SRX210, SRX220, SRX240, SRX550, and SRX650 devices can interoperate with Group VPNv2 servers. When you configure Group VPNv1 members for use with Group VPNv2 servers, note the following limitations:

- Group VPNv2 supports the IETF draft specification *IP Delivery Delay Detection Protocol* for a time-based antireplay mechanism. Therefore, IP delivery delay detection protocol-based antireplay is not supported on Group VPNv1 members and must be disabled on the Group VPNv2 server with the **deactivate security group-vpn server group group-name anti-replay-time-window** command.
- The Group VPNv2 server does not support colocation, where the group server and group member functions exist in the same device.
- The Group VPNv2 server does not support heartbeat transmittals. Heartbeat must be disabled on the Group VPNv1 member with the **deactivate security group-vpn member ipsec vpn vpn-name heartbeat-threshold** command. We recommend using Group VPNv2 server clusters to avoid traffic impact due to reboots or other interruptions on the Group VPNv2 server.
- Groupkey-push messages sent from the Group VPNv2 server are based on RFC 6407, *The Group Domain of Interpretation (GDOI)* and are not supported on Group VPNv1 members. Therefore, groupkey-push messages must be disabled on the Group VPNv2 server with the **deactivate security group-vpn server group group-name server-member-communication** command.

Rekeys are supported with groupkey-pull messages. If there are scaling issues where Group VPNv1 members cannot complete the groupkey-pull operation before the TEK hard lifetime expires, we recommend increasing the TEK lifetime to allow sufficient time for members to complete the groupkey-pull operation. Juniper's scaling numbers are qualified with a 2 hour TEK lifetime.

- If the Group VPNv2 server is rebooted or upgraded, or the SAs for the group are cleared, new members cannot be added to the network until the next rekey occurs for existing members. New members cannot send traffic to existing members that have old keys. As a workaround, clear the SAs on the existing Group VPNv1 members with the **clear security group-vpn member ipsec security-associations** command.
- Because multicast data traffic is not supported by Group VPNv2 members, multicast data traffic cannot be used when Group VPNv1 and Group VPNv2 members coexist in the network for the same group.

Understanding Group VPNv1 Servers and Members

The center of a group VPN is the group server. The group server performs the following tasks:

- Controls group membership
- Generates encryption keys
- Manages group SAs and keys and distributes them to group members

Group members encrypt traffic based on the group SAs and keys provided by the group server.

A group server can service multiple groups. A single security device can be a member of multiple groups.

Each group is represented by a group identifier, which is a number between 1 and 65,535. The group server and group members are linked together by the group identifier. There can be only one group identifier per group, and multiple groups cannot use the same group identifier.

The following is a high-level view of group VPN server and member actions:

1. The group server listens on UDP port 848 for members to register. A member device must provide correct IKE Phase 1 authentication to join the group. Preshared key authentication on a per-member basis is supported.
2. Upon successful authentication and registration, the member device retrieves group SAs and keys from the server with a GDOI **groupkey-pull** exchange.
3. The server adds the member to the membership for the group.
4. Group members exchange packets encrypted with group SA keys.

The server periodically sends SA and key refreshes to group members with rekey (GDOI **groupkey-push**) messages. Rekey messages are sent before SAs expire; this ensures that valid keys are available for encrypting traffic between group members.

The server also sends rekey messages to provide new keys to members when there is a change in group membership or when the group SA has changed.

Understanding Group VPNv1 Server-Member Communication

Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices. Server-member communication allows the server to send GDOI **groupkey-push** messages to members. If server-member communication is not configured for the group, members can send GDOI **groupkey-pull** messages to register and reregister with the server, but the server is not able to send rekey messages to members.

Server-member communication is configured for the group by using the **server-member-communication** configuration statement at the **[edit security group-vpn server]** hierarchy. The following options can be defined:

- Encryption algorithm used for communications between the server and member. You can specify 3des-cbc, aes-128-cbc, aes-192-cbc, aes-256-cbc, or des-cbc. There is no default algorithm.
- Authentication algorithm (md5 or sha1) used to authenticate the member to the server. There is no default algorithm.
- Whether the server sends unicast or multicast rekey messages to group members and parameters related to the communication type.
- Interval at which the server sends heartbeat messages to the group member. This allows the member to determine whether the server has rebooted, which would require the member to reregister with the server. The default is 300 seconds.
- Lifetime for the key encryption key (KEK). The default is 3600 seconds.



NOTE: Configuring server-member communication is necessary for the group server to send rekey messages to members, but there might be situations in which this behavior is not desired. For example, if group members are dynamic peers (such as in a home office), the devices are not always up and the IP address of a device might be different each time it is powered up. Configuring server-member communication for a group of dynamic peers can result in unnecessary transmissions by the server. If you want IKE Phase 1 SA negotiation to always be performed to protect GDOI negotiation, do not configure server-member communication.

If server-member communication for a group is not configured, the membership list displayed by the **show security group-vpn server registered-members** command shows group members who have registered with the server; members can be active or not. When server-member communication for a group is configured, the group membership list is cleared. If the communication type is configured as unicast, the **show security group-vpn server registered-members** command shows only active members. If the communication type is configured as multicast, the **show security group-vpn server registered-members** command shows members who have registered with the server after the configuration; the membership list does not necessarily represent active members because members might drop out after registration.

Understanding Group VPNv1 Group Key Operations

This topic contains the following sections:

- [Group Keys on page 709](#)
- [Rekey Messages on page 709](#)
- [Member Registration on page 710](#)
- [Key Activation on page 710](#)

Group Keys

The group server maintains a database to track the relationship among VPN groups, group members, and group keys. There are two kinds of group keys that the server downloads to members:

- **Key Encryption Key (KEK)**—Used to encrypt rekey messages. One KEK is supported per group.
- **Traffic Encryption Key (TEK)**—Used to encrypt and decrypt IPsec data traffic between group members.

The key associated with an SA is accepted by a group member only if there is a matching scope policy configured on the member. An accepted key is installed for the group VPN, whereas a rejected key is discarded.

Rekey Messages

If the group is configured for server-member communications, the server periodically sends SA and key refreshes to group members with rekey (GDOI **groupkey-push**) messages. Rekey messages are sent before SAs expire; this ensures that valid keys are available for encrypting traffic between group members.

The server also sends rekey messages to provide new keys to members when there is a change in group membership or the group SA has changed (for example, a group policy is added or deleted).

Server-member communications options must be configured on the server to allow the server to send rekey messages to group members. These options specify the type of message and the intervals at which the messages are sent, as explained in the following sections:

- [Types of Rekey Messages on page 709](#)
- [Rekey Intervals on page 710](#)

Types of Rekey Messages

There are two types of rekey messages:

- **Unicast rekey messages**—The group server sends one copy of the rekey message to each group member. Upon receipt of the rekey message, members must send an acknowledgment (ACK) to the server. If the server does not receive an ACK from a member (including retransmission of rekey messages), the server considers the member to be inactive and removes it from the membership list. The server stops sending rekey messages to the member.

The **number-of-retransmission** and **retransmission-period** configuration statements for server-member communications control the resending of rekey messages by the server when no ACK is received from a member.

- **Multicast rekey messages**—The group server sends one copy of the rekey message from the specified outgoing interface to the configured multicast group address. Members do not send acknowledgment of receipt of multicast rekey messages. The registered membership list does not necessarily represent active members because

members might drop out after initial registration. All members of the group must be configured to support multicast messages.



NOTE: IP multicast protocols must be configured to allow delivery of multicast traffic in the network. For detailed information about configuring multicast protocols on Juniper Networks devices, see *Multicast Protocols Feature Guide*.

Rekey Intervals

The interval at which the server sends rekey messages is calculated based on the values of the **lifetime-seconds** and **activation-time-delay** configuration statements at the [edit security group-vpn server group] hierarchy. The interval is calculated as **lifetime-seconds** minus $4 * (\text{activation-time-delay})$.

The **lifetime-seconds** for the KEK is configured as part of the server-member communications; the default is 3600 seconds. The **lifetime-seconds** for the TEK is configured for the IPsec proposal; the default is 3600 seconds. The **activation-time-delay** is configured for the group on the server; the default is 15 seconds. Using the default values for **lifetime-seconds** and **activation-time-delay**, the interval at which the server sends rekey messages is 3600 minus $4 * 15$, or 3540 seconds.

Member Registration

If a group member does not receive a new SA key from the server before the current key expires, the member must reregister with the server and obtain updated keys with a GDOI **groupkey-pull** exchange. In this case, the interval at which the server sends rekey messages is calculated as follows: **lifetime-seconds** minus $3 * (\text{activation-time-delay})$. Using the default values for **lifetime-seconds** and **activation-time-delay**, the interval at which the server sends rekey messages is 3600 minus $3 * 15$, or 3555 seconds.

Member reregistration can occur for the following reasons:

- The member detects a server reboot by the absence of heartbeats received from the server.
- The rekey message from the group server is lost or delayed, and the TEK lifetime has expired.

Key Activation

When a member receives a new key from the server, it waits a period of time before using the key for encryption. This period of time is determined by the **activation-time-delay** configuration statement and whether the key is received through a rekey message sent from the server or as a result of the member reregistering with the server.

If the key is received through a rekey message sent from the server, the member waits $2 * (\text{activation-time-delay})$ seconds before using the key. If the key is received through member reregistration, the member waits the number of seconds specified by the **activation-time-delay** value.

A member retains the two most recent keys sent from the server for each group SA installed on the member. Both keys can be used for decryption, while the most recent key is used for encryption. The previous key is removed the number of seconds specified by the **activation-time-delay** value after the new key is activated.

The default for the **activation-time-delay** configuration statement is 15 seconds. Setting this time period too small can result in a packet being dropped at a remote group member before the new key is installed. Consider the network topology and system transport delays when you change the **activation-time-delay** value. For unicast transmissions, the system transport delay is proportional to the number of group members.

A group VPNv1 server can send multiple traffic encryption keys (TEKs) to a group VPNv1 member in response to a **groupkey-pull** request. The following describes how the group VPNv1 member handles the existing TEK and the TEKs it receives from the server:

- If the group VPNv1 member receives two or more TEKs, it holds the most recent two TEKs and deletes the existing TEK. Of the two held TEKs, the older TEK is activated immediately, and the newer TEK is activated after the **activation-time-delay** configured on the group VPNv1 server has elapsed (the default is 15 seconds).
- If the group VPNv1 member receives only one TEK, or if it receives a TEK through a **groupkey-push** message from the server, the existing TEK is not deleted until the hard lifetime expires. The lifetime is not shortened for the existing TEK.

The group VPNv1 member still installs a received TEK even if the TEK lifetime is less than two times the **activation-time-delay** value.

Understanding Group VPNv1 Heartbeat Messages

When server-member communication is configured, the group VPNv1 server sends heartbeat messages to members at specified intervals (the default interval is 300 seconds). The heartbeat mechanism allows members to reregister with the server if the specified number of heartbeats is not received. For example, members will not receive heartbeat messages during a server reboot. When the server has rebooted, members reregister with the server.

Heartbeats are transmitted through **groupkey-push** messages. The sequence number is incremented on each heartbeat message, which protects members from replay attacks. Unlike rekey messages, heartbeat messages are not acknowledged by recipients and are not retransmitted by the server.

Heartbeat messages contain the following information:

- Current state and configuration of the keys on the server
- Relative time, if antireplay is enabled

By comparing the information in the heartbeats, a member can detect whether it has missed server information or rekey messages. The member reregisters to synchronize itself with the server.



NOTE: Heartbeat messages can increase network congestion and cause unnecessary member reregistrations. Thus, heartbeat detection can be disabled on the member if necessary.

Understanding Group VPNv1 Server-Member Colocation Mode

Group server and group member functions are separate and do not overlap. The server and member functions can coexist in the same physical device, which is referred as colocation mode. In colocation mode, there is no change in terms of functionality and behavior of the server or a member, but the server and member each need to be assigned different IP addresses so that packets can be delivered properly. In colocation mode, there can be only one IP address assigned to the server and one IP address assigned to the member across groups.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [Understanding IKE and IPsec Packet Processing on page 38](#)
 - [Group VPNv1 Configuration Overview on page 712](#)

Group VPNv1 Configuration Overview

This topic describes the main tasks for configuring group VPNv1.

On the group server, configure the following:

1. IKE Phase 1 negotiation. Use the **[edit security group-vpn server ike]** hierarchy to configure the IKE Phase 1 SA. See “[Understanding IKE Phase 1 Configuration for Group VPNv2](#)” on page 753.
2. Phase 2 IPsec SA. See “[Understanding IPsec SA Configuration for Group VPNv1](#)” on page 714.
3. VPN group. See “[Group VPNv1 Configuration Overview](#)” on page 712.

On the group member, configure the following:

1. IKE Phase 1 negotiation. Use the **[edit security group-vpn member ike]** hierarchy to configure IKE Phase 1 SA. See “[Understanding IKE Phase 1 Configuration for Group VPNv1](#)” on page 713.
2. Phase 2 IPsec SA. See “[Understanding IPsec SA Configuration for Group VPNv1](#)” on page 714.
3. Scope policy that determines which group policies are installed on the member. See “[Understanding Dynamic Policies for Group VPNv1](#)” on page 715.



NOTE: To prevent packet fragmentation issues, we recommend that the interface used by the group member to connect to the MPLS network be configured for a maximum transmission unit (MTU) size no larger than 1400 bytes. Use the `set interface mtu` configuration statement to set the MTU size.

The VPN group is configured on the server with the **group** configuration statement at the `[edit security group-vpn server]` hierarchy.

The group information consists of the following information:

- Group identifier—A value between 1 and 65,535 that identifies the VPN group. The same group identifier must be configured on the group member for Autokey IKE.
- Group members, as configured with the **ike-gateway** configuration statement. There can be multiple instances of this configuration statement, one for each member of the group.
- IP address of the server (the loopback interface address is recommended).
- Group policies—Policies that are to be downloaded to members. Group policies describe the traffic to which the SA and keys apply. See [“Understanding Dynamic Policies for Group VPNv1” on page 715](#).
- Server-member communication—Optional configuration that allows the server to send rekey messages to members. See [“Group VPNv1 Overview” on page 703](#).
- Antireplay—Optional configuration that detects packet interception and replay. See [“Understanding Antireplay for Group VPNv1” on page 716](#).

See Also

Understanding IKE Phase 1 Configuration for Group VPNv1

An IKE Phase 1 SA between the group server and a group member establishes a secure channel in which to negotiate IPsec SAs that are shared by a group. For standard IPsec VPNs on Juniper Networks security devices, Phase 1 SA configuration consists of specifying an IKE proposal, policy, and gateway. For group VPNv1, the IKE Phase 1 SA configuration is similar to the configuration for standard IPsec VPNs, but is performed at the `[edit security group-vpn]` hierarchy.

In the IKE proposal configuration, you set the authentication method and the authentication and encryption algorithms that will be used to open a secure channel between participants. In the IKE policy configuration, you set the mode (main or aggressive) in which the Phase 1 channel will be negotiated, specify the type of key exchange to be used, and reference the Phase 1 proposal. In the IKE gateway configuration, you reference the Phase 1 policy.



NOTE: Because Group VPNv2 only supports strong algorithms, the sha-256 authentication algorithm option is supported for Group VPNv1 members on SRX100, SRX110, SRX210, SRX220, SRX240, SRX550, and SRX650 devices. When Group VPNv1 members interoperate with Group VPNv2 servers, this option must be configured on the Group VPNv1 members with the `edit security group-vpn member ike proposal proposal-name authentication-algorithm sha-256` command. On the Group VPNv2 server, `authentication-algorithm sha-256` must be configured for IKE proposals and `authentication-algorithm hmac-sha-256-128` must be configured for IPsec proposals.

If an IKE gateway on a Group VPNv1 member is configured with more than one gateway address, the error message “Only one remote address is allowed to be configured per IKE gateway configuration” is displayed when the configuration is committed.

The IKE Phase 1 configuration on the group server must match the IKE Phase 1 configuration on group members.

See Also

Understanding IPsec SA Configuration for Group VPNv1

After the server and member have established a secure and authenticated channel in Phase 1 negotiation, they proceed through Phase 2. Phase 2 negotiation establishes the IPsec SAs that are shared by group members to secure data that is transmitted among members. While the IPsec SA configuration for group VPN is similar to the configuration for standard VPNs, a group member does not need to negotiate the SA with other group members.

Phase 2 IPsec configuration for group VPNv1 consists of the following information:

- A proposal for the security protocol, authentication, and encryption algorithm to be used for the SA. The IPsec SA proposal is configured on the group server with the **proposal** configuration statement at the `[edit security group-vpn server ipsec]` hierarchy.
- A group policy that references the proposal. A group policy specifies the traffic (protocol, source address, source port, destination address, and destination port) to which the SA and keys apply. The group policy is configured on the server with the **ipsec-sa** configuration statement at the `[edit security group-vpn server group]` hierarchy.
- An Autokey IKE that references the group identifier, the group server (configured with the **ike-gateway** configuration statement), and the interface used by the member to connect to the group. The Autokey IKE is configured on the member with the **ipsec vpn** configuration statement at the `[edit security group-vpn member]` hierarchy.

See Also

Understanding Dynamic Policies for Group VPNv1

The group server distributes group SAs and keys to members of a specified group. All members that belong to the same group can share the same set of IPsec SAs. But not all SAs configured for a group are installed on every group member. The SA installed on a specific member is determined by the policy associated with the group SA and the security policies configured on the member.

In a VPN group, each group SA and key that the server pushes to a member is associated with a group policy. The group policy describes the traffic on which the key should be used, including protocol, source address, source port, destination address, and destination port.



NOTE: Group policies that are identical (configured with the same source address, destination address, source port, destination port, and protocol values) cannot exist for a single group. An error is returned if you attempt to commit a configuration that contains identical group policies for a group. If this is the case, you must delete one of the identical group policies.

On a group member, a scope policy must be configured that defines the scope of the group policy downloaded from the server. A group policy distributed from the server is compared against the scope policies configured on the member. For a group policy to be installed on the member, the following conditions must be met:

- Any addresses specified in the group policy must be within the range of addresses specified in the scope policy.
- The source port, destination port, and protocol specified in the group policy must match those configured in the scope policy.

A group policy that is installed on a member is called a dynamic policy.

A scope policy can be part of an ordered list of security policies for a specific from-zone and to-zone context. Junos OS performs a security policy lookup on incoming packets starting from the top of the ordered list.

Depending on the position of the scope policy within the ordered list of security policies, there are several possibilities for dynamic policy lookup:

- If the incoming packet matches a security policy before the scope policy is considered, dynamic policy lookup does not occur.
- If an incoming policy matches a scope policy, the search process continues for a matching dynamic policy. If there is a matching dynamic policy, that policy action (permit) is performed. If there is no matching dynamic policy, the search process continues to search the policies below the scope policy.



NOTE: In this release, only the tunnel action is allowed for a scope policy. Other actions are not supported.

You configure a scope policy on a group member by using the **policies** configuration statement at the **[edit security]** hierarchy. Use the **ipsec-group-vpn** configuration statement in the permit tunnel rule to reference the group VPN; this allows group members to share a single SA.

- See Also**
- [Security Policies Overview](#)
 - [Understanding Security Policy Ordering](#)
 - [Example: Configuring a Security Policy to Permit or Deny All Traffic](#)

Understanding Antireplay for Group VPNv1

Antireplay is an IPsec feature that can detect when a packet is intercepted and then replayed by attackers. Antireplay is enabled by default for group VPNs but can be disabled for a group with the **no-anti-replay** configuration statement.

When antireplay is enabled, the group server synchronizes the time between the group members. Each IPsec packet contains a timestamp. The group member checks whether the packet's timestamp falls within the configured **anti-replay-time-window** value (the default is 100 seconds). A packet is dropped if the timestamp exceeds the value.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [Understanding IKE and IPsec Packet Processing on page 38](#)

Example: Configuring Group VPNv1 Server and Members

This example shows how to configure group VPNv1 to extend IPsec architecture to support SAs that are shared by a group of security devices. Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices.

- [Requirements on page 716](#)
- [Overview on page 716](#)
- [Configuration on page 717](#)
- [Verification on page 731](#)

Requirements

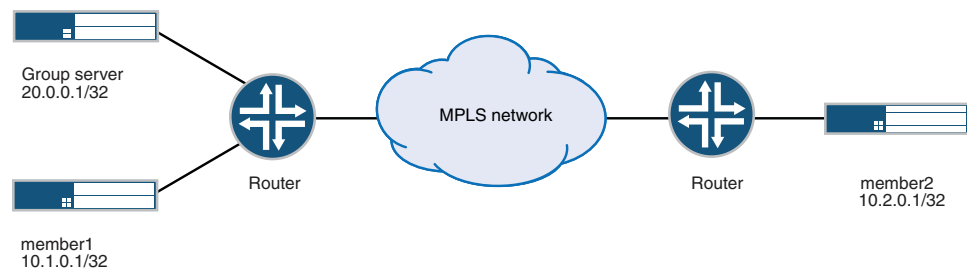
Before you begin:

- Configure the Juniper Networks security devices for network communication.
- Configure network interfaces on server and member devices. See *Interfaces Feature Guide for Security Devices*.

Overview

In [Figure 52 on page 717](#), a group VPN consists of two member devices (member1 and member2) and a group server (the IP address of the loopback interface on the server is 20.0.0.1). The group identifier is 1.

Figure 52: Server-Member Configuration Example



The Phase 2 group VPN SAs must be protected by a Phase 1 SA. Therefore, the group VPN configuration must include configuring IKE Phase 1 negotiations on both the group server and the group members. In addition, the same group identifier must be configured on both the group server and the group members.

Group policies are configured on the group server. All group policies configured for a group are downloaded to group members. Scope policies configured on a group member determine which group policies are actually installed on the member. In this example, the following group policies are configured on the group server for downloading to all group members:

- p1—Allows all traffic from 10.1.0.0/16 to 10.2.0.0/16
- p2—Allows all traffic from 10.2.0.0/16 to 10.1.0.0/16
- p3—Allows multicast traffic from 10.1.1.1/32

The member1 device is configured with scope policies that allow all unicast traffic to and from the 10.0.0.0/8 subnetwork. There is no scope policy configured on member1 to allow multicast traffic; therefore, the SA policy p3 is not installed on member1.

The member2 device is configured with scope policies that drop traffic from 10.1.0.0/16 from the trust zone to the untrust zone and to 10.1.0.0/16 from the untrust zone to the trust zone. Therefore the SA policy p2 is not installed on member2.

Configuration

Configuring the Group Server

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces lo0 unit 0 family inet address 20.0.0.1/32
set security group-vpn server ike proposal srv-prop authentication-method pre-shared-keys
set security group-vpn server ike proposal srv-prop dh-group group2
set security group-vpn server ike proposal srv-prop authentication-algorithm sha1
set security group-vpn server ike proposal srv-prop encryption-algorithm 3des-cbc
set security group-vpn server ike policy srv-pol mode main
set security group-vpn server ike policy srv-pol proposals srv-prop
set security group-vpn server ike policy srv-pol pre-shared-key ascii-text "$ABC123"
  
```

```

set security group-vpn server ike gateway gw1 ike-policy srv-pol
set security group-vpn server ike gateway gw1 address 10.1.0.1
set security group-vpn server ike gateway gw2 ike-policy srv-pol
set security group-vpn server ike gateway gw2 address 10.2.0.1
set security group-vpn server ipsec proposal group-prop authentication-algorithm
    hmac-sha1-96
set security group-vpn server ipsec proposal group-prop encryption-algorithm 3des-cbc
set security group-vpn server ipsec proposal group-prop lifetime-seconds 3600
set security group-vpn server group grp1 group-id 1
set security group-vpn server group grp1 ike-gateway gw1
set security group-vpn server group grp1 ike-gateway gw2
set security group-vpn server group grp1 anti-replay-time-window 120
set security group-vpn server group grp1 server-address 20.0.0.1
set security group-vpn server group grp1 ipsec-sa group-sa proposal group-prop
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 source
    10.1.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 destination
    10.2.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 source-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 destination-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 protocol 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 source
    10.2.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 destination
    10.1.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 source-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2
    destination-port 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 protocol 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 source
    10.1.1.1/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 destination
    239.1.1.1/32
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 source-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3
    destination-port 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 protocol 0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the group server:

1. Configure the loopback address on the device.

```

[edit]
user@host# edit interfaces
user@host# set lo0 unit 0 family inet address 20.0.0.1/32

```

2. Configure IKE Phase 1 SA (this configuration must match the Phase 1 SA configured on the group members).

```
[edit security group-vpn server ike proposal srv-prop]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm 3des-cbc
```

3. Define the IKE policy and set the remote gateways.

```
[edit security group-vpn server ike]
user@host# set policy srv-pol mode main proposals srv-prop pre-shared-key
  ascii-text "$ABC123"
user@host# set gateway gw1 ike-policy srv-pol address 10.1.0.1
user@host# set gateway gw2 ike-policy srv-pol address 10.2.0.1
```

4. Configure the Phase 2 SA exchange.

```
[edit security group-vpn server ipsec proposal group-prop]
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm 3des-cbc
user@host# set lifetime-seconds 3600
```

5. Configure the group identifier and IKE gateway.

```
[edit security group-vpn server group grp1]
user@host# set group-id 1
user@host# set ike-gateway gw1
user@host# set ike-gateway gw2
user@host# set anti-replay-time-window 120 server-address 20.0.0.1
```

6. Configure server-to-member communications.

```
[edit security group-vpn server group grp1]
user@host# set server-member-communication communication-type unicast
  encryption-algorithm aes-128-cbc sig-hash-algorithm md5 certificate "srv-cert"
```

7. Configure the group policies to be downloaded to group members.

```
[edit security group-vpn server group grp1 ipsec-sa group-sa]
user@host# set proposal group-prop match-policy p1 source 10.1.0.0/16 destination
  10.2.0.0/16 source-port 0 destination-port 0 protocol 0
user@host# set proposal group-prop match-policy p2 source 10.2.0.0/16 destination
  10.1.0.0/16 source-port 0 destination-port 0 protocol 0
user@host# set proposal group-prop match-policy p3 source 10.1.1.1/16 destination
  239.1.1.1/32 source-port 0 destination-port 0 protocol 0
```

Results From configuration mode, confirm your configuration by entering the **show security group-vpn server** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security group-vpn server
ike {
  proposal srv-prop {
    authentication-method pre-shared-keys;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm 3des-cbc;
  }
  policy srv-pol {
    mode main;
    proposals srv-prop;
    pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
  }
  gateway gw1 {
    ike-policy srv-pol;
    address 10.1.0.1;
  }
  gateway gw2 {
    ike-policy srv-pol;
    address 10.2.0.1;
  }
}
ipsec {
  proposal group-prop {
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm 3des-cbc;
    lifetime-seconds 3600;
  }
}
group grp1 {
  group-id 1;
  ike-gateway gw1;
  ike-gateway gw2;
  anti-replay-time-window 120;
  server-address 20.0.0.1;
  ipsec-sa group-sa {
    proposal group-prop;
    match-policy p1 {
      source 10.1.0.0/16;
      destination 10.2.0.0/16;
      source-port 0;
      destination-port 0;
      protocol 0;
    }
    match-policy p2 {
      source 10.2.0.0/16;
      destination 10.1.0.0/16;
      source-port 0;
      destination-port 0;
    }
  }
}
```

```

        protocol 0;
    }
    match-policy p3 {
        source 10.1.1.1/16;
        destination 239.1.1.1/32;
        source-port 0;
        destination-port 0;
        protocol 0;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Member1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security group-vpn member ike proposal prop1 authentication-method pre-shared-keys
set security group-vpn member ike proposal prop1 dh-group group2
set security group-vpn member ike proposal prop1 authentication-algorithm sha1
set security group-vpn member ike proposal prop1 encryption-algorithm 3des-cbc
set security group-vpn member ike policy pol1 mode main
set security group-vpn member ike policy pol1 proposals prop1
set security group-vpn member ike policy pol1 pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway g1 ike-policy pol1
set security group-vpn member ike gateway g1 address 20.0.0.1
set security group-vpn member ike gateway g1 local-address 10.1.0.1
set security group-vpn member ipsec vpn v1 ike-gateway g1
set security group-vpn member ipsec vpn v1 group-vpn-external-interface ge-0/1/0
set security group-vpn member ipsec vpn v1 group 1
set security address-book book1 address 10_subnet 10.0.0.0/8
set security address-book book1 attach zone trust
set security address-book book2 address 10_subnet 10.0.0.0/8
set security address-book book2 attach zone untrust
set security policies from-zone trust to-zone untrust policy scope1 match source-address 10_subnet
set security policies from-zone trust to-zone untrust policy scope1 match destination-address 10_subnet
set security policies from-zone trust to-zone untrust policy scope1 match application any
set security policies from-zone trust to-zone untrust policy scope1 then permit tunnel ipsec-group-vpn v1
set security policies from-zone untrust to-zone trust policy scope1 match source-address 10_subnet
set security policies from-zone untrust to-zone trust policy scope1 match destination-address 10_subnet
set security policies from-zone untrust to-zone trust policy scope1 match application any
set security policies from-zone untrust to-zone trust policy scope1 then permit tunnel ipsec-group-vpn v1

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure member1:

1. Configure Phase 1 SA (this configuration must match the Phase 1 SA configured on the group server).

```
[edit security group-vpn member ike proposal prop1]
user@member1# set authentication-method pre-shared-keys
user@member1# set dh-group group2
user@member1# set authentication-algorithm sha1
user@member1# set encryption-algorithm 3des-cbc
```

2. Define the IKE policy and set the remote gateways.

```
[edit security group-vpn member ike]
user@member1# set policy pol1 mode main proposals prop1 pre-shared-key ascii-text
"$ABC123"
user@member1# set gateway g1 ike-policy pol1 address 20.0.0.1 local-address
10.1.0.1
```

3. Configure the group identifier, IKE gateway, and interface for member1.

```
[edit security group-vpn member ipsec]
user@member1# set vpn v1 group 1 ike-gateway g1 group-vpn-external-interface
ge-0/1/0
```



NOTE: To prevent packet fragmentation issues, we recommend that the interface used by the group members to connect to the MPLS network be configured for an MTU size no larger than 1400 bytes. Use the `set interface mtu` configuration statement to set the MTU size.

4. Create address books and attach zones to them.

```
[edit security address-book book1]
user@member1# set address 10_subnet 10.0.0.0/8
user@member1# set attach zone trust
```

```
[edit security address-book book2]
user@member1# set address 10_subnet 10.0.0.0/8
user@member1# set attach zone untrust
```

5. Configure a scope policy from the trust zone to the untrust zone that allows unicast traffic to and from the 10.0.0.0/8 subnetwork.

```
[edit security policies from-zone trust to-zone untrust]
user@member1# set policy scope1 match source-address 10_subnet
destination-address 10_subnet application any
user@member1# set policy scope1 then permit tunnel ipsec-group-vpn v1
```

6. Configure a scope policy from the untrust zone to the trust zone that allows unicast traffic to and from the 10.0.0.0/8 subnetwork.

```
[edit security policies from-zone untrust to-zone trust]
user@member1# set policy scope1 match source-address 10_subnet
destination-address 10_subnet application any
user@member1# set policy scope1 then permit tunnel ipsec-group-vpn v1
```

Results From configuration mode, confirm your configuration by entering the **show security group-vpn member** and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@member1# show security group-vpn member
ike {
  proposal prop1 {
    authentication-method pre-shared-keys;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm 3des-cbc;
  }
  policy pol1 {
    mode main;
    proposals prop1;
    pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
  }
  gateway g1 {
    ike-policy pol1;
    address 20.0.0.1;
    local-address 10.1.0.1;
  }
}
ipsec {
  vpn v1 {
    ike-gateway g1;
    group-vpn-external-interface ge-0/1/0;
    group 1;
  }
}
```

```
[edit]
user@member1# show security policies
from-zone trust to-zone trust {
  policy default-permit {
```

```
match {
    source-address any;
    destination-address any;
    application any;
}
then {
    permit;
}
}
}
from-zone trust to-zone untrust {
    policy scope1 {
        match {
            source-address 10_subnet;
            destination-address 10_subnet;
            application any;
        }
        then {
            permit {
                tunnel {
                    ipsec-group-vpn v1;
                }
            }
        }
    }
}
policy default-permit {
    match {
        source-address any;
        destination-address any;
        application any;
    }
    then {
        permit;
    }
}
}
from-zone untrust to-zone trust {
    policy scope1 {
        match {
            source-address 10_subnet;
            destination-address 10_subnet;
            application any;
        }
        then {
            permit {
                tunnel {
                    ipsec-group-vpn v1;
                }
            }
        }
    }
}
policy default-deny {
    match {
        source-address any;
        destination-address any;
```



```

        application any;
    }
    then {
        deny;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Member2

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security group-vpn member ike proposal prop2 authentication-method pre-shared-keys
set security group-vpn member ike proposal prop2 authentication-method pre-shared-keys
set security group-vpn member ike proposal prop2 dh-group group2
set security group-vpn member ike proposal prop2 authentication-algorithm sha1
set security group-vpn member ike proposal prop2 encryption-algorithm 3des-cbc
set security group-vpn member ike policy pol2 mode main
set security group-vpn member ike policy pol2 proposals prop2
set security group-vpn member ike policy pol2 pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway g2 ike-policy pol2
set security group-vpn member ike gateway g2 address 20.0.0.1
set security group-vpn member ike gateway g2 local-address 10.2.0.1
set security group-vpn member ipsec vpn v2 ike-gateway g2
set security group-vpn member ipsec vpn v2 group-vpn-external-interface ge-0/1/0
set security group-vpn member ipsec vpn v2 group 1
set security address-book book1 address 10_subnet 10.0.0.0/8
set security address-book book1 address 10_1_0_0_16 10.1.0.0/16
set security address-book book1 address multicast_net 239.0.0.0/8
set security address-book book1 attach zone trust
set security address-book book2 address 10_subnet 10.0.0.0/8
set security address-book book2 address 10_1_0_0_16 10.1.0.0/16
set security address-book book2 address multicast_net 239.0.0.0/8
set security address-book book2 attach zone untrust
set security policies from-zone trust to-zone untrust policy deny2 match source-address
  10_1_0_0_16
set security policies from-zone trust to-zone untrust policy deny2 match
  destination-address any
set security policies from-zone trust to-zone untrust policy deny2 match application any
set security policies from-zone trust to-zone untrust policy deny2 then reject
set security policies from-zone trust to-zone untrust policy scope2 match source-address
  10_subnet
set security policies from-zone trust to-zone untrust policy scope2 match
  destination-address 10_subnet
set security policies from-zone trust to-zone untrust policy scope2 match application any
set security policies from-zone trust to-zone untrust policy scope2 then permit tunnel
  ipsec-group-vpn v2

```

```

set security policies from-zone trust to-zone untrust policy multicast-scope2 match
  source-address 10_subnet
set security policies from-zone trust to-zone untrust policy multicast-scope2 match
  destination-address multicast-net
set security policies from-zone trust to-zone untrust policy multicast-scope2 match
  application any
set security policies from-zone trust to-zone untrust policy multicast-scope2 then permit
  tunnel ipsec-group-vpn v2
set security policies from-zone untrust to-zone trust policy deny2 match source-address
  any set security policies from-zone untrust to-zone trust policy multicast-scope2 ma
  tch application any set security policies from-zone untr
set security policies from-zone untrust to-zone trust policy deny2 match
  destination-address 10_1_0_0_16
set security policies from-zone untrust to-zone trust policy deny2 match application any
set security policies from-zone untrust to-zone trust policy deny2 then reject
set security policies from-zone untrust to-zone trust policy scope2 match source-address
  10_subnet
set security policies from-zone untrust to-zone trust policy scope2 match
  destination-address 10_subnet
set security policies from-zone untrust to-zone trust policy scope2 match application any
set security policies from-zone untrust to-zone trust policy scope2 then permit tunnel
  ipsec-group-vpn v2
set security policies from-zone untrust to-zone trust policy multicast-scope2 match
  source-address 10_subnet
set security policies from-zone untrust to-zone trust policy multicast-scope2 match
  destination-address multicast-net
set security policies from-zone untrust to-zone trust policy multicast-scope2 match
  application any
set security policies from-zone untrust to-zone trust policy multicast-scope2 then permit
  tunnel ipsec-group-vpn v2

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure member2:

1. Configure Phase 1 SA (this configuration must match the Phase 1 SA configured on the group server).

```

[edit security group-vpn member ike proposal prop2]
user@member2# set authentication-method pre-shared-keys
user@member2# set dh-group group2
user@member2# set authentication-algorithm sha1
user@member2# set encryption-algorithm 3des-cbc

```

2. Define the IKE policy and set the remote gateway.

```

[edit security group-vpn member ike]
user@member2# set policy pol2 mode main proposals prop2 pre-shared-key
  ascii-text "$ABC123"

```

```
user@member2# set gateway g2 ike-policy pol2 address 20.0.0.1 local-address 10.2.0.1
```

3. Configure the group identifier, IKE gateway, and interface for member2.

```
[edit security group-vpn member ipsec]
user@member2# set vpn v2 group 1 ike-gateway g2 group-vpn-external-interface ge-0/1/0
```



NOTE: To prevent packet fragmentation issues, we recommend that the interface used by the group members to connect to the MPLS network be configured for an MTU size no larger than 1400 bytes. Use the `set interface mtu` configuration statement to set the MTU size.

4. Create an address book and attach it to the trust zone.

```
[edit security address-book book1]
user@member2# set address 10_subnet 10.0.0.0/8
user@member2# set address 10_1_0_0_16 10.1.0.0/16
user@member2# set address multicast_net 239.0.0.0/8
user@member2# set attach zone trust
```

5. Create another address book and attach it to the untrust zone.

```
[edit security address-book book2]
user@member2# set address 10_subnet 10.0.0.0/8
user@member2# set address 10_1_0_0_16 10.1.0.0/16
user@member2# set address multicast_net 239.0.0.0/8
user@member2# set attach zone untrust
```

6. Configure a scope policy from the trust zone to the untrust zone that blocks traffic from 10.1.0.0/16.

```
[edit security policies from-zone trust to-zone untrust]
user@member2# set policy deny2 match source-address 10_1_0_0_16
destination-address any application any
user@member2# set policy deny2 then reject
user@member2# set policy scope2 match source-address 10_subnet
destination-address 10_subnet application any
user@member2# set policy scope2 then permit tunnel ipsec-group-vpn v2
user@member2# set policy multicast-scope2 match source-address 10_subnet
destination-address multicast-net application any
user@member2# set policy multicast-scope2 then permit tunnel ipsec-group-vpn v2
```

7. Configure a scope policy from the untrust zone to the trust zone that blocks traffic to 10.1.0.0/16.

```
[edit security policies from-zone untrust to-zone trust]
user@member2# set policy deny2 match source-address any destination-address
10_1_0_0_16 application any
user@member2# set policy deny2 then reject
user@member2# set policy scope2 match source-address 10_subnet
destination-address 10_subnet application any
user@member2# set policy scope2 then permit tunnel ipsec-group-vpn v2
user@member2# set policy multicast-scope2 match source-address 10_subnet
destination-address multicast-net application any
user@member2# set policy multicast-scope2 then permit tunnel ipsec-group-vpn
v2
```

Results From configuration mode, confirm your configuration by entering the **show security group-vpn member** and **show security policies** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@member2# show security group-vpn member
ike {
  proposal prop2 {
    authentication-method pre-shared-keys;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm 3des-cbc;
  }
  policy pol2 {
    mode main;
    proposals prop2;
    pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
  }
  gateway g2 {
    ike-policy pol2;
    address 20.0.0.1;
    local-address 10.2.0.1;
  }
}
ipsec {
  vpn v2 {
    ike-gateway g2;
    group-vpn-external-interface ge-0/1/0;
    group 1;
  }
}
```

```
[edit]
user@member2# show security policies
from-zone trust to-zone trust {
  policy default-permit {
```

```
match {
  source-address any;
  destination-address any;
  application any;
}
then {
  permit;
}
}
}
from-zone trust to-zone untrust {
  policy deny2 {
    match {
      source-address 10_1_0_0_16;
      destination-address any;
      application any;
    }
    then {
      reject;
    }
  }
  policy scope2 {
    match {
      source-address 10_subnet;
      destination-address 10_subnet;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-group-vpn v2;
        }
      }
    }
  }
  policy multicast-scope2 {
    match {
      source-address 10_subnet;
      destination-address multicast-net;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-group-vpn v2;
        }
      }
    }
  }
  policy default-permit {
    match {
      source-address any;
      destination-address any;
      application any;
    }
  }
}
```

```
        then {
            permit;
        }
    }
}
from-zone untrust to-zone trust {
    policy deny2 {
        match {
            source-address any;
            destination-address 10_1_0_0_16;
            application any;
        }
        then {
            reject;
        }
    }
    policy scope2 {
        match {
            source-address 10_subnet;
            destination-address 10_subnet;
            application any;
        }
        then {
            permit {
                tunnel {
                    ipsec-group-vpn v2;
                }
            }
        }
    }
    policy multicast-scope2 {
        match {
            source-address 10_subnet;
            destination-address multicast-net;
            application any;
        }
        then {
            permit {
                tunnel {
                    ipsec-group-vpn v2;
                }
            }
        }
    }
    policy default-deny {
        match {
            source-address any;
            destination-address any;
            application any;
        }
        then {
            deny;
        }
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform this task:

- [Verifying Dynamic Policies for Member1 on page 731](#)
- [Verifying Dynamic Policies for Member2 on page 731](#)

Verifying Dynamic Policies for Member1

Purpose View the dynamic policies installed on member1.

Action After the group server downloads keys to member1, enter the **show security dynamic-policies** command from operational mode.

```
user@member1> show security dynamic-policies
Policy: scope1-0001, action-type: permit, State: enabled, Index: 1048580, AI:
disabled, Scope Policy: 4
Policy Type: Dynamic
Sequence number: 1
From zone: untrust, To zone: trust
Source addresses: 10.1.0.0/16
Destination addresses: 10.2.0.0/16
Application: Unknown
IP protocol: 0, ALG: 0, Inactivity timeout: 0
Source port range: [0-0]
Destination port range: [0-0]
Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586
Policy: scope1-0001, action-type: permit, State: enabled, Index: 1048581, AI:
disabled, Scope Policy: 5
Policy Type: Dynamic
Sequence number: 2
From zone: trust, To zone: untrust
Source addresses: 10.1.0.0/16
Destination addresses: 10.2.0.0/16
Application: Unknown
IP protocol: 0, ALG: 0, Inactivity timeout: 0
Source port range: [0-0]
Destination port range: [0-0]
Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586
```

Meaning The multicast policy p3 from the server is not installed on member1 because there is no scope policy configured on member1 that allows multicast traffic.

Verifying Dynamic Policies for Member2

Purpose View the dynamic policies installed on member 2.

Action After the group server downloads keys to member2, enter the **show security dynamic-policies** command from operational mode.

```

user@member2> show security dynamic-policies
Policy: scope2-0001, action-type: permit, State: enabled, Index: 1048580,AI:
disabled, Scope Policy: 4
  Policy Type: Dynamic
  Sequence number: 1
  From zone: untrust, To zone: trust
  Source addresses: 10.1.0.0/16
  Destination addresses: 10.2.0.0/16
  Application: Unknown
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [0-0]
  Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586
Policy: scope2-0001, action-type: permit, State: enabled, Index: 1048580,AI:
disabled, Scope Policy: 4
  Policy Type: Dynamic
  Sequence number: 1
  From zone: untrust, To zone: trust
  Source addresses: 10.1.1.1/32
  Destination addresses: 239.1.1.1/32
  Application: Unknown
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [0-0]
  Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586
Policy: scope2-0001, action-type: permit, State: enabled, Index: 1048581,AI:
disabled, Scope Policy: 5
  Policy Type: Dynamic
  Sequence number: 2
  From zone: trust, To zone: untrust
  Source addresses: 10.2.0.0/16/0
  Destination addresses: 10.1.0.0/16
  Application: Unknown
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [0-0]
  Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586
Policy: scope2-0001, action-type: permit, State: enabled, Index: 1048581,AI:
disabled, Scope Policy: 5
  Policy Type: Dynamic
  Sequence number: 2
  From zone: trust, To zone: untrust
  Source addresses: 10.1.1.1/32
  Destination addresses: 239.1.1.1/32
  Application: Unknown
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [0-0]
  Tunnel: INSTANCE-gvpn_133955586, Type: IPSec, Index: 133955586

```

Meaning The policy p2 (for traffic from 10.1.0.0/16 to 10.2.0.0/16) from the server is not installed on member2, because it matches the deny2 security policy configured on member2.

See Also • [Example: Configuring a Group IKE ID for Multiple Users on page 919](#)

Example: Configuring Group VPNv1 Server-Member Communication for Unicast Rekey Messages

This example shows how to enable the server to send unicast rekey messages to group members to ensure that valid keys are available for encrypting traffic between group members. Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices.

- [Requirements on page 733](#)
- [Overview on page 733](#)
- [Configuration on page 733](#)
- [Verification on page 734](#)

Requirements

Before you begin:

- Configure the group server and members for IKE Phase 1 negotiation.
- Configure the group server and members for Phase 2 IPsec SA.
- Configure the group **g1** on the group server.

Overview

In this example, you specify the following server-member communication parameters for group **g1**:

- The server sends unicast rekey messages to group members.
- 3des-cbc is used to encrypt traffic between the server and members.
- sha1 is used for member authentication.

Default values are used for server heartbeats, KEK lifetime, and retransmissions.

Configuration

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure server-member communication:

1. Set the communications type.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set communications-type unicast
```

2. Set the encryption algorithm.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set encryption-algorithm 3des-cbc
```

3. Set the member authentication.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set sig-hash-algorithm sha1
```

Verification

To verify the configuration is working properly, enter the **show security group-vpn server group g1 server-member-communication** command.

See Also • [Understanding IKE and IPsec Packet Processing on page 38](#)

Example: Configuring Group VPNv1 Server-Member Communication for Multicast Rekey Messages

This example shows how to enable the server to send multicast rekey messages to group members to ensure that valid keys are available for encrypting traffic between group members. Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices.

- [Requirements on page 734](#)
- [Overview on page 734](#)
- [Configuration on page 735](#)
- [Verification on page 736](#)

Requirements

Before you begin:

- Configure the group server and members for IKE Phase 1 negotiation and Phase 2 IPsec SA. See [“Example: Configuring Group VPNv1 Server and Members” on page 716](#) or [“Example: Configuring Group VPNv1 with Server-Member Colocation” on page 736](#).
- Configure ge-0/0/1.0, which is the interface the server will use for sending multicast messages. See *Junos OS Routing Protocols Library*.
- Configure the multicast group address 226.1.1.1. See *Junos OS Routing Protocols Library*.



NOTE: IP multicast protocols must be configured to allow delivery of multicast traffic in the network. This example does not show multicast configuration.

Overview

In this example, you specify the following server-member communication for group **g1**:

- The server sends multicast rekey messages to group members by means of multicast address 226.1.1.1 and interface ge-0/0/1.0.

- 3des-cbc is used to encrypt traffic between the server and members.
- sha1 is used for member authentication.

Default values are used for server heartbeats, KEK lifetime, and retransmissions.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security group-vpn server group g1 server-member-communication
communication-type multicast
set security group-vpn server group g1 server-member-communication multicast-group
226.1.1.1
set security group-vpn server group g1 server-member-communication
multicast-outgoing-interface ge-0/0/1.0
set security group-vpn server group g1 server-member-communication
encryption-algorithm 3des-cbc
set security group-vpn server group g1 server-member-communication sig-hash-algorithm
sha1
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure configure server-member communication for multicast rekey messages:

1. Set the communications type.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set communication-type multicast
```

2. Set the multicast group.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set multicast-group 226.1.1.1
```

3. Set the interface for outgoing multicast messages.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set multicast-outgoing-interface ge-0/0/1.0
```

4. Set the encryption algorithm.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set encryption-algorithm 3des-cbc
```

5. Set the member authentication.

```
[edit security group-vpn server group g1 server-member-communication]
user@host# set sig-hash-algorithm sha1
```

Results From configuration mode, confirm your configuration by entering the **show security group-vpn server group g1 server-member-communication** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security group-vpn server group g1 server-member-communication
communication-type multicast;
multicast-group 226.1.1.1;
multicast-outgoing-interface ge-0/0/1.0;
encryption-algorithm 3des-cbc;
sig-hash-algorithm sha1;
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying Server-Member Communication for Multicast Rekey Messages on page 736](#)

Verifying Server-Member Communication for Multicast Rekey Messages

Purpose Verify that server-member communication parameters for multicast rekey message are configured properly to ensure that valid keys are available for encrypting traffic between group members.

Action From operational mode, enter the **show security group-vpn server group g1 server-member-communication** command.

- See Also**
- [Example: Configuring a Group IKE ID for Multiple Users on page 919](#)
 - [Understanding IKE and IPsec Packet Processing on page 38](#)

Example: Configuring Group VPNv1 with Server-Member Colocation

This example shows how to configure a device for colocation mode, which allows server and member functions to coexist on the same physical device. Group VPNv1 is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices.

- [Requirements on page 737](#)
- [Overview on page 737](#)

- [Configuration on page 737](#)
- [Verification on page 745](#)

Requirements

Before you begin:

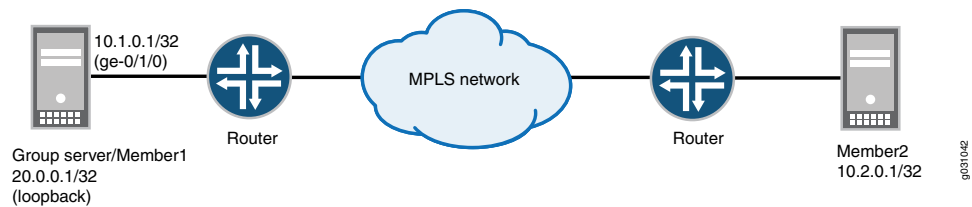
- Configure the Juniper Networks security devices for network communication.
- Configure network interfaces on server and member devices. See *Interfaces Feature Guide for Security Devices*.

Overview

When colocation mode is configured, group server and group member functions can coexist in the same device. In colocation mode, the server and member must have different IP addresses so that packets are delivered properly.

In [Figure 53 on page 737](#), a group VPN (group identifier is 1) consists of two members (member1 and member2) and a group server (the IP address of the loopback interface is 20.0.0.1). Note that member1 coexists in the same device as the group server. In this example, the interface that member1 uses to connect to the MPLS network (ge-0/1/0) is assigned the IP address 10.1.0.1/32.

Figure 53: Server-Member Colocation Example



NOTE: The configuration instructions in this topic describe how to configure the group server-member1 device for colocation mode. To configure member2, see [“Example: Configuring Group VPNv1 Server and Members” on page 716](#).



NOTE: To prevent packet fragmentation issues, we recommend that the interface used by the group member to connect to the MPLS network be configured for an MTU size no larger than 1400 bytes. Use the `set interface mtu` configuration statement to set the MTU size.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces lo0 unit 0 family inet address 20.0.0.1/32
set interfaces ge-0/1/0 unit 0 family inet address 10.1.0.1/32
set security group-vpn member ike proposal prop1 authentication-method pre-shared-keys
set security group-vpn member ike proposal prop1 dh-group group2
set security group-vpn member ike proposal prop1 authentication-algorithm sha1
set security group-vpn member ike proposal prop1 encryption-algorithm 3des-cbc
set security group-vpn member ike policy pol1 mode main
set security group-vpn member ike policy pol1 proposals prop1
set security group-vpn member ike policy pol1 pre-shared-key ascii-text "$9$c1gr
    K8-VYZUHX7UHqmF3Sre"
set security group-vpn member ike gateway g1 ike-policy pol1
set security group-vpn member ike gateway g1 address 20.0.0.1
set security group-vpn member ike gateway g1 local-address 10.1.0.1
set security group-vpn member ipsec vpn v1 ike-gateway g1
set security group-vpn member ipsec vpn v1 group-vpn-external-interface ge-0/1/0
set security group-vpn member ipsec vpn v1 group 1
set security group-vpn server ike proposal srv-prop authentication-method pre-shared-keys
set security group-vpn server ike proposal srv-prop dh-group group2
set security group-vpn server ike proposal srv-prop authentication-algorithm sha1
set security group-vpn server ike proposal srv-prop encryption-algorithm 3des-cbc
set security group-vpn server ike policy srv-pol mode main
set security group-vpn server ike policy srv-pol proposals srv-prop
set security group-vpn server ike policy srv-pol pre-shared-key ascii-text "$9$c
    1grK8-VYZUHX7UHqmF3Sre"
set security group-vpn server ike gateway gw1 ike-policy srv-pol
set security group-vpn server ike gateway gw1 address 10.1.0.1
set security group-vpn server ike gateway gw2 ike-policy srv-pol
set security group-vpn server ike gateway gw2 address 10.2.0.1
set security group-vpn server ipsec proposal group-prop authentication-algorithm
    hmac-sha1-96
set security group-vpn server ipsec proposal group-prop encryption-algorithm 3des-cbc
set security group-vpn server ipsec proposal group-prop lifetime-seconds 3600
set security group-vpn server group grp1 group-id 1
set security group-vpn server group grp1 ike-gateway gw1
set security group-vpn server group grp1 ike-gateway gw2
set security group-vpn server group grp1 anti-replay-time-window 120
set security group-vpn server group grp1 server-address 20.0.0.1
set security group-vpn server group grp1 server-member-communication
    communication-type unicast
set security group-vpn server group grp1 server-member-communication
    encryption-algorithm aes-128-cbc
set security group-vpn server group grp1 server-member-communication
    sig-hash-algorithm md5
set security group-vpn server group grp1 server-member-communication certificate
    srv-cert
set security group-vpn server group grp1 ipsec-sa group-sa proposal group-prop
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 source
    10.1.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 destination
    10.2.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 source-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 destination-port
    0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p1 protocol 0
```

```

set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 source
  10.2.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 destination
  10.1.0.0/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 source-port
  0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2
  destination-port 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p2 protocol 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 source
  10.1.1.1/16
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 destination
  239.1.1.1/32
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 source-port
  0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3
  destination-port 0
set security group-vpn server group grp1 ipsec-sa group-sa match-policy p3 protocol 0
set security group-vpn co-location
set security group-vpn member ipsec vpn v1 ike-gateway g1
set security group-vpn member ipsec vpn v1 group-vpn-external-interface ge-0/1/0
set security address-book book1 address 10_subnet 10.0.0.0/8
set security address-book book1 attach zone trust
set security address-book book2 address 10_subnet 10.0.0.0/8
set security address-book book2 attach zone untrust
set security policies from-zone trust to-zone untrust policy scope1 match source-address
  10_subnet
set security policies from-zone trust to-zone untrust policy scope1 match
  destination-address 10_subnet
set security policies from-zone trust to-zone untrust policy scope1 match application any
set security policies from-zone trust to-zone untrust policy scope1 then permit tunnel
  ipsec-group-vpn v1
set security policies from-zone untrust to-zone trust policy scope1 match source-address
  10_subnet
set security policies from-zone untrust to-zone trust policy scope1 match
  destination-address 10_subnet
set security policies from-zone untrust to-zone trust policy scope1 match application any
set security policies from-zone untrust to-zone trust policy scope1 then permit tunnel
  ipsec-group-vpn v1

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure group VPN with server-member colocation:

1. Configure the loopback address on the device.

```

[edit interfaces]
user@host# set lo0 unit 0 family inet address 20.0.0.1/32

```

2. Configure the interface that member1 uses to connect to the MPLS network.

```
[edit interfaces]
user@host# set ge-0/1/0 unit 0 family inet address 10.1.0.1/32
```

3. Configure group VPN colocation on the device.

```
[edit security group-vpn]
user@host# set co-location
```

4. Configure IKE Phase 1 SA for the server (this configuration must match the Phase 1 SA configured on group members).

```
[edit security group-vpn server ike proposal srv-prop]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm 3des-cbc
```

5. Define the IKE policy and set the remote gateways.

```
[edit security group-vpn server ike]
user@host# set policy srv-pol proposals srv-prop mode main pre-shared-key
  ascii-text "$9$clgrK8-VYZUHX7UHqmF3Sre"
user@host# set gateway gw1 ike-policy srv-pol address 10.1.0.1
user@host# set gateway gw2 ike-policy srv-pol address 10.2.0.1
```

6. Configure the Phase 2 SA exchange for the server.

```
[edit security group-vpn server ipsec proposal group-prop]
user@host# set authentication-algorithm hmac-sha1-96
user@host# set encryption-algorithm 3des-cbc
user@host# set lifetime-seconds 3600
```

7. Configure the group identifier, IKE gateway, antireplay time, and server address on the server.

```
[edit security group-vpn server group grp1]
user@host# set group-id 1 anti-replay-time-window 120 server-address 20.0.0.1
user@host# set ike-gateway gw1
user@host# set ike-gateway gw2
```

8. Configure server to member communications.

```
[edit security group-vpn server group grp1]
user@host# set server-member-communication communication-type unicast
  encryption-algorithm aes-128-cbc sig-hash-algorithm md5 certificate "srv-cert"
```

9. Configure the group policies to be downloaded to group members.


```
[edit security group-vpn server group grp1 ipsec-sa group-sa ]
user@host# set proposal group-prop match-policy p1 source 10.1.0.0/16 destination
10.2.0.0/16 source-port 0 destination-port 0 protocol 0
user@host# set proposal group-prop match-policy p2 source 10.2.0.0/16 destination
10.1.0.0/16 source-port 0 destination-port 0 protocol 0
user@host# set proposal group-prop match-policy p3 source 10.1.1.1/16 destination
239.1.1.1/32 source-port 0 destination-port 0 protocol 0
```

10. Configure Phase 1 SA for member1 (this configuration must match the Phase 1 SA configured for the group server).

```
[edit security group-vpn member ike proposal prop1]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group2
user@host# set authentication-algorithm sha1
user@host# set encryption-algorithm 3des-cbc
```

11. Define the policy and set the remote gateway for member1.

```
[edit security group-vpn member ike]
user@host# set policy pol1 mode main proposals prop1 pre-shared-key ascii-text
"$9$c1grK8-VYZUHX7UHqmF3Sre"
user@host# set gateway g1 ike-policy pol1 address 20.0.0.1 local-address 10.1.0.1
```

12. Configure the group identifier, IKE gateway, and interface for member1.

```
[edit security group-vpn member ipsec]
user@host# set vpn v1 group 1 ike-gateway g1 group-vpn-external-interface ge-0/1/0
```

13. Create address books and attach them to zones.

```
[edit security address-book book1]
user@member1# set address 10_subnet 10.0.0.0/8
user@member1# set attach zone trust
```

```
[edit security address-book book2]
user@member1# set address 10_subnet 10.0.0.0/8
user@member1# set attach zone untrust
```

14. Configure a scope policy from the trust zone to the untrust zone that allows unicast traffic to and from the 10.0.0.0/8 subnetwork.

```
[edit security policies from-zone trust to-zone untrust]
user@member1# set policy scope1 match source-address 10_subnet
destination-address 10_subnet application any
user@member1# set policy scope1 then permit tunnel ipsec-group-vpn v1
```

15. Configure a scope policy from the untrust zone to the trust zone that allows unicast traffic to and from the 10.0.0.0/8 subnetwork.

```
[edit security policies from-zone untrust to-zone trust]
user@member1# set policy scope1 match source-address 10_subnet
destination-address 10_subnet application any
user@member1# set policy scope1 then permit tunnel ipsec-group-vpn v1
```

Results From configuration mode, confirm your configuration by entering the **show security group-vpn** and **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.



NOTE: In the list of configured security policies, make sure that the scope policies are listed before the default policies.

```
[edit]
user@host# show security group-vpn
member {
  ike {
    proposal prop1 {
      authentication-method pre-shared-keys;
      dh-group group2;
      authentication-algorithm sha1;
      encryption-algorithm 3des-cbc;
    }
    policy pol1 {
      mode main;
      proposals prop1;
      pre-shared-key ascii-text "$9$c1grK8-VYZUHX7UHqmF3Sre"; ## SECRET-DATA
    }
    gateway g1 {
      ike-policy pol1;
      address 20.0.0.1;
      local-address 10.1.0.1;
    }
  }
  ipsec {
    vpn v1 {
      ike-gateway g1;
      group-vpn-external-interface ge-0/1/0;
      group 1;
    }
  }
  server {
    ike {
      proposal srv-prop {
        authentication-method pre-shared-keys;
```

```

    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm 3des-cbc;
  }
  policy srv-pol {
    mode main;
    proposals srv-prop;
    pre-shared-key ascii-text "$9$c1grK8-VYZUHX7UHqmF3Sre"; ## SECRET-DATA
  }
  gateway gw1 {
    ike-policy srv-pol;
    address 10.1.0.1;
  }
  gateway gw2 {
    ike-policy srv-pol;
    address 10.2.0.1;
  }
}
ipsec {
  proposal group-prop {
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm 3des-cbc;
    lifetime-seconds 3600;
  }
}
group grp1 {
  group-id 1;
  ike-gateway gw1;
  ike-gateway gw2;
  anti-replay-time-window 120;
  server-address 20.0.0.1;
  server-member-communication {
    communication-type unicast;
    encryption-algorithm aes-128-cbc;
    sig-hash-algorithm md5;
    certificate srv-cert;
  }
  ipsec-sa group-sa {
    proposal group-prop;
    match-policy p1 {
      source 10.1.0.0/16;
      destination 10.2.0.0/16;
      source-port 0;
      destination-port 0;
      protocol 0;
    }
    match-policy p2 {
      source 10.2.0.0/16;
      destination 10.1.0.0/16;
      source-port 0;
      destination-port 0;
      protocol 0;
    }
    match-policy p3 {
      source 10.1.1.1/16;

```

```
        destination 239.1.1.1/32;
        source-port 0;
        destination-port 0;
        protocol 0;
    }
}
}
co-location;
```

```
[edit]
user@host# show security policies
from-zone trust to-zone trust {
  policy default-permit {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit;
    }
  }
}
from-zone trust to-zone untrust {
  policy scope1 {
    match {
      source-address 10_subnet;
      destination-address 10_subnet;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-group-vpn v1;
        }
      }
    }
  }
}
policy default-permit {
  match {
    source-address any;
    destination-address any;
    application any;
  }
  then {
    permit;
  }
}
}
from-zone untrust to-zone trust {
  policy default-deny {
    match {
      source-address any;
```

```

        destination-address any;
        application any;
    }
    then {
        deny;
    }
}
policy scope1 {
    match {
        source-address 10_subnet;
        destination-address 10_subnet;
        application any;
    }
    then {
        permit {
            tunnel {
                ipsec-group-vpn v1;
            }
        }
    }
}
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying Group VPN Member Registration on page 745](#)
- [Verifying Group VPN Server Security Associations for IKE on page 745](#)
- [Verifying Group VPN Server Security Associations for IPsec on page 746](#)
- [Verifying Group VPN Member Security Associations for IKE on page 746](#)
- [Verifying Group VPN Member Security Associations for IPsec on page 746](#)

Verifying Group VPN Member Registration

Purpose Verify that the group VPN members are registered correctly.

Action From operational mode, enter the **show security group-vpn registered-members** command.

Verifying Group VPN Server Security Associations for IKE

Purpose Verify the SAs for the group VPN server for IKE.

Action From operational mode, enter the **show security group-vpn server ike security-associations** command.

Verifying Group VPN Server Security Associations for IPsec

Purpose Verify the SAs for the group VPN server for IPsec.

Action From operational mode, enter the **show security group-vpn server ipsec security-associations** command.

Verifying Group VPN Member Security Associations for IKE

Purpose Verify the SAs for the group VPN members for IKE.

Action From operational mode, enter the **show security group-vpn member ike security-associations** command.

Verifying Group VPN Member Security Associations for IPsec

Purpose Verify the SAs for the group VPN members for IPsec.

Action From operational mode, enter the **show security group-vpn member ipsec security-associations** command.

See Also**Release History Table**

Release	Description
12.3X48-D30	Starting with Junos OS Release 12.3X48-D30, Group VPNv1 members can interoperate with Group VPNv2 servers.
12.3X48-D30	Starting with Junos OS Release 12.3X48-D30, Group VPNv1 members on SRX100, SRX110, SRX210, SRX220, SRX240, SRX550, and SRX650 devices can interoperate with Group VPNv2 servers.

Related Documentation

- [Monitoring VPN Traffic on page 939](#)

Group VPNv2

Group VPNv2 introduces the concept of a trusted group to eliminate point-to-point tunnels and their associated overlay routing. All group members share a common security association (SA), also known as a group SA.

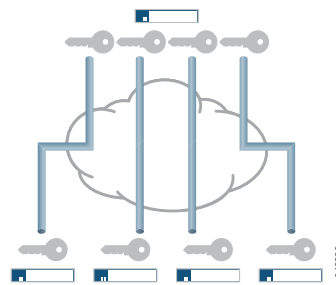
- [Group VPNv2 Overview on page 747](#)
- [Group VPNv2 Configuration Overview on page 752](#)
- [Understanding IKE Phase 1 Configuration for Group VPNv2 on page 753](#)

- [Understanding IPsec SA Configuration for Group VPNv2 on page 754](#)
- [Understanding Group VPNv2 Traffic Steering on page 754](#)
- [Understanding the Group VPNv2 Recovery Probe Process on page 756](#)
- [Understanding Group VPNv2 Antireplay on page 757](#)
- [Example: Configuring a Group VPNv2 Server and Members on page 757](#)
- [Example: Configuring Group VPNv2 Server-Member Communication for Unicast Rekey Messages on page 793](#)

Group VPNv2 Overview

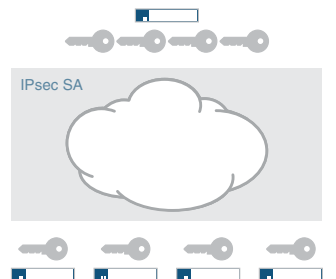
An IPsec security association (SA) is a unidirectional agreement between virtual private network (VPN) participants that defines the rules to use for authentication and encryption algorithms, key exchange mechanisms, and secure communications. With many VPN implementations, the SA is a point-to-point tunnel between two security devices (see [Figure 54 on page 747](#)).

Figure 54: Point-to-Point SAs



Group VPNv2 extends IPsec architecture to support SAs that are shared by a group of security devices (see [Figure 55 on page 747](#)). With Group VPNv2, any-to-any connectivity is achieved by preserving the original source and destination IP addresses in the outer header. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Figure 55: Shared SAs





NOTE: Group VPNv2 is an enhanced version of the group VPN feature introduced in an earlier Junos OS release for SRX Series devices. Group VPNv2 on Juniper devices support RFC 6407, *The Group Domain of Interpretation (GDOI)*, and interoperate with other devices that comply with RFC 6407.

Understanding the GDOI Protocol for Group VPNv2

Group VPNv2 is based on RFC 6407, *The Group Domain of Interpretation (GDOI)*. This RFC describes the protocol between group members and group servers to establish SAs among group members. GDOI messages create, maintain, or delete SAs for a group of devices. Group VPNv2 is supported on vSRX instances and all SRX Series devices except for SRX5400, SRX5600, and SRX5800 devices.

The GDOI protocol runs on UDP port 848. The Internet Security Association and Key Management Protocol (ISAKMP) defines two negotiation phases to establish SAs for an IKE IPsec tunnel. Phase 1 allows two devices to establish an ISAKMP SA for other security protocols, such as GDOI.

With Group VPNv2, Phase 1 ISAKMP SA negotiation is performed between a group server and a group member. The server and member must use the same ISAKMP policy. GDOI exchanges between the server and member establish the SAs that are shared with other group members. A group member does not need to negotiate IPsec with other group members. GDOI exchanges must be protected by ISAKMP Phase 1 SAs.

There are two types of GDOI exchanges:

- The **groupkey-pull** exchange allows a member to request SAs and keys shared by the group from the server. Group members must register with a group server through a **groupkey-pull** exchange.
- The **groupkey-push** exchange is a single rekey message that allows the server to send group SAs and keys to members before existing group SAs expire. Rekey messages are unsolicited messages sent from the server to members.

Understanding Group VPNv2 Servers and Members

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. The center of Group VPNv2 is the group controller/key server (GCKS). A server cluster can be used to provide GCKS redundancy.

The GCKS or group server performs the following tasks:

- Controls group membership.
- Generates encryption keys.
- Sends new group SAs and keys to members. Group members encrypt traffic based on the group SAs and keys provided by the group server.

A group server can service multiple groups. A single security device can be a member of multiple groups.

Each group is represented by a group identifier, which is a number between 1 and 4,294,967,295. The group server and group members are linked together by the group identifier. There can be only one group identifier per group, and multiple groups cannot use the same group identifier.

The following is a high-level view of Group VPNv2 server and member actions:

1. The group server listens on UDP port 848 for members to register.
2. To register with the group server, the member first establishes an IKE SA with the server. A member device must provide correct IKE Phase 1 authentication to join the group. Preshared key authentication on a per-member basis is supported.
3. Upon successful authentication and registration, the member device retrieves group SAs and keys for the specified group identifier from the server with a GDOI **groupkey-pull** exchange.
4. The server adds the member to the membership for the group.
5. Group members exchange packets encrypted with group SA keys.

The server sends SA and key refreshes to group members with rekey (GDOI **groupkey-push**) messages. The server sends rekey messages before SAs expire to ensure that valid keys are available for encrypting traffic between group members.

A rekey message sent by the server requires an acknowledgement (ack) message from each group member. If the server does not receive an ack message from the member, the rekey message is retransmitted at the configured **retransmission-period** (the default is 10 seconds). If there is no reply from the member after the configured **number-of-retransmission** (the default is 2 times), the member is removed from the server's registered members. The IKE SA between the server and member is also removed.

The server also sends rekey messages to provide new keys to members when the group SA has changed.

Understanding Group VPNv2 Limitations



NOTE: Group VPNv2 servers only operate with Group VPNv2 members that support RFC 6407, *The Group Domain of Interpretation (GDOI)*.

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. The following are not supported in this release for Group VPNv2:

- SNMP.
- Deny policy from Cisco GET VPN server.
- PKI support for Phase 1 IKE authentication.
- Colocation of group server and member, where server and member functions coexist in the same physical device.
- Group members configured as chassis clusters.
- J-Web interface for configuration and monitoring.
- Multicast data traffic.

Group VPNv2 is not supported in deployments where IP addresses cannot be preserved—for example, across the Internet where NAT is used.

Understanding Group VPNv2 Server-Member Communication

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. Server-member communication allows the server to send GDOI **groupkey-push** (rekey) messages to members. If server-member communication is not configured for the group, members can send GDOI **groupkey-pull** messages to register and reregister with the server, but the server is not able to send **groupkey-push** messages to members.

Server-member communication is configured for the group by using the **server-member-communication** configuration statement at the [**edit security group-vpn server**] hierarchy. The following options can be defined:

- Authentication algorithm (sha-256 or sha-384) used to authenticate the member to the server. There is no default algorithm.
- Encryption algorithm used for communications between the server and member. You can specify aes-128-cbc, aes-192-cbc, or aes-256-cbc. There is no default algorithm.
- Unicast communication type for rekey messages sent to group members.
- Lifetime for the key encryption key (KEK). The default is 3600 seconds.
- Number of times the group server retransmits **groupkey-push** messages to a group member without a response (the default is 2 times) and the period of time between retransmissions (the default is 10 seconds).

If server-member communication for a group is not configured, the membership list displayed by the **show security group-vpn server registered-members** command shows group members who have registered with the server; members can be active or not. When server-member communication for a group is configured, the group membership list is cleared. For unicast communication type, the **show security group-vpn server registered-members** command shows only active members.

Understanding Group VPNv2 Key Operations

This topic contains the following sections:

- [Group Keys on page 751](#)
- [Rekey Messages on page 751](#)
- [Member Registration on page 752](#)

Group Keys

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. The group server maintains a database to track the relationship among VPN groups, group members, and group keys. There are two kinds of group keys that the server downloads to members:

- **Key Encryption Key (KEK)**—Used to encrypt SA rekey (GDOI **groupkey-push**) exchanges. One KEK is supported per group.
- **Traffic Encryption Key (TEK)**—Used to encrypt and decrypt IPsec data traffic between group members.

The key associated with an SA is accepted by a group member only if there is a matching policy configured on the member. An accepted key is installed for the group, whereas a rejected key is discarded.

Rekey Messages

If the group is configured for server-member communications, the server sends SA and key refreshes to group members with rekey (GDOI **groupkey-push**) messages. Rekey messages are sent before SAs expire; this ensures that valid keys are available for encrypting traffic between group members.

The server also sends rekey messages to provide new keys to members when there is a change in group membership or the group SA has changed (for example, a group policy is added or deleted).

Server-member communications options must be configured on the server to allow the server to send rekey messages to group members.

The group server sends one copy of the unicast rekey message to each group member. Upon receipt of the rekey message, members must send an acknowledgment (ACK) to the server. If the server does not receive an ACK from a member (including retransmission of rekey messages), the server considers the member to be inactive and removes it from the membership list. The server stops sending rekey messages to the member.

The **number-of-retransmission** and **retransmission-period** configuration statements for server-member communications control the resending of rekey messages by the server when no ACK is received from a member.

The interval at which the server sends rekey messages is based on the value of the **lifetime-seconds** configuration statement at the **[edit security group-vpn server group group-name]** hierarchy. New keys are generated before the expiration of the KEK and TEK keys.

The **lifetime-seconds** for the KEK is configured as part of the server-member communications; the default is 3600 seconds. The **lifetime-seconds** for the TEK is configured for the IPsec proposal; the default is 3600 seconds.

Member Registration

If a group member does not receive a new SA key from the server before the current key expires, the member must reregister with the server and obtain updated keys with a GDOI **groupkey-pull** exchange.

See Also

Group VPNv2 Configuration Overview

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. This topic describes the main tasks for configuring Group VPNv2.



NOTE: The group controller/key server (GCKS) manages Group VPNv2 security associations (SAs), and generates encryption keys and distributes them to group members. You can use a Group VPNv2 server cluster to provide GCKS redundancy. See [“Understanding Group VPNv2 Server Clusters” on page 795](#).

On the group server(s), configure the following:

1. IKE Phase 1 SA. See [“Understanding IKE Phase 1 Configuration for Group VPNv2” on page 753](#).
2. IPsec SA. See [“Understanding IPsec SA Configuration for Group VPNv2” on page 754](#).
3. VPN group information, including the group identifier, IKE gateways for group members, the maximum number of members in the group, and server-member communications. Group configuration includes a group policy that defines the traffic to which the SA and keys apply. Server cluster and antireplay time window can optionally be configured. See [“Group VPNv2 Configuration Overview” on page 752](#) and [“Understanding Group VPNv2 Traffic Steering” on page 754](#).

On the group member, configure the following:

1. IKE Phase 1 SA. See [“Understanding IKE Phase 1 Configuration for Group VPNv2” on page 753](#).
2. IPsec SA. See [“Understanding IPsec SA Configuration for Group VPNv2” on page 754](#).
3. IPsec policy that defines the incoming zone (usually a protected LAN), outgoing zone (usually a WAN) and the VPN group to which the policy applies. Exclude or fail-open

rules can also be specified. See [“Understanding Group VPNv2 Traffic Steering” on page 754](#).

4. Security policy to allow group VPN traffic between the zones specified in the IPsec policy.



NOTE: Group VPNv2 operation requires a working routing topology that allows client devices to reach their intended sites throughout the network.

The group is configured on the server with the **group** configuration statement at the **[edit security group-vpn server]** hierarchy.

The group information consists of the following information:

- Group identifier—A value that identifies the VPN group. The same group identifier must be configured on the group member.
- Each group member is configured with the **ike-gateway** configuration statement. There can be multiple instances of this configuration statement, one for each member of the group.
- Group policies—Policies that are to be downloaded to members. Group policies describe the traffic to which the SA and keys apply. See [“Understanding Group VPNv2 Traffic Steering” on page 754](#).
- Member threshold—The maximum number of members in the group. After the member threshold for a group is reached, a server stops responding to **groupkey-pull** initiations from new members. See [“Understanding Group VPNv2 Server Clusters” on page 795](#).
- Server-member communication—Optional configuration that allows the server to send **groupkey-push** rekey messages to members.
- Server cluster—Optional configuration that supports group controller/key server (GCKS) redundancy. See [“Understanding Group VPNv2 Server Clusters” on page 795](#).
- Antireplay—Optional configuration that detects packet interception and replay. See [“Understanding Group VPNv2 Antireplay” on page 757](#).

See Also

Understanding IKE Phase 1 Configuration for Group VPNv2

An IKE Phase 1 SA between a group server and a group member establishes a secure channel in which to negotiate IPsec SAs that are shared by a group. For standard IPsec VPNs on Juniper Networks security devices, Phase 1 SA configuration consists of specifying an IKE proposal, policy, and gateway.

For Group VPNv2, the IKE Phase 1 SA configuration is similar to the configuration for standard IPsec VPNs, but is performed at the **[edit security group-vpn server ike]** and **[edit security group-vpn member ike]** hierarchies. Group VPNv2 is supported on SRX300,

SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

In the IKE proposal configuration, you set the authentication method and the authentication and encryption algorithms that will be used to open a secure channel between participants. In the IKE policy configuration, you set the mode in which the Phase 1 channel will be negotiated, specify the type of key exchange to be used, and reference the Phase 1 proposal. In the IKE gateway configuration, you reference the Phase 1 policy.

The IKE proposal and policy configuration on the group server must match the IKE proposal and policy configuration on group members. On a group server, an IKE gateway is configured for each group member. On a group member, up to four server addresses can be specified in the IKE gateway configuration.

See Also

Understanding IPsec SA Configuration for Group VPNv2

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. After the server and member have established a secure and authenticated channel in Phase 1 negotiation, they proceed to establish the IPsec SAs that are shared by group members to secure data that is transmitted among members. While the IPsec SA configuration for Group VPNv2 is similar to the configuration for standard VPNs, a group member does not need to negotiate the SA with other group members.

IPsec configuration for Group VPNv2 consists of the following information:

- On the group server, an IPsec proposal is configured for the security protocol, authentication, and encryption algorithm to be used for the SA. The IPsec SA proposal is configured on the group server with the **proposal** configuration statement at the **[edit security group-vpn server ipsec]** hierarchy.
- On the group member, an Autokey IKE is configured that references the group identifier, the group server (configured with the **ike-gateway** configuration statement), and the interface used by the member to connect to group peers. The Autokey IKE is configured on the member with the **vpn** configuration statement at the **[edit security group-vpn member ipsec]** hierarchy.

- See Also**
- [Understanding Group VPNv2 Server Clusters on page 795](#)

Understanding Group VPNv2 Traffic Steering

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. The group server distributes IPsec security associations (SAs) and keys to members of a specified group. All members that belong to the same group share the same set of IPsec SAs. The SA that is installed on a

specific group member is determined by the policy associated with the group SA and the IPsec policy that is configured on the group member.

- [Group Policies Configured on Group Servers on page 755](#)
- [IPsec Policies Configured on Group Members on page 755](#)
- [Fail-Close on page 755](#)
- [Exclude and Fail-Open Rules on page 756](#)
- [Priorities of IPsec Policies and Rules on page 756](#)

Group Policies Configured on Group Servers

In a VPN group, each group SA and key that the server pushes to a member are associated with a group policy. The group policy describes the traffic on which the key should be used, including protocol, source address, source port, destination address, and destination port. On the server, the group policy is configured with the **match-policy policy-name** options at the **[edit security group-vpn server group name ipsec-sa name]** hierarchy level.



NOTE: Group policies that are identical (configured with the same source address, destination address, source port, destination port, and protocol values) cannot exist for a single group. An error is returned if you attempt to commit a configuration that contains identical group policies for a group. If this occurs, you must delete one of the identical group policies before you can commit the configuration.

IPsec Policies Configured on Group Members

On the group member, an IPsec policy consists of the following information:

- Incoming zone (**from-zone**) for group traffic.
- Outgoing zone (**to-zone**) for group traffic.
- The name of the group to which the IPsec policy applies. Only one Group VPNv2 name can be referenced by a specific from-zone/to-zone pair.



NOTE: The interface that is used by the group member to connect to the Group VPNv2 must belong to the outgoing zone. This interface is specified with the **group-vpn-external-interface** statement at the **[edit security group-vpn member ipsec vpn vpn-name]** hierarchy level.

On the group member, the IPsec policy is configured at the **[edit security ipsec-policy]** hierarchy level. Traffic that matches the IPsec policy is further checked against exclude and fail-open rules that are configured for the group.

Fail-Close

By default, traffic that does not match exclude or fail-open rules or group policies received from the group server is blocked; this is known as fail-close.

Exclude and Fail-Open Rules

On group members, the following types of rules can be configured for each group:

- Traffic that is excluded from VPN encryption. Examples of this type of traffic can include BGP or OSPF routing protocols. To exclude traffic from a group, use the **set security group-vpn member ipsec vpn *vpn-name* exclude rule** configuration. A maximum of 10 exclude rules can be configured.
- Traffic that is critical to the customer's operation and must be sent in cleartext (unencrypted) if the group member has not received a valid traffic encryption key (TEK) for the IPsec SA. Fail-open rules allow this traffic flow while all other traffic is blocked. Enable fail-open with the **set security group-vpn member ipsec vpn *vpn-name* fail-open rule** configuration. A maximum of 10 fail-open rules can be configured.

Priorities of IPsec Policies and Rules

IPsec policies and rules have the following priorities on the group member:

1. Exclude rules that define traffic to be excluded from VPN encryption.
2. Group policies that are downloaded from the group server.
3. Fail-open rules that define traffic that is sent in cleartext if there is no valid TEK for the SA.
4. Fail-close policy that blocks traffic. This is the default if traffic does not match exclude or fail-open rules or group policies.

See Also • [Understanding Configuration Changes with Group VPNv2 Server Clusters on page 802](#)

Understanding the Group VPNv2 Recovery Probe Process

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. Two situations could indicate that a group member is out of synchronization with the group server and other group members:

- The group member receives an Encapsulating Security Payload (ESP) packet with an unrecognized Security Parameter Index (SPI).
- There is outgoing IPsec traffic but no incoming IPsec traffic on the group member.

When either situation is detected, a recovery probe process can be triggered on the group member. The recovery probe process initiates GDOI **groupkey-pull** exchanges at specific intervals to update the member's SA from the group server. If there is a DoS attack of bad SPI packets or if the sender itself is out of synchronization, the out-of-synchronization indication on the group member might be a false alarm. To avoid overloading the system, the **groupkey-pull** initiation is retried at intervals of 10, 20, 40, 80, 160, and 320 seconds.

The recovery probe process is disabled by default. To enable the recovery probe process, configure **recovery-probe** at the `[edit security group-vpn member ipsec vpn vpn-name]` hierarchy level.

See Also

Understanding Group VPNv2 Antireplay

Group VPNv2 antireplay is supported on vSRX instances and all SRX Series devices except for SRX5400, SRX5600, and SRX5800 devices. Antireplay is an IPsec feature that can detect when a packet is intercepted and then replayed by attackers. Antireplay is disabled by default for a group.

Each IPsec packet contains a timestamp. The group member checks whether the packet's timestamp falls within the configured **anti-replay-time-window** value. A packet is dropped if the timestamp exceeds the value.

We recommend that NTP be configured on all devices that support Group VPNv2 antireplay.



NOTE: Group members that are running on vSRX instances on a host machine where the hypervisor is running under a heavy load can experience issues that can be corrected by reconfiguring the **anti-replay-time-window** value. If data that matches the IPsec policy on the group member is not being transferred, check the `show security group-vpn member ipsec statistics` output for D3P errors. Make sure that NTP is operating correctly. If there are errors, adjust the **anti-replay-time-window** value.

See Also • [Understanding Antireplay for Group VPNv1 on page 716](#)

Example: Configuring a Group VPNv2 Server and Members

This example shows how to configure a Group VPNv2 server to provide group controller/key server (GCKS) support to Group VPNv2 group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

- [Requirements on page 758](#)
- [Overview on page 758](#)
- [Configuration on page 759](#)
- [Verification on page 787](#)

Requirements

The example uses the following hardware and software components:

- A supported SRX Series device or vSRX instance running Junos OS Release 15.1X49-D30 or later that supports Group VPNv2. This SRX Series device or vSRX instance operates as a Group VPNv2 server.
- Two supported SRX Series devices or vSRX instances running Junos OS Release 15.1X49-D30 or later that support Group VPNv2. These devices or instances operate as Group VPNv2 group members.
- Two supported MX Series devices running Junos OS Release 15.1R2 or later that support Group VPNv2. These devices operate as Group VPNv2 group members.

A hostname, a root administrator password, and management access must be configured on each device. We recommend that NTP also be configured on each device.



NOTE: Group VPNv2 operation requires a working routing topology that allows client devices to reach their intended sites throughout the network. This examples focuses on the Group VPNv2 configuration; the routing configuration is not described.

Overview

In this example, the Group VPNv2 network consists of a server and four members. Two of the members are SRX Series devices or vSRX instances while the other two members are MX Series devices. The shared group VPN SAs secure traffic between group members.

The group VPN SAs must be protected by a Phase 1 SA. Therefore, the group VPN configuration must include configuring IKE Phase 1 negotiations on both the group server and the group members.

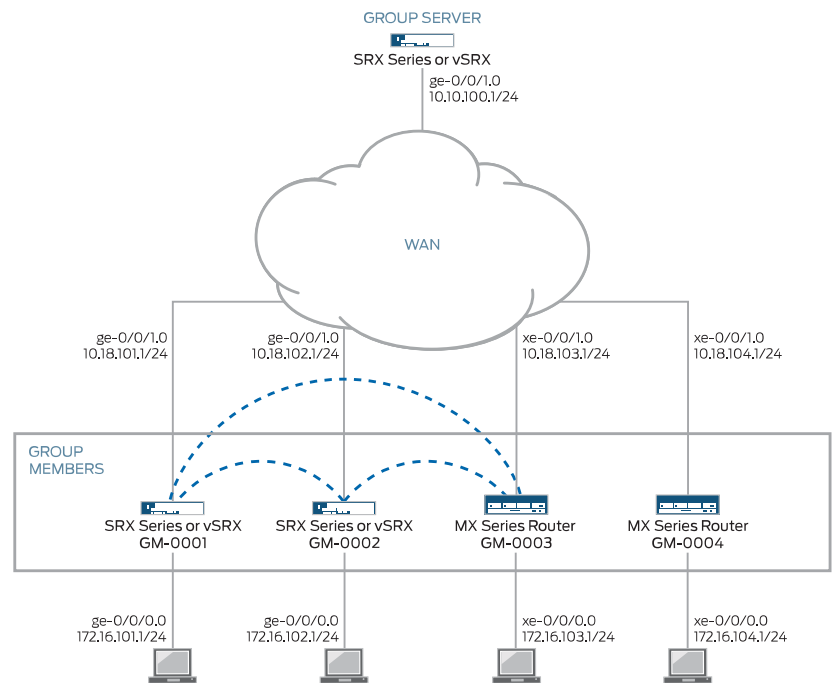
The same group identifier must be configured on both the group server and the group members. In this example, the group name is GROUP_ID-0001 and the group identifier is 1. The group policy configured on the server specifies that the SA and key are applied to traffic between subnetworks in the 172.16.0.0/12 range.

On SRX or vSRX group members, an IPsec policy is configured for the group with the LAN zone as the from-zone (incoming traffic) and the WAN zone as the to-zone (outgoing traffic). A security policy is also needed to allow traffic between the LAN and WAN zones.

Topology

[Figure 56 on page 759](#) shows the Juniper Networks devices to be configured for this example.

Figure 56: Group VPNv2 Server with SRX or vSRX and MX Series Members



Configuration

- [Configuring the Group Server on page 759](#)
- [Configuring Group Member GM-0001 \(SRX Series Device or vSRX Instance\) on page 765](#)
- [Configuring Group Member GM-0002 \(SRX Series Device or vSRX Instance\) on page 771](#)
- [Configuring Group Member GM-0003 \(MX Series Device\) on page 777](#)
- [Configuring Group Member GM-0004 \(MX Series Device\) on page 782](#)

Configuring the Group Server

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family inet address 10.10.100.1/24
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then reject
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
```

```
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces ge-0/0/1.0
set routing-options static route 10.18.101.0/24 next-hop 10.10.100.254
set routing-options static route 10.18.102.0/24 next-hop 10.10.100.254
set routing-options static route 10.18.103.0/24 next-hop 10.10.100.254
set routing-options static route 10.18.104.0/24 next-hop 10.10.100.254
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn server ike policy GMs mode main
set security group-vpn server ike policy GMs proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy GMs pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike gateway GM-0001 ike-policy GMs
set security group-vpn server ike gateway GM-0001 address 10.18.101.1
set security group-vpn server ike gateway GM-0001 local-address 10.10.100.1
set security group-vpn server ike gateway GM-0002 ike-policy GMs
set security group-vpn server ike gateway GM-0002 address 10.18.102.1
set security group-vpn server ike gateway GM-0002 local-address 10.10.100.1
set security group-vpn server ike gateway GM-0003 ike-policy GMs
set security group-vpn server ike gateway GM-0003 address 10.18.103.1
set security group-vpn server ike gateway GM-0003 local-address 10.10.100.1
set security group-vpn server ike gateway GM-0004 ike-policy GMs
set security group-vpn server ike gateway GM-0004 address 10.18.104.1
set security group-vpn server ike gateway GM-0004 local-address 10.10.100.1
set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0001
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0002
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0003
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0004
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0005
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
set security group-vpn server group GROUP_ID-0001 server-member-communication
  sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
  AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 source 172.16.0.0/12
```

```
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 destination 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 protocol 0
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 server:

1. Configure interfaces, security zones, and security policies.

```
[edit interfaces]
user@host# set ge-0/0/1 unit 0 family inet address 10.10.100.1/24

[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/1.0

[edit security policies]
user@host# set global policy 1000 match source-address any
user@host# set global policy 1000 match destination-address any
user@host# set global policy 1000 match application any
user@host# set global policy 1000 match from-zone any
user@host# set global policy 1000 match to-zone any
user@host# set global policy 1000 then reject
user@host# set global policy 1000 then log session-init
user@host# set global policy 1000 then count
user@host# set default-policy deny-all
```

2. Configure the static routes.

```
[edit routing-options]
user@host# set static route 10.18.101.0/24 next-hop 10.10.100.254
user@host# set static route 10.18.102.0/24 next-hop 10.10.100.254
user@host# set static route 10.18.103.0/24 next-hop 10.10.100.254
user@host# set static route 10.18.104.0/24 next-hop 10.10.100.254
```

3. Configure the IKE proposal, policy, and gateways.

```
[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set authentication-algorithm sha-256
user@host# set dh-group group14
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn server ike policy GMs]
```

```
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security group-vpn server ike gateway GM-0001]
user@host# set ike-policy GMs
user@host# set address 10.18.101.1
user@host# set local-address 10.10.100.1
```

```
[edit security group-vpn server ike gateway GM-0002]
user@host# set ike-policy GMs
user@host# set address 10.18.102.1
user@host# set local-address 10.10.100.1
```

```
[edit security group-vpn server ike gateway GM-0003]
user@host# set ike-policy GMs
user@host# set address 10.18.103.1
user@host# set local-address 10.10.100.1
```

```
[edit security group-vpn server ike gateway GM-0004]
user@host# set ike-policy GMs
user@host# set address 10.18.104.1
user@host# set local-address 10.10.100.1
```

4. Configure the IPsec proposal.

```
[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600 VPN Group
```

5. Configure the group.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
user@host# set ike-gateway GM-0001
user@host# set ike-gateway GM-0002
user@host# set ike-gateway GM-0003
user@host# set ike-gateway GM-0004
user@host# set anti-replay-time-window 1000
```

6. Configure server-to-member communications.

```
[edit security group-vpn server group GROUP_ID-0001
server-member-communication]
user@host# set communication-type unicast
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 7200
user@host# set sig-hash-algorithm sha-256
```

7. Configure the group policy to be downloaded to the group members.

```
[edit security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001]
user@host# set proposal AES256-SHA256-L3600
user@host# set match-policy 1 source 172.16.0.0/12
user@host# set match-policy 1 destination 172.16.0.0/12
user@host# set match-policy 1 protocol 0
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family inet {
      address 10.10.100.1/24;
    }
  }
}
[edit]
user@host# show routing-options
static {
  route 10.18.101.0/24 next-hop 10.10.100.254;
  route 10.18.102.0/24 next-hop 10.10.100.254;
  route 10.18.103.0/24 next-hop 10.10.100.254;
  route 10.18.104.0/24 next-hop 10.10.100.254;
}
[edit]
user@host# show security
group-vpn {
  server {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        authentication-algorithm sha-256;
        dh-group group14;
        encryption-algorithm aes-256-cbc;
      }
      policy GMs {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
      }
      gateway GM-0001 {
        ike-policy GMs;
        address 10.18.101.1;
        local-address 10.10.100.1;
      }
      gateway GM-0002 {
        ike-policy GMs;
```

```

        address 10.18.102.1;
        local-address 10.10.100.1;
    }
    gateway GM-0003 {
        ike-policy GMS;
        address 10.18.103.1;
        local-address 10.10.100.1;
    }
    gateway GM-0004 {
        ike-policy GMS;
        address 10.18.104.1;
        local-address 10.10.100.1;
    }
}
ipsec {
    proposal AES256-SHA256-L3600 {
        authentication-algorithm hmac-sha-256-128;
        encryption-algorithm aes-256-cbc;
        lifetime-seconds 3600;
    }
}
group GROUP_ID-0001 {
    group-id 1;
    member-threshold 2000;
    ike-gateway GM-0001;
    ike-gateway GM-0002;
    ike-gateway GM-0003;
    ike-gateway GM-0004;
    anti-replay-time-window 1000;
    server-member-communication {
        communication-type unicast;
        lifetime-seconds 7200;
        encryption-algorithm aes-256-cbc;
        sig-hash-algorithm sha-256;
    }
    ipsec-sa GROUP_ID-0001 {
        proposal AES256-SHA256-L3600;
        match-policy 1 {
            source 172.16.0.0/12;
            destination 172.16.0.0/12;
            protocol 0;
        }
    }
}
}
}
policies {
    global {
        policy 1000 {
            match {
                source-address any;
                destination-address any;
                application any;
                from-zone any;
                to-zone any;
            }
        }
    }
}

```



```

    }
    then {
        reject;
        log {
            session-init;
        }
        count;
    }
}
}
default-policy {
    deny-all;
}
}
zones {
    security-zone GROUPVPN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/1.0;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Group Member GM-0001 (SRX Series Device or vSRX Instance)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_LAN
set interfaces ge-0/0/0 unit 0 family inet address 172.16.101.1/24
set interfaces ge-0/0/1 unit 0 description To_KeySrv
set interfaces ge-0/0/1 unit 0 family inet address 10.18.101.1/24
set security zones security-zone LAN host-inbound-traffic system-services ike
set security zones security-zone LAN host-inbound-traffic system-services ssh
set security zones security-zone LAN host-inbound-traffic system-services ping
set security zones security-zone LAN interfaces ge-0/0/0.0
set security zones security-zone WAN host-inbound-traffic system-services ike
set security zones security-zone WAN host-inbound-traffic system-services ssh
set security zones security-zone WAN host-inbound-traffic system-services ping
set security zones security-zone WAN interfaces ge-0/0/1.0
set security address-book global address 172.16.0.0/12 172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match source-address
172.16.0.0/12

```

```
set security policies from-zone LAN to-zone WAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match application any
set security policies from-zone LAN to-zone WAN policy 1 then permit
set security policies from-zone LAN to-zone WAN policy 1 then log session-init
set security policies from-zone WAN to-zone LAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match application any
set security policies from-zone WAN to-zone LAN policy 1 then permit
set security policies from-zone WAN to-zone LAN policy 1 then log session-init
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then reject
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set routing-options static route 10.18.102.0/24 next-hop 10.18.101.254
set routing-options static route 10.18.103.0/24 next-hop 10.18.101.254
set routing-options static route 10.18.104.0/24 next-hop 10.18.101.254
set routing-options static route 172.16.101.0/24 next-hop 10.18.101.254
set routing-options static route 172.16.102.0/24 next-hop 10.18.101.254
set routing-options static route 172.16.103.0/24 next-hop 10.18.101.254
set routing-options static route 172.16.104.0/24 next-hop 10.18.101.254
set routing-options static route 10.10.100.0/24 next-hop 10.18.101.254
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy KeySrv mode main
set security group-vpn member ike policy KeySrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy KeySrv pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway KeySrv ike-policy KeySrv
set security group-vpn member ike gateway KeySrv server-address 10.10.100.1
set security group-vpn member ike gateway KeySrv local-address 10.18.101.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway KeySrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group-vpn-external-interface
  ge-0/0/1.0
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 recovery-probe
set security ipsec-policy from-zone LAN to-zone WAN ipsec-group-vpn GROUP_ID-0001
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure interfaces, security zones, and security policies.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_LAN
user@host# set ge-0/0/0 unit 0 family inet address 172.16.101.1/24
user@host# set ge-0/0/1 unit 0 description To_KeySrv
user@host# set ge-0/0/1 unit 0 family inet address 10.18.101.1/24

[edit security zones security-zone LAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0

[edit security]
user@host# set address-book global address 172.16.0.0/12 172.16.0.0/12

[edit security zones security-zone WAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/1.0

[edit security policies from-zone LAN to-zone WAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set then log session-init

[edit security policies from-zone WAN to-zone LAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set then log session-init

[edit security policies]
user@host# set global policy 1000 match source-address any
user@host# set global policy 1000 match destination-address any
user@host# set global policy 1000 match application any
user@host# set global policy 1000 match from-zone any
user@host# set global policy 1000 match to-zone any
user@host# set global policy 1000 match then reject
user@host# set global policy 1000 match then log session-init
user@host# set global policy 1000 match then count
user@host# set default-policy deny-all
```

2. Configure the static routes.

```
[edit routing-options]
user@host# set static route 10.18.102.0/24 next-hop 10.18.101.254
user@host# set static route 10.18.103.0/24 next-hop 10.18.101.254
user@host# set static route 10.18.104.0/24 next-hop 10.18.101.254
user@host# set static route 172.16.101.0/24 next-hop 10.18.101.254
user@host# set static route 172.16.102.0/24 next-hop 10.18.101.254
user@host# set static route 172.16.103.0/24 next-hop 10.18.101.254
user@host# set static route 172.16.104.0/24 next-hop 10.18.101.254
user@host# set static route 10.10.100.0/24 next-hop 10.18.101.254
```

3. Configure the IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set authentication-algorithm sha-256
user@host# set dh-group group14
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security group-vpn member ike policy KeySrv ]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security group-vpn member ike gateway KeySrv]
user@host# set ike-policy KeySrv
user@host# set server-address 10.10.100.1
user@host# set local-address 10.18.101.1
```

4. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway KeySrv
user@host# set group-vpn-external-interface ge-0/0/1.0
user@host# set group 1
user@host# set recovery-probe
```

5. Configure the IPsec policy.

```
[edit security ipsec-policy from-zone LAN to-zone WAN]
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
```

```

user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_LAN;
    family inet {
      address 172.16.101.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_KeySrv;
    family inet {
      address 10.18.101.1/24;
    }
  }
}
[edit]
user@host# show routing-options
static {
  route 10.18.102.0/24 next-hop 10.18.101.254;
  route 10.18.103.0/24 next-hop 10.18.101.254;
  route 10.18.104.0/24 next-hop 10.18.101.254;
  route 172.16.101.0/24 next-hop 10.18.101.254;
  route 172.16.102.0/24 next-hop 10.18.101.254;
  route 172.16.103.0/24 next-hop 10.18.101.254;
  route 172.16.104.0/24 next-hop 10.18.101.254;
  route 10.10.100.0/24 next-hop 10.18.101.254;
}
[edit]
user@host# show security
address-book {
  global {
    address 172.16.0.0/12 172.16.0.0/12;
  }
}
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy KeySrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
      }
      gateway KeySrv {
        ike-policy KeySrv;
        server-address 10.10.100.1;
        local-address 10.18.101.1;
      }
    }
  }
}

```

```
}
ipsec {
  vpn GROUP_ID-0001 {
    ike-gateway KeySrv;
    group-vpn-external-interface ge-0/0/1.0;
    group 1;
    recovery-probe;
  }
}
}
ipsec-policy {
  from-zone LAN to-zone WAN {
    ipsec-group-vpn GROUP_ID-0001;
  }
}
policies {
  from-zone LAN to-zone WAN {
    policy 1 {
      match {
        source-address 172.16.0.0/12;
        destination-address 172.16.0.0/12;
        application any;
      }
      then {
        permit;
        log {
          session-init;
        }
      }
    }
  }
  from-zone WAN to-zone LAN {
    policy 1 {
      match {
        source-address 172.16.0.0/12;
        destination-address 172.16.0.0/12;
        application any;
      }
      then {
        permit;
        log {
          session-init;
        }
      }
    }
  }
}
global {
  policy 1000 {
    match {
      source-address any;
      destination-address any;
      application any;
      from-zone any;
      to-zone any;
    }
  }
}
```

```

    }
    then {
        reject;
        log {
            session-init;
        }
        count;
    }
}
}
default-policy {
    deny-all;
}
}
zones {
    security-zone LAN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/0.0;
        }
    }
    security-zone WAN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/1.0;
        }
    }
}
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Group Member GM-0002 (SRX Series Device or vSRX Instance)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_LAN
set interfaces ge-0/0/0 unit 0 family inet address 172.16.102.1/24
set interfaces ge-0/0/1 unit 0 description To_KeySrv

```

```
set interfaces ge-0/0/1 unit 0 family inet address 10.18.102.1/24
set security zones security-zone LAN host-inbound-traffic system-services ike
set security zones security-zone LAN host-inbound-traffic system-services ssh
set security zones security-zone LAN host-inbound-traffic system-services ping
set security zones security-zone LAN interfaces ge-0/0/0.0
set security zones security-zone WAN host-inbound-traffic system-services ike
set security zones security-zone WAN host-inbound-traffic system-services ssh
set security zones security-zone WAN host-inbound-traffic system-services ping
set security zones security-zone WAN interfaces ge-0/0/1.0
set security address-book global address 172.16.0.0/12 172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match application any
set security policies from-zone LAN to-zone WAN policy 1 then permit
set security policies from-zone LAN to-zone WAN policy 1 then log session-init
set security policies from-zone WAN to-zone LAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match application any
set security policies from-zone WAN to-zone LAN policy 1 then permit
set security policies from-zone WAN to-zone LAN policy 1 then log session-init
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then reject
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set routing-options static route 10.18.101.0/24 next-hop 10.18.102.254
set routing-options static route 10.18.103.0/24 next-hop 10.18.102.254
set routing-options static route 10.18.104.0/24 next-hop 10.18.102.254
set routing-options static route 172.16.101.0/24 next-hop 10.18.102.254
set routing-options static route 172.16.102.0/24 next-hop 10.18.102.254
set routing-options static route 172.16.103.0/24 next-hop 10.18.102.254
set routing-options static route 172.16.104.0/24 next-hop 10.18.102.254
set routing-options static route 10.10.100.0/24 next-hop 10.18.102.254
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy KeySrv mode main
set security group-vpn member ike policy KeySrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy KeySrv pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway KeySrv ike-policy KeySrv
set security group-vpn member ike gateway KeySrv server-address 10.10.100.1
set security group-vpn member ike gateway KeySrv local-address 10.18.102.1
```



```

set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway KeySrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group-vpn-external-interface
  ge-0/0/1.0
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 recovery-probe
set security ipsec-policy from-zone LAN to-zone WAN ipsec-group-vpn GROUP_ID-0001

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure interfaces, security zones, and security policies.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_LAN
user@host# set ge-0/0/0 unit 0 family inet address 172.16.102.1/24
user@host# set ge-0/0/1 unit 0 description To_KeySrv
user@host# set ge-0/0/1 unit 0 family inet address 10.18.101.1/24

[edit security zones security-zone LAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0

[edit security zones security-zone WAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/1.0

[edit security]
user@host# set address-book global address 172.16.0.0/12 172.16.0.0/12

[edit security policies from-zone LAN to-zone WAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set then log session-init

[edit security policies from-zone WAN to-zone LAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set then log session-init

[edit security policies]

```

```
user@host# set global policy 1000 match source-address any
user@host# set global policy 1000 match destination-address any
user@host# set global policy 1000 match application any
user@host# set global policy 1000 match from-zone any
user@host# set global policy 1000 match to-zone any
user@host# set global policy 1000 match then reject
user@host# set global policy 1000 match then log session-init
user@host# set global policy 1000 match then count
user@host# set default-policy deny-all
```

2. Configure the static routes.

```
[edit routing-options]
user@host# set static route 10.18.101.0/24 next-hop 10.18.102.254
user@host# set static route 10.18.103.0/24 next-hop 10.18.102.254
user@host# set static route 10.18.104.0/24 next-hop 10.18.102.254
user@host# set static route 172.16.101.0/24 next-hop 10.18.102.254
user@host# set static route 172.16.102.0/24 next-hop 10.18.102.254
user@host# set static route 172.16.103.0/24 next-hop 10.18.102.254
user@host# set static route 172.16.104.0/24 next-hop 10.18.102.254
user@host# set static route 10.10.100.0/24 next-hop 10.18.102.254
```

3. Configure the IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set authentication-algorithm sha-256
user@host# set dh-group group14
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn member ike policy KeySrv ]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security group-vpn member ike gateway KeySrv]
user@host# set ike-policy KeySrv
user@host# set server-address 10.10.100.1
user@host# set local-address 10.18.102.1
```

4. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway KeySrv
user@host# set group-vpn-external-interface ge-0/0/1.0
user@host# set group 1
user@host# set recovery-probe
```

5. Configure the IPsec policy.

```
[edit security ipsec-policy from-zone LAN to-zone WAN]
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_LAN;
    family inet {
      address 172.16.102.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_KeySrv;
    family inet {
      address 10.18.102.1/24;
    }
  }
}
[edit]
user@host# show routing-options
static {
  route 10.18.101.0/24 next-hop 10.18.102.254;
  route 10.18.103.0/24 next-hop 10.18.102.254;
  route 10.18.104.0/24 next-hop 10.18.102.254;
  route 172.16.101.0/24 next-hop 10.18.102.254;
  route 172.16.102.0/24 next-hop 10.18.102.254;
  route 172.16.103.0/24 next-hop 10.18.102.254;
  route 172.16.104.0/24 next-hop 10.18.102.254;
  route 10.10.100.0/24 next-hop 10.18.102.254;
}
[edit]
user@host# show security
address-book {
  global {
    address 172.16.0.0/12 172.16.0.0/12;
  }
}
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
    }
  }
}
```

```
}
policy KeySrv {
    mode main;
    proposals PSK-SHA256-DH14-AES256;
    pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
gateway KeySrv {
    ike-policy KeySrv;
    server-address 10.10.100.1;
    local-address 10.18.102.1;
}
}
ipsec {
    vpn GROUP_ID-0001 {
        ike-gateway KeySrv;
        group-vpn-external-interface ge-0/0/1.0;
        group 1;
        recovery-probe;
    }
}
}
policies {
    from-zone LAN to-zone WAN {
        policy 1 {
            match {
                source-address 172.16.0.0/12;
                destination-address 172.16.0.0/12;
                application any;
            }
            then {
                permit;
                log {
                    session-init;
                }
            }
        }
    }
    from-zone WAN to-zone LAN {
        policy 1 {
            match {
                source-address 172.16.0.0/12;
                destination-address 172.16.0.0/12;
                application any;
            }
            then {
                permit;
                log {
                    session-init;
                }
            }
        }
    }
}
global {
    policy 1000 {
```

```

match {
    source-address any;
    destination-address any;
    application any;
    from-zone any;
    to-zone any;
}
then {
    reject;
    log {
        session-init;
    }
    count;
}
}
}
default-policy {
    deny-all;
}
}
zones {
    security-zone LAN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/0.0;
        }
    }
    security-zone WAN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/1.0;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Group Member GM-0003 (MX Series Device)

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network

configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet service output service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet address 10.18.103.1/24
set interfaces xe-0/0/2 unit 0 family inet address 172.16.103.1/24
set interfaces ms-0/2/0 unit 0 family inet
set routing-options static route 10.18.101.0/24 next-hop 10.18.103.254
set routing-options static route 10.18.102.0/24 next-hop 10.18.103.254
set routing-options static route 10.18.104.0/24 next-hop 10.18.103.254
set routing-options static route 172.16.101.0/24 next-hop 10.18.103.254
set routing-options static route 172.16.102.0/24 next-hop 10.18.103.254
set routing-options static route 172.16.103.0/24 next-hop 10.18.103.254
set routing-options static route 172.16.104.0/24 next-hop 10.18.103.254
set routing-options static route 10.10.100.0/24 next-hop 10.18.103.254
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy KeySrv mode main
set security group-vpn member ike policy KeySrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy KeySrv pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway KeySrv ike-policy KeySrv
set security group-vpn member ike gateway KeySrv server-address 10.10.100.1
set security group-vpn member ike gateway KeySrv local-address 10.18.103.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway KeySrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 match-direction output
set security group-vpn member ipsec vpn GROUP_ID-0001 tunnel-mtu 1400
set security group-vpn member ipsec vpn GROUP_ID-0001 df-bit clear
set services service-set GROUP_ID-0001 interface-service service-interface ms-0/2/0.0
set services service-set GROUP_ID-0001 ipsec-group-vpn GROUP_ID-0001
set firewall family inet service-filter GroupVPN-KS term inbound-ks from
  destination-address 10.10.100.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.10.100.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.10.100.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  source-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  destination-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 then service

```

Step-by-Step Procedure To configure the Group VPNv2 member:

1. Configure the interfaces.

```
[edit interfaces]
user@host# set xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet service output service-set
GROUP_ID-0001 service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet address 10.18.103.1/24
user@host# set xe-0/0/2 unit 0 family inet address 172.16.103.1/24
user@host# set ms-0/2/0 unit 0 family inet
```

2. Configure routing.

```
[edit routing-options]
user@host# set static route 10.18.101.0/24 next-hop 10.18.103.254
user@host# set static route 10.18.102.0/24 next-hop 10.18.103.254
user@host# set static route 10.18.104.0/24 next-hop 10.18.103.254
user@host# set static route 172.16.101.0/24 next-hop 10.18.103.254
user@host# set static route 172.16.102.0/24 next-hop 10.18.103.254
user@host# set static route 172.16.103.0/24 next-hop 10.18.103.254
user@host# set static route 172.16.104.0/24 next-hop 10.18.103.254
user@host# set static route 10.10.100.0/24 next-hop 10.18.103.254
```

3. Configure IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256 ]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn member ike policy KeySrv ]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security group-vpn member ike gateway KeySrv]
user@host# set ike-policy KeySrv
user@host# set server-address 10.10.100.1
user@host# set local-address 10.18.103.1
```

4. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway KeySrv
user@host# set group 1
user@host# set match-direction output
user@host# set tunnel-mtu 1400
user@host# set df-bit clear
```

5. Configure the service filter.

```
[edit firewall family inet service-filter GroupVPN-KS]
user@host# set term inbound-ks from destination-address 10.10.100.1/32
user@host# set term inbound-ks from source-address 10.10.100.1/32
user@host# set term inbound-ks then skip
user@host# set term outbound-ks from destination-address 10.10.100.1/32
user@host# set term outbound-ks then skip
user@host# set term GROUP_ID-0001 from source-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 from destination-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 then service
```

6. Configure the service set.

```
[edit services service-set GROUP_ID-0001]
user@host# set interface-service service-interface ms-0/2/0.0
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security**, **show services**, and **show firewall** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
xe-0/0/1 {
  unit 0 {
    family inet {
      service {
        input {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
        output {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
      }
      address 10.18.103.1/24;
    }
  }
}
xe-0/0/2 {
  unit 0 {
    family inet {
      address 172.16.103.1/24;
    }
  }
}
ms-0/2/0 {
  unit 0 {
    family inet;
  }
}
```



```

}
[edit]
user@host# show routing-options
static {
    route 10.18.101.0/24 next-hop 10.18.103.254;
    route 10.18.102.0/24 next-hop 10.18.103.254;
    route 10.18.104.0/24 next-hop 10.18.103.254;
    route 172.16.101.0/24 next-hop 10.18.103.254;
    route 172.16.102.0/24 next-hop 10.18.103.254;
    route 172.16.103.0/24 next-hop 10.18.103.254;
    route 172.16.104.0/24 next-hop 10.18.103.254;
}
[edit]
user@host# show security
group-vpn {
    member {
        ike {
            proposal PSK-SHA256-DH14-AES256 {
                authentication-method pre-shared-keys;
                dh-group group14;
                authentication-algorithm sha-256;
                encryption-algorithm aes-256-cbc;
            }
            policy KeySrv {
                mode main;
                proposals PSK-SHA256-DH14-AES256;
                pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
            }
            gateway KeySrv {
                ike-policy KeySrv;
                local-address 10.18.103.1;
                server-address 10.10.101.1;
            }
        }
    }
    ipsec {
        vpn GROUP_ID-0001 {
            ike-gateway KeySrv
            group 1;
            match-direction output;
            tunnel-mtu 1400;
            df-bit clear;
        }
    }
}
[edit]
user@host# show services
service-set GROUP_ID-0001 {
    interface-service {
        service-interface ms-0/2/0.0;
    }
    ipsec-group-vpn GROUP_ID-0001;
}
[edit]
user@host# show firewall

```

```

family inet {
  service-filter GroupVPN-KS {
    term inbound-ks {
      from {
        destination-address {
          10.10.100.1/32;
        }
        source-address {
          10.10.100.1/32;
        }
      }
      then skip;
    }
    term outbound-ks {
      from {
        destination-address {
          10.10.100.1/32;
        }
      }
      then skip;
    }
    term GROUP_ID-0001 {
      from {
        source-address {
          172.16.0.0/12;
        }
        destination-address {
          172.16.0.0/12;
        }
      }
      then service;
    }
  }
}

```

Configuring Group Member GM-0004 (MX Series Device)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet service output service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet address 10.18.104.1/24
set interfaces xe-0/0/2 unit 0 family inet address 172.16.104.1/24
set interfaces ms-0/2/0 unit 0 family inet
set routing-options static route 10.18.101.0/24 next-hop 10.18.104.254
set routing-options static route 10.18.102.0/24 next-hop 10.18.104.254
set routing-options static route 10.18.103.0/24 next-hop 10.18.104.254
set routing-options static route 172.16.101.0/24 next-hop 10.18.104.254

```

```

set routing-options static route 172.16.102.0/24 next-hop 10.18.104.254
set routing-options static route 172.16.103.0/24 next-hop 10.18.104.254
set routing-options static route 172.16.104.0/24 next-hop 10.18.104.254
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy SubSrv mode main
set security group-vpn member ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy SubSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn member ike gateway SubSrv ike-policy SubSrv
set security group-vpn member ike gateway SubSrv server-address 10.17.101.1
set security group-vpn member ike gateway SubSrv server-address 10.17.102.1
set security group-vpn member ike gateway SubSrv server-address 10.17.103.1
set security group-vpn member ike gateway SubSrv server-address 10.17.104.1
set security group-vpn member ike gateway SubSrv local-address 10.18.104.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway SubSrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 match-direction output
set security group-vpn member ipsec vpn GROUP_ID-0001 tunnel-mtu 1400
set security group-vpn member ipsec vpn GROUP_ID-0001 df-bit clear
set services service-set GROUP_ID-0001 interface-service service-interface ms-0/2/0.0
set services service-set GROUP_ID-0001 ipsec-group-vpn GROUP_ID-0001
set firewall family inet service-filter GroupVPN-KS term inbound-ks from
  destination-address 10.10.100.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.10.100.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.101.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.102.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.103.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.104.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  source-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  destination-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 then service

```

Step-by-Step Procedure To configure the Group VPNv2 member:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS

```

```
user@host# set xe-0/0/1 unit 0 family inet service output service-set
GROUP_ID-0001 service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet address 10.18.104.1/24
user@host# set xe-0/0/2 unit 0 family inet address 172.16.104.1/24
user@host# set ms-0/2/0 unit 0 family inet
```

2. Configure routing.

```
[edit routing-options]
user@host# set static route 10.18.101.0/24 next-hop 10.18.104.254
user@host# set static route 10.18.102.0/24 next-hop 10.18.104.254
user@host# set static route 10.18.103.0/24 next-hop 10.18.104.254
user@host# set static route 172.16.101.0/24 next-hop 10.18.104.254
user@host# set static route 172.16.102.0/24 next-hop 10.18.104.254
user@host# set static route 172.16.103.0/24 next-hop 10.18.104.254
user@host# set static route 172.16.104.0/24 next-hop 10.18.104.254
```

3. Configure IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256 ]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn member ike policy KeySrv ]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security group-vpn member ike gateway KeySrv]
user@host# set ike-policy KeySrv
user@host# set server-address 10.10.100.1
user@host# set local-address 10.18.104.1
```

4. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway KeySrv
user@host# set group 1
user@host# set match-direction output
user@host# set tunnel-mtu 1400
user@host# set df-bit clear
```

5. Configure the service filter.

```
[edit firewall family inet service-filter GroupVPN-KS]
user@host# set term inbound-ks from destination-address 10.10.101.1/32
user@host# set term inbound-ks from source-address 10.10.101.1/32
```

```

user@host# set term inbound-ks then skip
user@host# set term outbound-ks from destination-address 10.17.101.1/32
user@host# set term outbound-ks from destination-address 10.17.102.1/32
user@host# set term outbound-ks from destination-address 10.17.103.1/32
user@host# set term outbound-ks from destination-address 10.17.104.1/32
user@host# set term outbound-ks then skip
user@host# set term GROUP_ID-0001 from source-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 from destination-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 then service

```

6. Configure the service set.

```

[edit services service-set GROUP_ID-0001]
user@host# set interface-service service-interface ms-0/2/0.0
user@host# set ipsec-group-vpn GROUP_ID-0001

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show security**, **show services**, and **show firewall** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
xe-0/0/1 {
  unit 0 {
    family inet {
      service {
        input {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
        output {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
      }
      address 10.18.104.1/24;
    }
  }
}
xe-0/0/2 {
  unit 0 {
    family inet {
      address 172.16.104.1/24;
    }
  }
}
ms-0/2/0 {
  unit 0 {
    family inet;
  }
}
[edit]

```

```
user@host# show routing-options
static {
  route 10.18.101.0/24 next-hop 10.18.104.254;
  route 10.18.102.0/24 next-hop 10.18.104.254;
  route 10.18.103.0/24 next-hop 10.18.104.254;
  route 172.16.101.0/24 next-hop 10.18.104.254;
  route 172.16.102.0/24 next-hop 10.18.104.254;
  route 172.16.103.0/24 next-hop 10.18.104.254;
  route 172.16.104.0/24 next-hop 10.18.104.254;
}
[edit]
user@host# show security
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy KeySrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
      }
      gateway KeySrv {
        ike-policy KeySrv;
        local-address 10.18.104.1;
        server-address 10.17.101.1;
      }
    }
  }
  ipsec {
    vpn GROUP_ID-0001 {
      ike-gateway KeySrv
      group 1;
      match-direction output;
      tunnel-mtu 1400;
      df-bit clear;
    }
  }
}
[edit]
user@host# show services
service-set GROUP_ID-0001 {
  interface-service {
    service-interface ms-0/2/0.0;
  }
  ipsec-group-vpn GROUP_ID-0001;
}
[edit]
user@host# show firewall
family inet {
  service-filter GroupVPN-KS {
```

```

term inbound-ks {
  from {
    destination-address {
      10.10.100.1/32;
    }
    source-address {
      10.10.100.1/32;
    }
  }
  then skip;
}
term outbound-ks {
  from {
    destination-address {
      10.17.101.1/32;
      10.17.102.1/32;
      10.17.103.1/32;
      10.17.104.1/32;
    }
  }
  then skip;
}
term GROUP_ID-0001 {
  from {
    source-address {
      172.16.0.0/12;
    }
    destination-address {
      172.16.0.0/12;
    }
  }
  then service;
}
}
}

```

Verification

Confirm that the configuration is working properly.

- [Verifying Group Member Registration on page 787](#)
- [Verifying That Group Keys Are Distributed on page 788](#)
- [Verifying Group VPN SAs on the Group Server on page 789](#)
- [Verifying Group VPN SAs on Group Members on page 789](#)
- [Verifying IPsec SAs on the Group Server on page 790](#)
- [Verifying IPsec SAs on the Group Members on page 791](#)
- [Verifying Group Policies \(SRX or vSRX Group Members Only\) on page 793](#)

Verifying Group Member Registration

Purpose Verify that group members are registered on the server.

Action From operational mode, enter the **show security group-vpn server registered-members** and **show security group-vpn server registered-members detail** commands on the server.

```
user@host> show security group-vpn server registered-members
```

```
Group: GROUP_ID-0001, Group Id: 1
Total number of registered members: 2
Member Gateway          Member IP          Last Update          Vsys
-----
GM-0001                  10.18.101.1       Thu Nov 19 2015 16:31:09 root
GM-0003                  10.18.103.1       Thu Nov 19 2015 16:29:47 root
```

```
user@host> show security group-vpn server registered-members detail
```

```
GGroup: GROUP_ID-0001, Group Id: 1
Total number of registered members: 2

Member gateway: GM-0001, Member IP: 10.18.101.1, Vsys: root
Last Update: Thu Nov 19 2015 16:31:09
Stats:
  Pull Succeeded          : 2
  Pull Failed             : 0
  Push Sent               : 0
  Push Acknowledged       : 0
  Push Unacknowledged     : 0

Member gateway: GM-0003, Member IP: 10.18.103.1, Vsys: root
Last Update: Thu Nov 19 2015 16:29:47
Stats:
  Pull Succeeded          : 1
  Pull Failed             : 0
  Push Sent               : 0
  Push Acknowledged       : 0
  Push Unacknowledged     : 0
```

Verifying That Group Keys Are Distributed

Purpose Verify that group keys are distributed to members.

Action From operational mode, enter the **show security group-vpn server statistics** command on the group server.

```
user@host> show security group-vpn server statistics
```

```
Group: GROUP_ID-0001, Group Id: 1
Stats:
  Pull Succeeded          : 4
  Pull Failed             : 0
  Pull Exceed Member Threshold : 0
  Push Sent               : 0
  Push Acknowledged       : 0
  Push Unacknowledged     : 0
```


Verifying Group VPN SAs on the Group Server

Purpose Verify Group VPN SAs on the group server.

Action From operational mode, enter the `show security group-vpn server kek security-associations` and `show security group-vpn server kek security-associations detail` commands on the group server.

```
user@host> show security group-vpn server kek security-associations
```

Index	Life:sec	Initiator cookie	Responder cookie	GroupId
738879	1206	a471513492db1e13	24045792a4b3dd64	1

```
user@host> show security group-vpn server kek security-associations detail
```

```
Index 738879, Group Name: GROUP_ID-0001, Group Id: 1
Initiator cookie: a471513492db1e13, Responder cookie: 24045792a4b3dd64
Authentication method: RSA
Lifetime: Expires in 1204 seconds, Activated
Rekey in 694 seconds
  Algorithms:
    Sig-hash      : sha256
    Encryption    : aes256-cbc
  Traffic statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  Server Member Communication: Unicast
  Retransmission Period: 10, Number of Retransmissions: 2
  Group Key Push sequence number: 0

PUSH negotiations in progress: 0
```

Verifying Group VPN SAs on Group Members

Purpose Verify Group VPN SAs on the group members.

Action From operational mode, enter the `show security group-vpn member kek security-associations` and `show security group-vpn member kek security-associations detail` commands on the SRX or vSRX group member.

```
user@host> show security group-vpn member kek security-associations
```

Index	Server Address	Life:sec	Initiator cookie	Responder cookie	GroupId
5455810	10.10.100.1	1093	a471513492db1e13	24045792a4b3dd64	1

```
user@host> show security group-vpn member kek security-associations detail
```

```
Index 5455810, Group Id: 1
Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.101.1, GDOI Server: 10.10.100.1
Initiator cookie: a471513492db1e13, Responder cookie: 24045792a4b3dd64
```

```

Lifetime: Expires in 1090 seconds
Group Key Push Sequence number: 0

Algorithms:
  Sig-hash      : hmac-sha256-128
  Encryption    : aes256-cbc
Traffic statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets: 0
  Output packets: 0
Stats:
  Push received : 0
  Delete received: 0

```

From operational mode, enter the **show security group-vpn member kek security-associations** and **show security group-vpn member kek security-associations detail** commands on the MX Series group member.

```
user@host> show security group-vpn member kek security-associations
```

Index	Server Address	Life:sec	Initiator cookie	Responder cookie	GroupId
488598	10.10.100.1	963	a471513492db1e13	24045792a4b3dd64	1

```
user@host> show security group-vpn member kek security-associations detail
```

```

Index 488598, Group Id: 1
Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.103.1, GDOI Server: 10.10.100.1
Initiator cookie: a471513492db1e13, Responder cookie: 24045792a4b3dd64
Lifetime: Expires in 961 seconds
Group Key Push Sequence number: 0

Algorithms:
  Sig-hash      : hmac-sha256-128
  Encryption    : aes256-cbc
Traffic statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets: 0
  Output packets: 0
Stats:
  Push received : 0
  Delete received: 0

```

Verifying IPsec SAs on the Group Server

Purpose Verify IPsec SAs on the group server.

Action From operational mode, enter the **show security group-vpn server ipsec security-associations** and **show security group-vpn server ipsec security-associations detail** commands on the group server.

```
user@host> show security group-vpn server ipsec security-associations
```

```

Group: GROUP_ID-0001, Group Id: 1
Total IPsec SAs: 1
IPsec SA      Algorithm      SPI      Lifetime
GROUP_ID-0001  ESP:aes-256/sha256  1c548e4e  1156

```

```
user@host> show security group-vpn server ipsec security-associations detail
```

```

Group: GROUP_ID-0001, Group Id: 1
Total IPsec SAs: 1
IPsec SA: GROUP_ID-0001
  Protocol: ESP, Authentication: sha256, Encryption: aes-256
  Anti-replay: D3P enabled
  SPI: 1c548e4e
  Lifetime: Expires in 1152 seconds, Activated
  Rekey in 642 seconds
  Policy Name: 1
    Source: 172.16.0.0/12
    Destination: 172.16.0.0/12
    Source Port: 0
    Destination Port: 0
    Protocol: 0

```

Verifying IPsec SAs on the Group Members

Purpose Verify IPsec SAs on the group members.

Action From operational mode, enter the **show security group-vpn member ipsec security-associations** and **show security group-vpn member ipsec security-associations detail** commands on the SRX or vSRX group member.

```
user@host> show security group-vpn member ipsec security-associations
```

```

Total active tunnels: 1
ID   Server      Port Algorithm      SPI      Life:sec/kb  GID lsys
<>49152 10.10.100.1  848  ESP:aes-256/sha256-128 1c548e4e 1073/ unlim 1 root

```

```
user@host> show security group-vpn member ipsec security-associations detail
```

```

Virtual-system: root Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.101.1, GDOI Server: 10.10.100.1
Group Id: 1
Routing Instance: default
Recovery Probe: Enabled
DF-bit: clear
Stats:
  Pull Succeeded           : 4
  Pull Failed              : 3
  Pull Timeout             : 3
  Pull Aborted             : 0
  Push Succeeded           : 6
  Push Failed              : 0
  Server Failover          : 0
  Delete Received          : 0
  Exceed Maximum Keys(4)   : 0
  Exceed Maximum Policies(10): 0

```

```

        Unsupported Algo          :    0
Flags:
  Rekey Needed:    no

List of policies received from server:
Tunnel-id: 49152
Source IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)
Destination IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)

Direction: bi-directional, SPI: 1c548e4e
Protocol: ESP, Authentication: sha256-128, Encryption: aes-256
Hard lifetime: Expires in 1070 seconds, Activated
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 931 seconds
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled

```

From operational mode, enter the **show security group-vpn member ipsec security-associations** and **show security group-vpn member ipsec security-associations detail** commands on the MX Series group member.

user@host> **show security group-vpn member ipsec security-associations**

```

Total active tunnels: 1
ID      Server      Port  Algorithm      SPI      Life:sec/kb  GId lsys
<->10001 10.10.100.1      848   ESP:aes-256/sha256-128 1c548e4e 947/ unlim 1 root

```

user@host> **show security group-vpn member ipsec security-associations detail**

```

Virtual-system: root Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.103.1, GDOI Server: 10.10.100.1
Group Id: 1
Rule Match Direction: output, Tunnel-MTU: 1400
Routing Instance: default
DF-bit: clear
Stats:
  Pull Succeeded          :    2
  Pull Failed             :    0
  Pull Timeout            :    1
  Pull Aborted            :    0
  Push Succeeded          :    2
  Push Failed             :    0
  Server Failover         :    0
  Delete Received         :    0
  Exceed Maximum Keys(4)  :    0
  Exceed Maximum Policies(1):    0
  Unsupported Algo        :    0
Flags:
  Rekey Needed:    no

List of policies received from server:
Tunnel-id: 10001
Source IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)
Destination IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)

Direction: bi-directional, SPI: 1c548e4e
Protocol: ESP, Authentication: sha256-128, Encryption: aes-256
Hard lifetime: Expires in 945 seconds, Activated

```

```
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 840 seconds
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled
```

Verifying Group Policies (SRX or vSRX Group Members Only)

Purpose Verify group policies on SRX or vSRX group members.

Action From operational mode, enter the **show security group-vpn member policy** command on the group member.

```
user@host> show security group-vpn member policy

Group VPN Name: GROUP_ID-0001, Group Id: 1
From-zone: LAN, To-zone: WAN
Tunnel-id: 49152, Policy type: Secure
Source      : IP <172.16.0.0 - 172.31.255.255>, Port <0 - 65535>, Protocol <0>

Destination : IP <172.16.0.0 - 172.31.255.255>, Port <0 - 65535>, Protocol <0>

Tunnel-id: 63488, Policy type: Fail-close
Source      : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
Destination : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
```

See Also • [Configuring Group VPNs in Group VPNv2 on Routing Device](#)

Example: Configuring Group VPNv2 Server-Member Communication for Unicast Rekey Messages

This example shows how to enable the server to send unicast rekey messages to group members to ensure that valid keys are available for encrypting traffic between group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

- [Requirements on page 793](#)
- [Overview on page 794](#)
- [Configuration on page 794](#)
- [Verification on page 794](#)

Requirements

Before you begin:

- Configure the group server and members for IKE Phase 1 negotiation.
- Configure the group server and members for IPsec SA.
- Configure the group **g1** on the group server.

Overview

In this example, you specify the following server-member communication parameters for group **g1**:

- The server sends unicast rekey messages to group members.
- aes-128-cbc is used to encrypt traffic between the server and members.
- sha-256 is used for member authentication.

Default values are used for KEK lifetime and retransmissions.

Configuration

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure server-member communication:

1. Set the communications type.

```
[edit security group-vpn server group g1 server-member-communication]  
user@host# set communications-type unicast
```

2. Set the encryption algorithm.

```
[edit security group-vpn server group g1 server-member-communication]  
user@host# set encryption-algorithm aes-128-cbc
```

3. Set the member authentication.

```
[edit security group-vpn server group g1 server-member-communication]  
user@host# set sig-hash-algorithm sha-256
```

Verification

To verify the configuration is working properly, enter the **show security group-vpn server group g1 server-member-communication** command.

See Also

- [Example: Configuring Group VPNv1 Server and Members on page 716](#)
- [Example: Configuring Group VPNv1 with Server-Member Colocation on page 736](#)

Related Documentation

- [Monitoring VPN Traffic on page 939](#)
- [Improving IPsec VPN Traffic Performance on page 951](#)

Group VPNv2 Server Clusters

Group VPNv2 server cluster provides group controller/key server (GCKS) redundancy, so there is no single point of failure for the entire group VPN network.

- [Understanding Group VPNv2 Server Clusters on page 795](#)
- [Understanding Group VPNv2 Server Cluster Limitations on page 799](#)
- [Understanding Group VPNv2 Server Cluster Messages on page 800](#)
- [Understanding Configuration Changes with Group VPNv2 Server Clusters on page 802](#)
- [Migrating a Standalone Group VPNv2 Server to a Group VPNv2 Server Cluster on page 804](#)
- [Example: Configuring a Group VPNv2 Server Cluster and Members on page 805](#)

Understanding Group VPNv2 Server Clusters

In the Group Domain of Interpretation (GDOI) protocol, the group controller/key server (GCKS) manages Group VPN security associations (SAs), and generates encryption keys and distributes them to group members. Group members encrypt traffic based on the group SAs and keys provided by the GCKS. If the GCKS fails, group members cannot register or obtain keys. A Group VPNv2 server cluster provides GCKS redundancy so there is no single point of failure for the entire group VPN network. Group VPNv2 server clusters can also provide load balancing, scaling, and link redundancy.



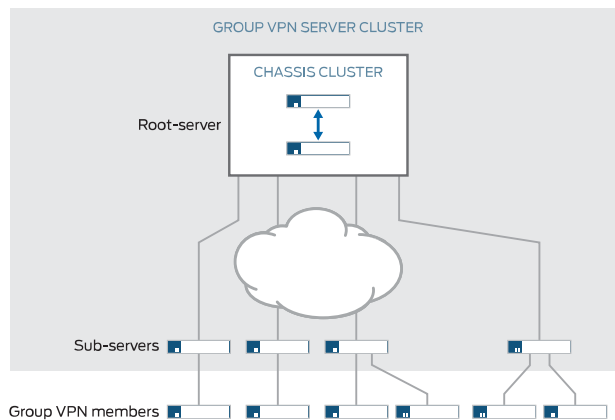
NOTE: Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances. All servers in a Group VPNv2 server cluster must be supported on SRX Series devices or vSRX instances. Group VPNv2 server clusters are a Juniper Networks proprietary solution and have no interoperability with other vendor's GCKS.

- [Root-Server and Sub-Servers on page 795](#)
- [Group Member Registration with Server Clusters on page 797](#)
- [Dead Peer Detection on page 798](#)
- [Load Balancing on page 798](#)

Root-Server and Sub-Servers

A Group VPNv2 server cluster consists of one root-server with up to four connected sub-servers. All servers in the cluster share the same SA and encryption keys that are distributed to Group VPNv2 members. Servers in the cluster can be located at different sites, as shown in [Figure 57 on page 796](#).

Figure 57: Group VPNv2 Server Cluster



Messages between servers in the cluster are encrypted and authenticated by IKE SAs. The root-server is responsible for generating and distributing encryption keys to sub-servers; because of this responsibility, we recommend that the root-server be configured as a chassis cluster. Sub-servers are single devices and cannot be chassis clusters. Sub-servers must be able to connect to the root-server, although direct links between sub-servers are not necessary.



NOTE: If a sub-server loses its connection to the root-server, no further connection to the sub-server from group members are allowed and SAs are deleted. Therefore, we recommend that you use a different link to connect each sub-server to the root-server.

Group VPNv2 server clusters are configured with the **server-cluster** statements at the **[edit security group-vpn server group-name]** hierarchy level. The following values must be configured for each server in a cluster:

- The server role—Specify either **root-server** or **sub-server**. A given server can be part of multiple Group VPNv2 server clusters, but it must have the same server role in all clusters. A server cannot be configured with the root-server role in one group and the sub-server role in another group.



NOTE: You must ensure that there is only one root-server at any time for a Group VPNv2 server cluster.

- IKE gateway—Specify the name of an IKE gateway configured at the **[edit security group-vpn server ike]** hierarchy level. For a root-server, the IKE gateway must be a sub-server in the cluster; up to four sub-servers can be specified. For sub-servers, the IKE gateway must be the root-server.



NOTE: The root-server and sub-servers must be configured with **dead-peer-detection always-send** and cannot be configured for a dynamic (unspecified) IP address. Group members are not configured with dead peer detection.

The Group VPNv2 configuration must be the same on each sub-server in a given group.

Each sub-server in the Group VPNv2 server cluster operates as a normal GCKS for registering and deleting members. Upon successful member registration, the registering server is responsible for sending updates to the member. For a given group, you can configure the maximum number of Group VPNv2 members that can be accepted by each sub-server; this number must be the same on all sub-servers in the cluster. A sub-server stops responding to registration requests by new members when it reaches the configured maximum number of Group VPNv2 members. See [“Load Balancing” on page 798](#).

Group Member Registration with Server Clusters

Group members can register with any server in the Group VPNv2 server cluster for a given group, however we recommend that members only connect to sub-servers and not the root-server. Up to four server addresses can be configured on each group member. The server addresses configured on group members can be different. In the example shown below, group member A is configured for sub-servers 1 through 4, while member B is configured for sub-servers 4 and 3:

	Group member A:	Group member B:
Server addresses:	Sub-server 1	Sub-server 4
	Sub-server 2	Sub-server 3
	Sub-server 3	
	Sub-server 4	

The order that the server addresses is configured on a member is important. A group member attempts to register with the first configured server. If registration with a configured server is not successful, the group member tries to register with the next configured server.

Each server in a Group VPNv2 server cluster operates as a normal GCKS for registering and deleting members. Upon successful registration, the registering server is responsible for sending updates to the member via **groupkey-push** exchanges. For a given group, you can configure the maximum number of group members that can be accepted by each server, however this number must be the same on all servers in the cluster for a given group. Upon reaching the configured maximum number of group members, a server stops responding to registration requests by new members. See [“Load Balancing” on page 798](#) for additional information.

Dead Peer Detection

To verify the availability of peer servers in a Group VPNv2 server cluster, each server in the cluster must be configured to send dead peer detection (DPD) requests regardless of whether there is outgoing IPsec traffic to the peer. This is configured with the **dead-peer-detection always-send** statement at the [edit security group-vpn server ike gateway *gateway-name*] hierarchy level.

An active server in a Group VPNv2 server cluster sends DPD probes to the IKE gateway(s) configured in the server cluster. DPD should not be configured for a group because multiple groups can share the same peer server IKE gateway configuration. When DPD detects that a server is down, the IKE SA with that server is deleted. All groups mark the server as inactive and DPD to the server is stopped.



NOTE: DPD should not be configured for the IKE gateway on group members.

When DPD marks the root-server as inactive, the sub-servers stop responding to new group member requests however existing SAs for current group members remain active. An inactive sub-server does not send deletes to group members because the SAs could be still valid and group members can continue using existing SAs.

If an IKE SA expires while a peer server is still active, DPD triggers IKE SA negotiation. Because both root-servers and sub-servers can trigger IKE SAs through DPD, simultaneous negotiation might result in multiple IKE SAs. No impact on server-cluster functionality is expected in this case.

Load Balancing

Load balancing in the Group VPNv2 server cluster can be achieved by configuring the right **member-threshold** value for the group. When the number of members registered on a server exceeds the **member-threshold** value, subsequent member registration on that server is rejected. The member registration fails over to the next server configured on the group member until it reaches a server whose **member-threshold** is not yet reached.

There are two restrictions on configuring the **member-threshold**:

- For a given group, the same **member-threshold** value must be configured on the root-server and all sub-servers in a group server cluster. If the total number of members in the group exceeds the configured **member-threshold** value, then a **groupkey-pull** registration initiated by a new member is rejected (the server does not send a response).
- A server can support members in multiple groups. Each server has a maximum number of group members that it can support. If a server reaches the maximum number of members it can support, then a **groupkey-pull** registration initiated by a new member is rejected even if the **member-threshold** value of a specific group has not been reached.

There is no member synchronization among servers in the cluster. The root-server does not have information about the number of registered members on sub-servers. Each sub-server can only show its own registered members.

See Also • [Group VPNv2 Overview on page 747](#)

Understanding Group VPNv2 Server Cluster Limitations

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances. Note the following caveats when configuring Group VPNv2 server clusters:

- Certificate authentication is not supported for server authentication; only preshared keys can be configured.
- There is no configuration synchronization between servers in the Group VPNv2 server cluster.
- When enabling a Group VPNv2 server cluster, configuration must be done on the root-server first and then on the sub-servers. Until the configuration is manually synchronized among the servers, traffic loss can be expected during the configuration change.
- In certain corner cases, the SAs on Group VPNv2 members can be out of sync. Group VPN members can synchronize SAs by getting a new key through a **groupkey-pull** exchange. You can manually clear SAs on a Group VPNv2 member with the **clear security group-vpn member ipsec security-associations** or **clear security group-vpn member group** commands to help speed recovery.
- The Group VPNv2 server cluster does not support ISSU.
- If the last **groupkey-pull** message is lost during a Group VPNv2 member's registration, a server might consider the member to be a registered member even though the member might fail over to the next server in the server cluster. In this case, the same member might appear to be registered on multiple servers. If the total member-threshold on all servers equals the total number of deployed members, subsequent group members might fail to register.

Note the following caveats for chassis cluster operations on the root-server:

- No statistics are preserved.
- No negotiation data or state is saved. If a root-server chassis cluster failover occurs during a **groupkey-pull** or **groupkey-push** negotiation, the negotiation is not restarted after the failover.
- If both chassis cluster nodes of a root-server go down during a rekey of an encryption key, some Group VPNv2 members might receive the new key while other members do not. Traffic might be impacted. Manually clearing SAs on a Group VPNv2 member with the **clear security group-vpn member ipsec security-associations** or **clear security group-vpn member group** commands might help speed up recovery when the root-server becomes reachable.
- In a large-scale environment, RGO failover on the root-server might take time. If the DPD interval and threshold on a sub-server are configured with small values, it can result in the sub-server marking the root-server as inactive during an RGO failover.

Traffic might be impacted. We recommend that you configure the IKE gateway for the sub-server with a DPD **interval** * **threshold** value larger than 150 seconds.

See Also

Understanding Group VPNv2 Server Cluster Messages

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances. All messages between servers in a Group VPNv2 server cluster are encrypted and authenticated by an IKE security association (SA). Each sub-server initiates an IKE SA with the root-server; this IKE SA must be established before messages can be exchanged between the servers.

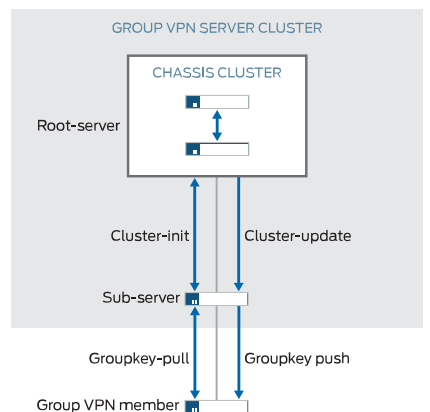
This section describes the messages exchanged between the root-server and sub-servers.

- [Cluster Exchanges on page 800](#)
- [Cluster-Init Exchanges on page 800](#)
- [Cluster-Update Messages on page 801](#)

Cluster Exchanges

Figure 58 on page 800 shows the basic messages exchanged between the Group VPNv2 server cluster and Group VPNv2 members.

Figure 58: Group VPNv2 Server Cluster Messages



Cluster-Init Exchanges

A sub-server launches a cluster initialization (**cluster-init**) exchange with the root-server to obtain SA and encryption key information. The root-server responds by sending current SA information to the sub-server through the **cluster-init** exchange.

Sub-servers can then respond to registration requests from Group VPNv2 members through a **groupkey-pull** exchange. The **groupkey-pull** exchange allows a Group VPNv2 member to request SAs and keys shared by the group from a sub-server.

Sub-servers start a **cluster-init** exchange with the root-server when:

- The root-server is considered inactive. This is the initial assumed state of the root-server. If there is no IKE SA between the root-server and the sub-server, the sub-server initiates an IKE SA with the root-server. After a successful **cluster-init** exchange, the sub-server obtains information on SAs and marks the root-server as active.
- The soft lifetime of the SA has expired.
- A **cluster-update** message is received to delete all SAs.
- There are group configuration changes.

If the **cluster-init** exchange fails, the sub-server retries the exchange with the root-server every 5 seconds.

Cluster-Update Messages

The **groupkey-push** exchange is a single rekey message that allows a group controller/key server (GCKS) to send group SAs and keys to members before existing group SAs expire and to update group membership. Rekey messages are unsolicited messages sent from the GCKS to members

Upon generating new encryption keys for an SA, the root-server sends SA updates to all active sub-servers through a **cluster-update** message. After receiving a **cluster-update** from the root-server, the sub-server installs the new SA and sends the new SA information through a **groupkey-push** to its registered group members.

A **cluster-update** message sent from the root-server requires an acknowledgement from the sub-server. If there is no acknowledgement received from a sub-server, the root-server retransmits the **cluster-update** at the configured retransmission period (the default is 10 seconds). The root-server does not retransmit if dead peer detection (DPD) indicates that the sub-server is unavailable. If a sub-server fails to update SA information after receiving a **cluster-update**, it does not send an acknowledgement and the root-server retransmits the **cluster-update** message.

If the soft lifetime of an SA expires before a new SA is received from the root-server, the sub-server sends a **cluster-init** message to the root-server to get all SAs and does not send a **groupkey-push** message to its members until it has a new update. If the hard lifetime of an SA expires on the sub-server before it receives a new SA, the sub-server marks the root-server inactive, deletes all registered group members, and continues to send **cluster-init** messages to the root-server.

A **cluster-update** message can be sent to delete an SA or a group member; this can be the result of a **clear** command or a configuration change. If a sub-server receives a **cluster-update** message to delete an SA, it sends a **groupkey-push** delete message to its group members and deletes the corresponding SA. If all SAs for a group are deleted, the sub-server initiates a **cluster-init** exchange with the root-server. If all registered members are deleted, the sub-server deletes all locally registered members.

See Also

Understanding Configuration Changes with Group VPNv2 Server Clusters

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances. Group VPNv2 server clusters behave differently from standalone Group VPNv2 servers when there are configuration changes that result in new encryption keys and changes to security associations (SAs). The root-server sends SA updates or deletions to sub-servers through **cluster-update** messages. The sub-servers then send **groupkey-push** messages to members. Sub-servers cannot send delete messages to group members without first receiving delete messages from the root-server.



NOTE: All configuration changes must be made on the root-server first and then on sub-servers to ensure that group members receive updates or deletions as expected. Until configuration is synchronized between the servers in the Group VPNv2 server cluster, traffic loss can be expected.

Table 87 on page 802 describes the effects of various configuration changes on Group VPNv2 servers.

Table 87: Effects of Configuration Changes on Group VPNv2 Servers

Configuration Change	Standalone Group VPNv2 Server Action	Group VPNv2 Server Cluster Action	
		Root-server	Sub-server
Change IKE proposal, policy, or gateway	Delete the IKE SA for the affected gateway. For IKE proposal, policy, or gateway deletions, delete the registered members for the affected gateway.		
Change IPsec proposal	Changes take effect after the traffic encryption key (TEK) rekey.		
Group changes:			
Delete group name	Send “delete all” to group members. Delete all IKE SAs in the group. Delete all keys in the group immediately. Delete all registered members in the group.	Send “delete all” to sub-servers. Delete all keys in the group immediately. Mark all peers inactive. Delete sub-server IKE SAs. Delete all member IKE SAs.	Delete all member IKE SAs. Delete all keys in the group immediately. Delete all registered members in the group. Mark peer inactive. Delete peer server IKE SAs.
Change ID	Send “delete all” to all members. Delete all IKE SAs in the group. Delete all keys in the group immediately. Delete all registered members in the group. Generate new keys according to the configuration.	Send “delete all” to sub-servers. Delete all member IKE SAs in the group. Delete all keys in the group immediately. Mark all peers inactive. Delete all peer server IKE SAs. Generate new keys according to the configuration.	Delete all member IKE SAs in the group. Delete all keys in the group immediately. Delete all registered members in the group. Mark peer inactive. Delete peer server IKE SAs. Initiate new cluster-init exchange.
Add or delete IKE gateway	No changes for additions. For deletions, delete the IKE SA and registered members for the affected gateway.		

Table 87: Effects of Configuration Changes on Group VPNv2 Servers (continued)

Configuration Change	Standalone Group VPNv2 Server Action	Group VPNv2 Server Cluster Action	
		Root-server	Sub-server
Add or change anti-replay time window	New value takes effect after the TEK rekey.		
Add or change no anti-replay	New value takes effect after the TEK rekey.		
Server-member communication changes:			
Add	Delete all registered members. Generate key encryption key (KEK) SA.	Generate KEK SA. Send new KEK SA to sub-server. Delete all member IKE SAs.	Delete all registered members.
Change	New value takes effect after KEK rekey.		
Delete	Send delete to delete all KEK SAs. Delete KEK SA.	Send delete to sub-servers. Delete KEK SA. Delete all member IKE SAs.	Delete KEK SA.
IPsec SA:			
Add	Generate new TEK SA. Update the new TEK SA on members.	Generate new TEK SA. Send new TEK SA to sub-servers.	No action.
Change	New value takes effect after TEK rekey. If the match-policy changes, the current TEK is removed immediately and delete groupkey-push is sent because members need to be explicitly notified that this configuration is removed.	If the match-policy changes, send delete to sub-servers. Delete TEK immediately.	If the match-policy changes, delete TEK immediately.
Delete	Delete TEK immediately. Send delete to delete this TEK SA.	Send delete to sub-servers. Delete TEK immediately.	Delete TEK immediately.

Table 88 on page 804 describes the effects of changing Group VPNv2 server cluster configuration.



NOTE: You must ensure that there is only one root-server in a server cluster at any time.

Table 88: Effects of Group VPNv2 Server Cluster Configuration Changes

Server Cluster Configuration Change	Group VPNv2 Server Cluster	
	Root-server	Sub-server
IKE proposal, policy, or gateway (cluster peer)	For additions, there is no change. For changes or deletions, delete the IKE SA for the affected peer.	
Server cluster:		
Add	None.	Send “delete all” to group members. Delete all member IKE SAs in the group. Delete all TEKs and KEKs immediately in the group. Delete all registered members in the group. Send cluster-init to root-server.
Change role <i>NOTE:</i> You must ensure that there is only one root-server in a server cluster at any time.	Send “delete all” to sub-servers. Delete all member IKE SAs in the group. Delete all TEKs and KEKs immediately in the group. Mark all peers inactive. Delete all peer server IKE SAs. Send cluster-init to root-server.	Rekey TEK. Rekey KEK. Send new keys to sub-servers. Send new keys to members.
Add peer	None.	
Delete peer	Mark peer inactive. Clear peer IKE SA.	Mark peer inactive. Clear KEK. Clear TEK. Clear peer IKE SA.
Change retransmission period	None.	
Delete server cluster	Send “delete all” to sub-servers. Delete all TEKs and KEKs immediately in the group. Mark all peers inactive. Delete all peer server IKE SAs. Generate new TEKs and KEKs according to the configuration.	Delete all member IKE SAs in the group. Delete all TEKs and KEKs immediately in the group. Delete all registered members in the group. Mark peer inactive. Delete peer server IKE SAs. Generate new TEK and KEK according to the configuration.

See Also**Migrating a Standalone Group VPNv2 Server to a Group VPNv2 Server Cluster**

Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances. This section describes how to migrate a standalone Group VPNv2 server to a Group VPNv2 server cluster.

To migrate a standalone Group VPNv2 server to a root-server:



NOTE: We highly recommend that the root-server be a chassis cluster.

1. Upgrade the standalone Group VPNv2 server to a chassis cluster. See *Chassis Cluster Feature Guide for SRX Series Devices* for more information



NOTE: A reboot is required during the upgrade of a standalone SRX Series device to a chassis cluster node. Traffic loss is expected.

2. On the chassis cluster, add the Group VPNv2 server cluster root-server configuration. The configured server role for the cluster must be **root-server**.

There should be no traffic loss among existing group members during the configuration change.

To add a sub-server to the Group VPNv2 server cluster:

1. On the root-server, configure both a Group VPNv2 server IKE gateway and a server cluster IKE gateway for the sub-server. SAs and existing member traffic should not be impacted.
2. On the sub-server, configure the server cluster. Remember that the Group VPNv2 configuration must be the same on each server in the cluster, with the exception of the Group VPNv2 server IKE gateways, the server role in the cluster, and the server cluster IKE gateway configurations. On the sub-server, the configured server role in the cluster must be **sub-server**. Configure a Group VPNv2 server IKE gateway and a server cluster IKE gateway for the root-server.

To delete a sub-server from the Group VPNv2 server cluster:

1. On the root-server, delete both the Group VPNv2 server IKE gateway and the server cluster IKE gateway configurations for the sub-server. SAs and existing member traffic should not be impacted.
2. Power off the sub-server.

See Also • [Group VPNv2 Overview on page 747](#)

Example: Configuring a Group VPNv2 Server Cluster and Members

This example shows how to configure a Group VPNv2 server cluster to provide group controller/key server (GCKS) redundancy and scaling to Group VPNv2 group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500,

SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, and SRX5800 devices and vSRX instances.

- [Requirements on page 806](#)
- [Overview on page 806](#)
- [Configuration on page 808](#)
- [Verification on page 863](#)

Requirements

The example uses the following hardware and software components:

- Eight supported SRX Series devices or vSRX instances running Junos OS Release 15.1X49-D30 or later that support Group VPNv2:
 - Two devices or instances are configured to operate as a chassis cluster. The chassis cluster operates as the root-server in the Group VPNv2 server cluster. The devices or instances must have the same software version and licenses.



NOTE: The root-server is responsible for generating and distributing encryption keys to sub-servers in the group VPN server cluster; because of this responsibility, we recommend that the root-server be a chassis cluster.

- Four other devices or instances operate as sub-servers in the Group VPNv2 server cluster.
- Two other devices or instances operate as Group VPNv2 group members.
- Two supported MX Series devices running Junos OS Release 15.1R2 or later that support Group VPNv2. These devices operate as Group VPNv2 group members.

A hostname, a root administrator password, and management access must be configured on each SRX Series device or vSRX instance. We recommend that NTP also be configured on each device.



NOTE: The configurations in this example focus on what is needed for Group VPNv2 operation, based on the topology shown in [Figure 59 on page 808](#). Some configurations, such as interface, routing, or chassis cluster setups, are not included here. For example, Group VPNv2 operation requires a working routing topology that allows client devices to reach their intended sites throughout the network; this example does not cover the configuration of static or dynamic routing.

Overview

In this example, the Group VPNv2 network consists of a server cluster and four members. The server cluster consists of a root-server and four sub-servers. Two of the members

are SRX Series devices or vSRX instances while the other two members are MX Series devices.

The group VPN SAs must be protected by a Phase 1 SA. Therefore, the group VPN configuration must include configuring IKE Phase 1 negotiations on the root-server, the sub-servers, and the group members. IKE configurations are described as follows.

On the root-server:

- The IKE policy **SubSrv** is used to establish Phase 1 SAs with each sub-server.
- An IKE gateway is configured with dead peer detection (DPD) for each sub-server.
- The server cluster role is **root-server** and each sub-server is configured as an IKE gateway for the server cluster.



NOTE: The root-server should be configured to support chassis cluster operation. In the example, redundant Ethernet interfaces on the root-server connect to each of the sub-servers in the server cluster; the entire chassis cluster configuration is not shown.

On each sub-server:

- Two IKE policies are configured: **RootSrv** is used to establish a Phase 1 SA with the root-server, and **GMs** is used to establish Phase 1 SAs with each group member.



NOTE: Preshared keys are used to secure the Phase 1 SAs between the root-server and the sub-servers and between the sub-servers and the group members. Ensure that the preshared keys used are strong keys. On the sub-servers, the preshared key configured for the IKE policy **RootSrv** must match the preshared key configured on the root-server, and the preshared key configured for the IKE policy **GMs** must match the preshared key configured on the group members.

- An IKE gateway is configured with DPD for the root-server. In addition, an IKE gateway is configured for each group member.
- The server cluster role is **sub-server** and the root-server is configured as the IKE gateway for the server cluster.

On each group member:

- The IKE policy **SubSrv** is used to establish Phase 1 SAs with the sub-servers.
- The IKE gateway configuration includes the addresses for the sub-servers.

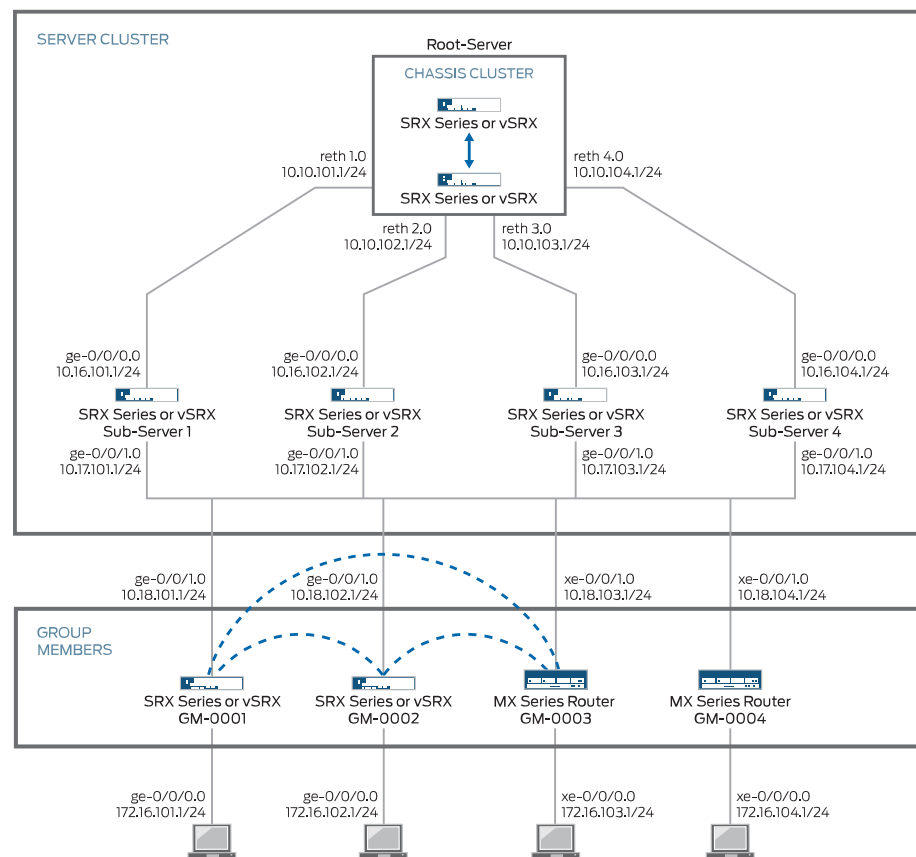
On SRX Series devices or vSRX group members, an IPsec policy is configured for the group with the LAN zone as the from-zone (incoming traffic) and the WAN zone as the to-zone (outgoing traffic). A security policy is also needed to allow traffic between the LAN and WAN zones.

The same group identifier must be configured on both the group server and the group members. In this example, the group name is GROUP_ID-0001 and the group identifier is 1. The group policy configured on the server specifies that the SA and key are applied to traffic between subnetworks in the 172.16.0.0/12 range.

Topology

Figure 59 on page 808 shows the Juniper Networks devices to be configured for this example.

Figure 59: Group VPNv2 Server Cluster with SRX Series or vSRX and MX Series Members



Configuration

Configuring the Root-Server

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 description To_SubSrv01
```

```

set interfaces reth1 unit 0 family inet address 10.10.101.1/24
set interfaces reth2 redundant-ether-options redundancy-group 1
set interfaces reth2 unit 0 description To_SubSrv02
set interfaces reth2 unit 0 family inet address 10.10.102.1/24
set interfaces reth3 redundant-ether-options redundancy-group 1
set interfaces reth3 unit 0 description To_SubSrv03
set interfaces reth3 unit 0 family inet address 10.10.103.1/24
set interfaces reth4 redundant-ether-options redundancy-group 1
set interfaces reth4 unit 0 description To_SubSrv04
set interfaces reth4 unit 0 family inet address 10.10.104.1/24
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces reth1.0
set security zones security-zone GROUPVPN interfaces reth2.0
set security zones security-zone GROUPVPN interfaces reth3.0
set security zones security-zone GROUPVPN interfaces reth4.0
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set chassis cluster reth-count 5
set chassis cluster redundancy-group 1 node 0 priority 254
set chassis cluster redundancy-group 1 node 1 priority 1
set chassis cluster redundancy-group 0 node 0 priority 254
set chassis cluster redundancy-group 0 node 1 priority 1
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
authentication-algorithm sha-256
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
encryption-algorithm aes-256-cbc
set security group-vpn server ike policy SubSrv mode main
set security group-vpn server ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy SubSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike gateway SubSrv01 ike-policy SubSrv
set security group-vpn server ike gateway SubSrv01 address 10.16.101.1
set security group-vpn server ike gateway SubSrv01 dead-peer-detection always-send
set security group-vpn server ike gateway SubSrv01 local-address 10.10.101.1
set security group-vpn server ike gateway SubSrv02 ike-policy SubSrv
set security group-vpn server ike gateway SubSrv02 address 10.16.102.1
set security group-vpn server ike gateway SubSrv02 dead-peer-detection always-send
set security group-vpn server ike gateway SubSrv02 local-address 10.10.102.1
set security group-vpn server ike gateway SubSrv03 ike-policy SubSrv
set security group-vpn server ike gateway SubSrv03 address 10.16.103.1
set security group-vpn server ike gateway SubSrv03 dead-peer-detection always-send
set security group-vpn server ike gateway SubSrv03 local-address 10.10.103.1
set security group-vpn server ike gateway SubSrv04 ike-policy SubSrv
set security group-vpn server ike gateway SubSrv04 address 10.16.104.1

```

```

set security group-vpn server ike gateway SubSrv04 dead-peer-detection always-send
set security group-vpn server ike gateway SubSrv04 local-address 10.10.104.1
set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 server-cluster server-role root-server
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway SubSrv01
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway SubSrv02
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway SubSrv03
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway SubSrv04
set security group-vpn server group GROUP_ID-0001 server-cluster retransmission-period
  10
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
set security group-vpn server group GROUP_ID-0001 server-member-communication
  sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
  AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 source 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 destination 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 protocol 0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the root-server:

1. Configure security zones and security policies.

```

[edit interfaces]
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth1 unit 0 description To_SubSrv01
user@host# set reth1 unit 0 family inet address 10.10.101.1/24
user@host# set reth2 redundant-ether-options redundancy-group 1
user@host# set reth2 unit 0 description To_SubSrv02
user@host# set reth2 unit 0 family inet address 10.10.102.1/24
user@host# set reth3 redundant-ether-options redundancy-group 1
user@host# set reth3 unit 0 description To_SubSrv03
user@host# set reth3 unit 0 family inet address 10.10.103.1/24

```

```

user@host# set reth4 redundant-ether-options redundancy-group 1
user@host# set reth4 unit 0 description To_SubSrv04
user@host# set reth4 unit 0 family inet address 10.10.104.1/24

```

```

[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces reth1.0
user@host# set interfaces reth2.0
user@host# set interfaces reth3.0
user@host# set interfaces reth4.0

```

```

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count

```

```

[edit security policies]
user@host# set default-policy deny-all

```

2. Configure the chassis cluster.

```

[edit chassis cluster]
user@host# set reth-count 5
user@host# set redundancy-group 1 node 0 priority 254
user@host# set redundancy-group 1 node 1 priority 1
user@host# set redundancy-group 0 node 0 priority 254
user@host# set redundancy-group 0 node 1 priority 1

```

3. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

```

```

[edit security group-vpn server ike policy SubSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

```

```

[edit security group-vpn server ike gateway SubSrv01]
user@host# set ike-policy SubSrv
user@host# set address 10.16.101.1

```

```
user@host# set dead-peer-detection always-send
user@host# set local-address 10.10.101.1
```

```
[edit security group-vpn server ike gateway SubSrv02]
user@host# set ike-policy SubSrv
user@host# set address 10.16.102.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.10.102.1
```

```
[edit security group-vpn server ike gateway SubSrv03]
user@host# set ike-policy SubSrv
user@host# set address 10.16.103.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.10.103.1
```

```
[edit security group-vpn server ike gateway SubSrv04]
user@host# set ike-policy SubSrv
user@host# set address 10.16.104.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.10.104.1
```

4. Configure the IPsec SA.

```
[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600
```

5. Configure the VPN group.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
user@host# set server-cluster server-role root-server
user@host# set server-cluster ike-gateway SubSrv01
user@host# set server-cluster ike-gateway SubSrv02
user@host# set server-cluster ike-gateway SubSrv03
user@host# set server-cluster ike-gateway SubSrv04
user@host# set server-cluster retransmission-period 10
user@host# set anti-replay-time-window 1000
user@host# set server-member-communication communication-type unicast
user@host# set server-member-communication encryption-algorithm aes-256-cbc
user@host# set server-member-communication lifetime-seconds 7200
user@host# set server-member-communication sig-hash-algorithm sha-256
```

6. Configure the group policy.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 source 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 destination 172.16.0.0/12
```



```

user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 protocol 0
user@host# set ipsec-sa GROUP_ID-0001 proposal AES256-SHA256-L3600

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show chassis cluster**, and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
reth1 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        description To_SubSrv01;
        family inet {
            address 10.10.101.1/24;
        }
    }
}
reth2 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        description To_SubSrv02;
        family inet {
            address 10.10.102.1/24;
        }
    }
}
reth3 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        description To_SubSrv03;
        family inet {
            address 10.10.103.1/24;
        }
    }
}
reth4 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        description To_SubSrv04;
        family inet {
            address 10.10.104.1/24;
        }
    }
}

```

```
}
[edit]
user@host# show chassis cluster
reth-count 5;
redundancy-group 1 {
    node 0 priority 254;
    node 1 priority 1;
}
redundancy-group 0 {
    node 0 priority 254;
    node 1 priority 1;
}
[edit]
user@host# show security
group-vpn {
    server {
        ike {
            proposal PSK-SHA256-DH14-AES256 {
                authentication-method pre-shared-keys;
                authentication-algorithm sha-256;
                dh-group group14;
                encryption-algorithm aes-256-cbc;
            }
            policy SubSrv {
                mode main;
                proposals PSK-SHA256-DH14-AES256;
                pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
            }
            gateway SubSrv01 {
                ike-policy SubSrv;
                address 10.16.101.1;
                dead-peer-detection always-send;
                local-address 10.10.101.1;
            }
            gateway SubSrv02 {
                ike-policy SubSrv;
                address 10.16.102.1;
                dead-peer-detection always-send;
                local-address 10.10.102.1;
            }
            gateway SubSrv03 {
                ike-policy SubSrv;
                address 10.16.103.1;
                dead-peer-detection always-send;
                local-address 10.10.103.1;
            }
            gateway SubSrv04 {
                ike-policy SubSrv;
                address 10.16.104.1;
                dead-peer-detection always-send;
                local-address 10.10.104.1;
            }
        }
    }
    ipsec {
        proposal AES256-SHA256-L3600 {
```

```

        authentication-algorithm hmac-sha-256-128;
        encryption-algorithm aes-256-cbc;
        lifetime-seconds 3600;
    }
}
group GROUP_ID-0001 {
    group-id 1;
    member-threshold 2000;
    server-cluster {
        server-role root-server;
        ike-gateway SubSrv01;
        ike-gateway SubSrv02;
        ike-gateway SubSrv03;
        ike-gateway SubSrv04;
        retransmission-period 10;
    }
    anti-replay-time-window 1000;
    server-member-communication {
        communication-type unicast;
        lifetime-seconds 7200;
        encryption-algorithm aes-256-cbc;
        sig-hash-algorithm sha-256;
    }
    ipsec-sa GROUP_ID-0001 {
        proposal AES256-SHA256-L3600;
        match-policy 1 {
            source 172.16.0.0/12;
            destination 172.16.0.0/12;
            protocol 0;
        }
    }
}
}
}
policies {
    global {
        policy 1000 {
            match {
                source-address any;
                destination-address any;
                application any;
                from-zone any;
                to-zone any;
            }
            then {
                deny;
                log {
                    session-init;
                }
                count;
            }
        }
    }
}
default-policy {
    deny-all;
}

```

```

    }
  }
  zones {
    security-zone GROUPVPN {
      host-inbound-traffic {
        system-services {
          ike;
          ssh;
          ping;
        }
      }
      interfaces {
        reth1.0;
        reth2.0;
        reth3.0;
        reth4.0;
      }
    }
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Sub-Server 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_RootSrv
set interfaces ge-0/0/0 unit 0 family inet address 10.16.101.1/24
set interfaces ge-0/0/1 unit 0 description To_WAN
set interfaces ge-0/0/1 unit 0 family inet address 10.17.101.1/24
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces ge-0/0/0.0
set security zones security-zone GROUPVPN interfaces ge-0/0/1.0
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256

```

```

set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn server ike policy RootSrv mode main
set security group-vpn server ike policy RootSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy RootSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike policy GMs mode main
set security group-vpn server ike policy GMs proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy GMs pre-shared-key ascii-text "$ABC123$ABC123"
set security group-vpn server ike gateway RootSrv ike-policy RootSrv
set security group-vpn server ike gateway RootSrv address 10.10.101.1
set security group-vpn server ike gateway RootSrv dead-peer-detection always-send
set security group-vpn server ike gateway RootSrv local-address 10.16.101.1
set security group-vpn server ike gateway GM-0001 ike-policy GMs
set security group-vpn server ike gateway GM-0001 address 10.18.101.1
set security group-vpn server ike gateway GM-0001 local-address 10.17.101.1
set security group-vpn server ike gateway GM-0002 ike-policy GMs
set security group-vpn server ike gateway GM-0002 address 10.18.102.1
set security group-vpn server ike gateway GM-0002 local-address 10.17.101.1
set security group-vpn server ike gateway GM-0003 ike-policy GMs
set security group-vpn server ike gateway GM-0003 address 10.18.103.1
set security group-vpn server ike gateway GM-0003 local-address 10.17.101.1
set security group-vpn server ike gateway GM-0004 ike-policy GMs
set security group-vpn server ike gateway GM-0004 address 10.18.104.1
set security group-vpn server ike gateway GM-0004 local-address 10.17.101.1
set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 server-cluster server-role sub-server
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway RootSrv
set security group-vpn server group GROUP_ID-0001 server-cluster retransmission-period
  10
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0001
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0002
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0003
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0004
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
set security group-vpn server group GROUP_ID-0001 server-member-communication
  sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
  AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 source 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 destination 172.16.0.0/12

```

```
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 protocol 0
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the sub-server in the Group VPNv2 server cluster:

1. Configure interfaces, security zones, and security policies.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_RootSrv
user@host# set ge-0/0/0 unit 0 family inet address 10.16.101.1/24
user@host# set ge-0/0/1 unit 0 description To_WAN
user@host# set ge-0/0/1 unit 0 family inet address 10.17.101.1/24
```

```
[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0
user@host# set interfaces ge-0/0/1.0
```

```
[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count
```

```
[edit security policies]
user@host# set default-policy deny-all
```

2. Configure the IKE proposal, policy, and gateway.

```
[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security group-vpn server ike policy RootSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"
```

```
[edit security group-vpn server ike policy GMs]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"
```

```
[edit security group-vpn server ike gateway RootSrv]
user@host# set ike-policy RootSrv
user@host# set address 10.10.101.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.16.101.1
```

```
[edit security group-vpn server ike gateway GM-0001]
user@host# set ike-policy GMs
user@host# set address 10.18.101.1
user@host# set local-address 10.17.101.1
```

```
[edit security group-vpn server ike gateway GM-0002]
user@host# set ike-policy GMs
user@host# set address 10.18.102.1
user@host# set local-address 10.17.101.1
```

```
[edit security group-vpn server ike gateway GM-0003]
user@host# set ike-policy GMs
user@host# set address 10.18.103.1
user@host# set local-address 10.17.101.1
```

```
[edit security group-vpn server ike gateway GM-0004]
user@host# set ike-policy GMs
user@host# set address 10.18.104.1
user@host# set local-address 10.17.101.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600
```

4. Configure the VPN group.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
user@host# set server-cluster server-role sub-server
user@host# set server-cluster ike-gateway RootSrv
user@host# set server-cluster retransmission-period 10
user@host# set ike-gateway GM-0001
user@host# set ike-gateway GM-0002
user@host# set ike-gateway GM-0003
user@host# set ike-gateway GM-0004
user@host# set anti-replay-time-window 1000
```

```

user@host# set server-member-communication communication-type unicast
user@host# set server-member-communication encryption-algorithm aes-256-cbc
user@host# set server-member-communication lifetime-seconds 7200
user@host# set server-member-communication sig-hash-algorithm sha-256
user@host# set ipsec-sa GROUP_ID-0001 proposal AES256-SHA256-L3600

```

5. Configure the group policy.

```

[edit security group-vpn server group GROUP_ID-0001]
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 source 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 destination 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 protocol 0

```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_RootSrv;
    family inet {
      address 10.16.101.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_WAN;
    family inet {
      address 10.17.101.1/24;
    }
  }
}
[edit]
user@host# show security
group-vpn {
  server {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        authentication-algorithm sha-256;
        dh-group group14;
        encryption-algorithm aes-256-cbc;
      }
      policy RootSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
      }
    }
  }
}

```



```
policy GMs {
  mode main;
  proposals PSK-SHA256-DH14-AES256;
  pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
}
gateway RootSrv {
  ike-policy RootSrv;
  address 10.10.101.1;
  dead-peer-detection always-send;
  local-address 10.16.101.1;
}
gateway GM-0001 {
  ike-policy GMs;
  address 10.18.101.1;
  local-address 10.17.101.1;
}
gateway GM-0002 {
  ike-policy GMs;
  address 10.18.102.1;
  local-address 10.17.101.1;
}
gateway GM-0003 {
  ike-policy GMs;
  address 10.18.103.1;
  local-address 10.17.101.1;
}
gateway GM-0004 {
  ike-policy GMs;
  address 10.18.104.1;
  local-address 10.17.101.1;
}
}
ipsec {
  proposal AES256-SHA256-L3600 {
    authentication-algorithm hmac-sha-256-128;
    encryption-algorithm aes-256-cbc;
    lifetime-seconds 3600;
  }
}
group GROUP_ID-0001 {
  group-id 1;
  member-threshold 2000;
  server-cluster {
    server-role sub-server;
    ike-gateway RootSrv;
    retransmission-period 10;
  }
  ike-gateway GM-0001;
  ike-gateway GM-0002;
  ike-gateway GM-0003;
  ike-gateway GM-0004;
  anti-replay-time-window 1000;
  server-member-communication {
    communication-type unicast;
    lifetime-seconds 7200;
  }
}
```

```

        encryption-algorithm aes-256-cbc;
        sig-hash-algorithm sha-256;
    }
    ipsec-sa GROUP_ID-0001 {
        proposal AES256-SHA256-L3600;
        match-policy 1 {
            source 172.16.0.0/12;
            destination 172.16.0.0/12;
            protocol 0;
        }
    }
}
}
}
}
}
policies {
    global {
        policy 1000 {
            match {
                source-address any;
                destination-address any;
                application any;
                from-zone any;
                to-zone any;
            }
            then {
                deny;
                log {
                    session-init;
                }
                count;
            }
        }
    }
    default-policy {
        deny-all;
    }
}
zones {
    security-zone GROUPVPN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/0.0;
            ge-0/0/1.0;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Sub-Server 2

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_RootSrv
set interfaces ge-0/0/0 unit 0 family inet address 10.16.102.1/24
set interfaces ge-0/0/1 unit 0 description To_WAN
set interfaces ge-0/0/1 unit 0 family inet address 10.17.102.1/24
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces ge-0/0/0.0
set security zones security-zone GROUPVPN interfaces ge-0/0/1.0
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn server ike policy RootSrv mode main
set security group-vpn server ike policy RootSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy RootSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike policy GMs mode main
set security group-vpn server ike policy GMs proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy GMs pre-shared-key ascii-text "$ABC123$ABC123"
set security group-vpn server ike gateway RootSrv ike-policy RootSrv
set security group-vpn server ike gateway RootSrv address 10.10.102.1
set security group-vpn server ike gateway RootSrv dead-peer-detection always-send
set security group-vpn server ike gateway RootSrv local-address 10.16.102.1
set security group-vpn server ike gateway GM-0001 ike-policy GMs
set security group-vpn server ike gateway GM-0001 address 10.18.101.1
set security group-vpn server ike gateway GM-0001 local-address 10.17.102.1
set security group-vpn server ike gateway GM-0002 ike-policy GMs
set security group-vpn server ike gateway GM-0002 address 10.18.102.1
set security group-vpn server ike gateway GM-0002 local-address 10.17.102.1
set security group-vpn server ike gateway GM-0003 ike-policy GMs
set security group-vpn server ike gateway GM-0003 address 10.18.103.1
set security group-vpn server ike gateway GM-0003 local-address 10.17.102.1
set security group-vpn server ike gateway GM-0004 ike-policy GMs
set security group-vpn server ike gateway GM-0004 address 10.18.104.1
set security group-vpn server ike gateway GM-0004 local-address 10.17.102.1

```

```

set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 server-cluster server-role sub-server
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway RootSrv
set security group-vpn server group GROUP_ID-0001 server-cluster retransmission-period
  10
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0001
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0002
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0003
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0004
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
set security group-vpn server group GROUP_ID-0001 server-member-communication
  sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
  AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 source 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 destination 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 protocol 0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the sub-server in the Group VPNv2 server cluster:

1. Configure interfaces, security zones, and security policies.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_RootSrv
user@host# set ge-0/0/0 unit 0 family inet address 10.16.102.1/24
user@host# set ge-0/0/1 unit 0 description To_WAN
user@host# set ge-0/0/1 unit 0 family inet address 10.17.102.1/24

[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0

```

```

user@host# set interfaces ge-0/0/1.0

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count

[edit security policies]
user@host# set default-policy deny-all

```

2. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn server ike policy RootSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security group-vpn server ike policy GMs]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"

[edit security group-vpn server ike gateway RootSrv]
user@host# set ike-policy RootSrv
user@host# set address 10.10.102.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.16.102.1

[edit security group-vpn server ike gateway GM-0001]
user@host# set ike-policy GMs
user@host# set address 10.18.101.1
user@host# set local-address 10.17.102.1

[edit security group-vpn server ike gateway GM-0002]
user@host# set ike-policy GMs
user@host# set address 10.18.102.1
user@host# set local-address 10.17.102.1

[edit security group-vpn server ike gateway GM-0003]
user@host# set ike-policy GMs

```

```
user@host# set address 10.18.103.1
user@host# set local-address 10.17.102.1
```

```
[edit security group-vpn server ike gateway GM-0004]
user@host# set ike-policy GMs
user@host# set address 10.18.104.1
user@host# set local-address 10.17.102.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600
```

4. Configure the VPN group.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
user@host# set server-cluster server-role sub-server
user@host# set server-cluster ike-gateway RootSrv
user@host# set server-cluster retransmission-period 10
user@host# set ike-gateway GM-0001
user@host# set ike-gateway GM-0002
user@host# set ike-gateway GM-0003
user@host# set ike-gateway GM-0004
user@host# set anti-replay-time-window 1000
user@host# set server-member-communication communication-type unicast
user@host# set server-member-communication encryption-algorithm aes-256-cbc
user@host# set server-member-communication lifetime-seconds 7200
user@host# set server-member-communication sig-hash-algorithm sha-256
```

5. Configure the group policy.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 source 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 destination 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 protocol 0
user@host# set ipsec-sa GROUP_ID-0001 proposal AES256-SHA256-L3600
```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
```

```

unit 0 {
    description To_RootSrv;
    family inet {
        address 10.16.102.1/24;
    }
}
}
ge-0/0/1 {
    unit 0 {
        description To_WAN;
        family inet {
            address 10.17.102.1/24;
        }
    }
}
[edit]
user@host# show security
group-vpn {
    server {
        ike {
            proposal PSK-SHA256-DH14-AES256 {
                authentication-method pre-shared-keys;
                authentication-algorithm sha-256;
                dh-group group14;
                encryption-algorithm aes-256-cbc;
            }
            policy RootSrv {
                mode main;
                proposals PSK-SHA256-DH14-AES256;
                pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
            }
            policy GMs {
                mode main;
                proposals PSK-SHA256-DH14-AES256;
                pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
            }
            gateway RootSrv {
                ike-policy RootSrv;
                address 10.10.102.1;
                dead-peer-detection always-send;
                local-address 10.16.102.1;
            }
            gateway GM-0001 {
                ike-policy GMs;
                address 10.18.101.1;
                local-address 10.17.102.1;
            }
            gateway GM-0002 {
                ike-policy GMs;
                address 10.18.102.1;
                local-address 10.17.102.1;
            }
            gateway GM-0003 {
                ike-policy GMs;
                address 10.18.103.1;
            }
        }
    }
}

```

```
        local-address 10.17.102.1;
    }
    gateway GM-0004 {
        ike-policy GMS;
        address 10.18.104.1;
        local-address 10.17.102.1;
    }
}
ipsec {
    proposal AES256-SHA256-L3600 {
        authentication-algorithm hmac-sha-256-128;
        encryption-algorithm aes-256-cbc;
        lifetime-seconds 3600;
    }
}
group GROUP_ID-0001 {
    group-id 1;
    member-threshold 2000;
    server-cluster {
        server-role sub-server;
        ike-gateway RootSrv;
        retransmission-period 10;
    }
    ike-gateway GM-0001;
    ike-gateway GM-0002;
    ike-gateway GM-0003;
    ike-gateway GM-0004;
    anti-replay-time-window 1000;
    server-member-communication {
        communication-type unicast;
        lifetime-seconds 7200;
        encryption-algorithm aes-256-cbc;
        sig-hash-algorithm sha-256;
    }
    ipsec-sa GROUP_ID-0001 {
        proposal AES256-SHA256-L3600;
        match-policy 1 {
            source 172.16.0.0/12;
            destination 172.16.0.0/12;
            protocol 0;
        }
    }
}
}
}
}
policies {
    global {
        policy 1000 {
            match {
                source-address any;
                destination-address any;
                application any;
                from-zone any;
                to-zone any;
            }
        }
    }
}
```



```

        then {
            deny;
            log {
                session-init;
            }
            count;
        }
    }
}
default-policy {
    deny-all;
}
}
zones {
    security-zone GROUPVPN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
        interfaces {
            ge-0/0/0.0;
            ge-0/0/1.0;
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Sub-Server 3

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_RootSrv
set interfaces ge-0/0/0 unit 0 family inet address 10.16.103.1/24
set interfaces ge-0/0/1 unit 0 description To_WAN
set interfaces ge-0/0/1 unit 0 family inet address 10.17.103.1/24
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces ge-0/0/0.0
set security zones security-zone GROUPVPN interfaces ge-0/0/1.0
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny

```

```
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn server ike policy RootSrv mode main
set security group-vpn server ike policy RootSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy RootSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike policy GMs mode main
set security group-vpn server ike policy GMs proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy GMs pre-shared-key ascii-text "$ABC123$ABC123"
set security group-vpn server ike gateway RootSrv ike-policy RootSrv
set security group-vpn server ike gateway RootSrv address 10.10.103.1
set security group-vpn server ike gateway RootSrv dead-peer-detection always-send
set security group-vpn server ike gateway RootSrv local-address 10.16.103.1
set security group-vpn server ike gateway GM-0001 ike-policy GMs
set security group-vpn server ike gateway GM-0001 address 10.18.101.1
set security group-vpn server ike gateway GM-0001 local-address 10.17.103.1
set security group-vpn server ike gateway GM-0002 ike-policy GMs
set security group-vpn server ike gateway GM-0002 address 10.18.102.1
set security group-vpn server ike gateway GM-0002 local-address 10.17.103.1
set security group-vpn server ike gateway GM-0003 ike-policy GMs
set security group-vpn server ike gateway GM-0003 address 10.18.103.1
set security group-vpn server ike gateway GM-0003 local-address 10.17.103.1
set security group-vpn server ike gateway GM-0004 ike-policy GMs
set security group-vpn server ike gateway GM-0004 address 10.18.104.1
set security group-vpn server ike gateway GM-0004 local-address 10.17.103.1
set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 server-cluster server-role sub-server
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway RootSrv
set security group-vpn server group GROUP_ID-0001 server-cluster retransmission-period
  10
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0001
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0002
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0003
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0004
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
```

```

set security group-vpn server group GROUP_ID-0001 server-member-communication
sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 source 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 destination 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
match-policy 1 protocol 0

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the sub-server in the Group VPNv2 server cluster:

1. Configure interfaces, security zones, and security policies.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_RootSrv
user@host# set ge-0/0/0 unit 0 family inet address 10.16.103.1/24
user@host# set ge-0/0/1 unit 0 description To_WAN
user@host# set ge-0/0/1 unit 0 family inet address 10.17.103.1/24

[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0
user@host# set interfaces ge-0/0/1.0

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count

[edit security policies]
user@host# set default-policy deny-all

```

2. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256

```

```
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn server ike policy RootSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

[edit security group-vpn server ike policy GMs]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"

[edit security group-vpn server ike gateway RootSrv]
user@host# set ike-policy RootSrv
user@host# set address 10.10.103.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.16.103.1

[edit security group-vpn server ike gateway GM-0001]
user@host# set ike-policy GMs
user@host# set address 10.18.101.1
user@host# set local-address 10.17.103.1

[edit security group-vpn server ike gateway GM-0002]
user@host# set ike-policy GMs
user@host# set address 10.18.102.1
user@host# set local-address 10.17.103.1

[edit security group-vpn server ike gateway GM-0003]
user@host# set ike-policy GMs
user@host# set address 10.18.103.1
user@host# set local-address 10.17.103.1

[edit security group-vpn server ike gateway GM-0004]
user@host# set ike-policy GMs
user@host# set address 10.18.104.1
user@host# set local-address 10.17.103.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600
```

4. Configure the VPN group.

```
[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
```

```

user@host# set server-cluster server-role sub-server
user@host# set server-cluster ike-gateway RootSrv
user@host# set server-cluster retransmission-period 10
user@host# set ike-gateway GM-0001
user@host# set ike-gateway GM-0002
user@host# set ike-gateway GM-0003
user@host# set ike-gateway GM-0004
user@host# set anti-replay-time-window 1000
user@host# set server-member-communication communication-type unicast
user@host# set server-member-communication encryption-algorithm aes-256-cbc
user@host# set server-member-communication lifetime-seconds 7200
user@host# set server-member-communication sig-hash-algorithm sha-256

```

5. Configure the group policy.

```

[edit security group-vpn server group GROUP_ID-0001]
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 source 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 destination 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 protocol 0
user@host# set ipsec-sa GROUP_ID-0001 proposal AES256-SHA256-L3600

```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_RootSrv;
    family inet {
      address 10.16.103.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_WAN;
    family inet {
      address 10.17.103.1/24;
    }
  }
}
[edit]
user@host# show security
group-vpn {
  server {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        authentication-algorithm sha-256;

```

```
dh-group group14;
encryption-algorithm aes-256-cbc;
}
policy RootSrv {
  mode main;
  proposals PSK-SHA256-DH14-AES256;
  pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
}
policy GMs {
  mode main;
  proposals PSK-SHA256-DH14-AES256;
  pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
}
gateway RootSrv {
  ike-policy RootSrv;
  address 10.10.103.1;
  dead-peer-detection always-send;
  local-address 10.16.103.1;
}
gateway GM-0001 {
  ike-policy GMs;
  address 10.18.101.1;
  local-address 10.17.103.1;
}
gateway GM-0002 {
  ike-policy GMs;
  address 10.18.102.1;
  local-address 10.17.103.1;
}
gateway GM-0003 {
  ike-policy GMs;
  address 10.18.103.1;
  local-address 10.17.103.1;
}
gateway GM-0004 {
  ike-policy GMs;
  address 10.18.104.1;
  local-address 10.17.103.1;
}
}
ipsec {
  proposal AES256-SHA256-L3600 {
    authentication-algorithm hmac-sha-256-128;
    encryption-algorithm aes-256-cbc;
    lifetime-seconds 3600;
  }
}
group GROUP_ID-0001 {
  group-id 1;
  member-threshold 2000;
  server-cluster {
    server-role sub-server;
    ike-gateway RootSrv;
    retransmission-period 10;
  }
}
```

```

ike-gateway GM-0001;
ike-gateway GM-0002;
ike-gateway GM-0003;
ike-gateway GM-0004;
anti-replay-time-window 1000;
server-member-communication {
    communication-type unicast;
    lifetime-seconds 7200;
    encryption-algorithm aes-256-cbc;
    sig-hash-algorithm sha-256;
}
ipsec-sa GROUP_ID-0001 {
    proposal AES256-SHA256-L3600;
    match-policy 1 {
        source 172.16.0.0/12;
        destination 172.16.0.0/12;
        protocol 0;
    }
}
}
}
}
policies {
    global {
        policy 1000 {
            match {
                source-address any;
                destination-address any;
                application any;
                from-zone any;
                to-zone any;
            }
            then {
                deny;
                log {
                    session-init;
                }
                count;
            }
        }
    }
    default-policy {
        deny-all;
    }
}
zones {
    security-zone GROUPVPN {
        host-inbound-traffic {
            system-services {
                ike;
                ssh;
                ping;
            }
        }
    }
    interfaces {

```

```

        ge-0/0/0.0;
        ge-0/0/1.0;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Sub-Server 4

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_RootSrv
set interfaces ge-0/0/0 unit 0 family inet address 10.16.104.1/24
set interfaces ge-0/0/1 unit 0 description To_WAN
set interfaces ge-0/0/1 unit 0 family inet address 10.17.104.1/24
set security zones security-zone GROUPVPN host-inbound-traffic system-services ike
set security zones security-zone GROUPVPN host-inbound-traffic system-services ssh
set security zones security-zone GROUPVPN host-inbound-traffic system-services ping
set security zones security-zone GROUPVPN interfaces ge-0/0/0.0
set security zones security-zone GROUPVPN interfaces ge-0/0/1.0
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
authentication-method pre-shared-keys
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256 dh-group group14
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
authentication-algorithm sha-256
set security group-vpn server ike proposal PSK-SHA256-DH14-AES256
encryption-algorithm aes-256-cbc
set security group-vpn server ike policy RootSrv mode main
set security group-vpn server ike policy RootSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy RootSrv pre-shared-key ascii-text "$ABC123"
set security group-vpn server ike policy GMs mode main
set security group-vpn server ike policy GMs proposals PSK-SHA256-DH14-AES256
set security group-vpn server ike policy GMs pre-shared-key ascii-text "$ABC123$ABC123"
set security group-vpn server ike gateway RootSrv ike-policy RootSrv
set security group-vpn server ike gateway RootSrv address 10.10.104.1
set security group-vpn server ike gateway RootSrv dead-peer-detection always-send
set security group-vpn server ike gateway RootSrv local-address 10.16.104.1
set security group-vpn server ike gateway GM-0001 ike-policy GMs
set security group-vpn server ike gateway GM-0001 address 10.18.101.1
set security group-vpn server ike gateway GM-0001 local-address 10.17.104.1

```



```

set security group-vpn server ike gateway GM-0002 ike-policy GMs
set security group-vpn server ike gateway GM-0002 address 10.18.102.1
set security group-vpn server ike gateway GM-0002 local-address 10.17.104.1
set security group-vpn server ike gateway GM-0003 ike-policy GMs
set security group-vpn server ike gateway GM-0003 address 10.18.103.1
set security group-vpn server ike gateway GM-0003 local-address 10.17.104.1
set security group-vpn server ike gateway GM-0004 ike-policy GMs
set security group-vpn server ike gateway GM-0004 address 10.18.104.1
set security group-vpn server ike gateway GM-0004 local-address 10.17.104.1
set security group-vpn server ipsec proposal AES256-SHA256-L3600
  authentication-algorithm hmac-sha-256-128
set security group-vpn server ipsec proposal AES256-SHA256-L3600 encryption-algorithm
  aes-256-cbc
set security group-vpn server ipsec proposal AES256-SHA256-L3600 lifetime-seconds
  3600
set security group-vpn server group GROUP_ID-0001 group-id 1
set security group-vpn server group GROUP_ID-0001 member-threshold 2000
set security group-vpn server group GROUP_ID-0001 server-cluster server-role sub-server
set security group-vpn server group GROUP_ID-0001 server-cluster ike-gateway RootSrv
set security group-vpn server group GROUP_ID-0001 server-cluster retransmission-period
  10
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0001
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0002
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0003
set security group-vpn server group GROUP_ID-0001 ike-gateway GM-0004
set security group-vpn server group GROUP_ID-0001 anti-replay-time-window 1000
set security group-vpn server group GROUP_ID-0001 server-member-communication
  communication-type unicast
set security group-vpn server group GROUP_ID-0001 server-member-communication
  encryption-algorithm aes-256-cbc
set security group-vpn server group GROUP_ID-0001 server-member-communication
  lifetime-seconds 7200
set security group-vpn server group GROUP_ID-0001 server-member-communication
  sig-hash-algorithm sha-256
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001 proposal
  AES256-SHA256-L3600
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 source 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 destination 172.16.0.0/12
set security group-vpn server group GROUP_ID-0001 ipsec-sa GROUP_ID-0001
  match-policy 1 protocol 0

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the sub-server in the Group VPNv2 server cluster:

1. Configure interfaces, security zones, and security policies.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_RootSrv

```

```

user@host# set ge-0/0/0 unit 0 family inet address 10.16.104.1/24
user@host# set ge-0/0/1 unit 0 description To_WAN
user@host# set ge-0/0/1 unit 0 family inet address 10.17.104.1/24

```

```

[edit security zones security-zone GROUPVPN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0
user@host# set interfaces ge-0/0/1.0

```

```

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count

```

```

[edit security policies]
user@host# set default-policy deny-all

```

2. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn server ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

```

```

[edit security group-vpn server ike policy RootSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123"

```

```

[edit security group-vpn server ike policy GMs]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"

```

```

[edit security group-vpn server ike gateway RootSrv]
user@host# set ike-policy RootSrv
user@host# set address 10.10.104.1
user@host# set dead-peer-detection always-send
user@host# set local-address 10.16.104.1

```

```

[edit security group-vpn server ike gateway GM-0001]
user@host# set ike-policy GMs
user@host# set address 10.18.101.1

```

```

user@host# set local-address 10.17.104.1

[edit security group-vpn server ike gateway GM-0002]
user@host# set ike-policy GMs
user@host# set address 10.18.102.1
user@host# set local-address 10.17.104.1

[edit security group-vpn server ike gateway GM-0003]
user@host# set ike-policy GMs
user@host# set address 10.18.103.1
user@host# set local-address 10.17.104.1

[edit security group-vpn server ike gateway GM-0004]
user@host# set ike-policy GMs
user@host# set address 10.18.104.1
user@host# set local-address 10.17.104.1

```

3. Configure the IPsec SA.

```

[edit security group-vpn server ipsec proposal AES256-SHA256-L3600]
user@host# set authentication-algorithm hmac-sha-256-128
user@host# set encryption-algorithm aes-256-cbc
user@host# set lifetime-seconds 3600

```

4. Configure the VPN group.

```

[edit security group-vpn server group GROUP_ID-0001]
user@host# set group-id 1
user@host# set member-threshold 2000
user@host# set server-cluster server-role sub-server
user@host# set server-cluster ike-gateway RootSrv
user@host# set server-cluster retransmission-period 10
user@host# set ike-gateway GM-0001
user@host# set ike-gateway GM-0002
user@host# set ike-gateway GM-0003
user@host# set ike-gateway GM-0004
user@host# set anti-replay-time-window 1000
user@host# set server-member-communication communication-type unicast
user@host# set server-member-communication encryption-algorithm aes-256-cbc
user@host# set server-member-communication lifetime-seconds 7200
user@host# set server-member-communication sig-hash-algorithm sha-256

```

5. Configure the group policy.

```

[edit security group-vpn server group GROUP_ID-0001]
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 source 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 destination 172.16.0.0/12
user@host# set ipsec-sa GROUP_ID-0001 match-policy 1 protocol 0
user@host# set ipsec-sa GROUP_ID-0001 proposal AES256-SHA256-L3600

```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_RootSrv;
    family inet {
      address 10.16.104.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_WAN;
    family inet {
      address 10.17.104.1/24;
    }
  }
}
[edit]
user@host# show security
group-vpn {
  server {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        authentication-algorithm sha-256;
        dh-group group14;
        encryption-algorithm aes-256-cbc;
      }
      policy RootSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123"; ## SECRET-DATA
      }
      policy GMs {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
      }
      gateway RootSrv {
        ike-policy RootSrv;
        address 10.10.104.1;
        dead-peer-detection always-send;
        local-address 10.16.104.1;
      }
      gateway GM-0001 {
        ike-policy GMs;
        address 10.18.101.1;
        local-address 10.17.104.1;
      }
    }
  }
}
```

```

gateway GM-0002 {
    ike-policy GMS;
    address 10.18.102.1;
    local-address 10.17.104.1;
}
gateway GM-0003 {
    ike-policy GMS;
    address 10.18.103.1;
    local-address 10.17.104.1;
}
gateway GM-0004 {
    ike-policy GMS;
    address 10.18.104.1;
    local-address 10.17.104.1;
}
}
ipsec {
    proposal AES256-SHA256-L3600 {
        authentication-algorithm hmac-sha-256-128;
        encryption-algorithm aes-256-cbc;
        lifetime-seconds 3600;
    }
}
group GROUP_ID-0001 {
    group-id 1;
    member-threshold 2000;
    server-cluster {
        server-role sub-server;
        ike-gateway RootSrv;
        retransmission-period 10;
    }
    ike-gateway GM-0001;
    ike-gateway GM-0002;
    ike-gateway GM-0003;
    ike-gateway GM-0004;
    anti-replay-time-window 1000;
    server-member-communication {
        communication-type unicast;
        lifetime-seconds 7200;
        encryption-algorithm aes-256-cbc;
        sig-hash-algorithm sha-256;
    }
    ipsec-sa GROUP_ID-0001 {
        proposal AES256-SHA256-L3600;
        match-policy 1 {
            source 172.16.0.0/12;
            destination 172.16.0.0/12;
            protocol 0;
        }
    }
}
}
}
}
policies {
    global {

```

```

policy 1000 {
  match {
    source-address any;
    destination-address any;
    application any;
    from-zone any;
    to-zone any;
  }
  then {
    deny;
    log {
      session-init;
    }
    count;
  }
}
}
default-policy {
  deny-all;
}
}
zones {
  security-zone GROUPVPN {
    host-inbound-traffic {
      system-services {
        ike;
        ssh;
        ping;
      }
    }
    interfaces {
      ge-0/0/0.0;
      ge-0/0/1.0;
    }
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring GM-0001 (SRX Series Device or vSRX Instance)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_LAN
set interfaces ge-0/0/0 unit 0 family inet address 172.16.101.1/24
set interfaces ge-0/0/1 unit 0 description To_SubSrv
set interfaces ge-0/0/1 unit 0 family inet address 10.18.101.1/24
set security zones security-zone LAN host-inbound-traffic system-services ike
set security zones security-zone LAN host-inbound-traffic system-services ssh
set security zones security-zone LAN host-inbound-traffic system-services ping

```

```

set security zones security-zone LAN interfaces ge-0/0/0.0
set security zones security-zone WAN host-inbound-traffic system-services ike
set security zones security-zone WAN host-inbound-traffic system-services ssh
set security zones security-zone WAN host-inbound-traffic system-services ping
set security zones security-zone WAN interfaces ge-0/0/1.0
set security address-book global address 172.16.0.0/12 172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match application any
set security policies from-zone LAN to-zone WAN policy 1 then permit
set security policies from-zone LAN to-zone WAN policy 1 then log session-init
set security policies from-zone WAN to-zone LAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match application any
set security policies from-zone WAN to-zone LAN policy 1 then permit
set security policies from-zone WAN to-zone LAN policy 1 then log session-init
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy SubSrv mode main
set security group-vpn member ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy SubSrv pre-shared-key ascii-text
  "$ABC123$ABC123"
set security group-vpn member ike gateway SubSrv ike-policy SubSrv
set security group-vpn member ike gateway SubSrv server-address 10.17.101.1
set security group-vpn member ike gateway SubSrv server-address 10.17.102.1
set security group-vpn member ike gateway SubSrv server-address 10.17.103.1
set security group-vpn member ike gateway SubSrv server-address 10.17.104.1
set security group-vpn member ike gateway SubSrv local-address 10.18.101.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway SubSrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group-vpn-external-interface
  ge-0/0/1.0
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 recovery-probe
set security ipsec-policy from-zone LAN to-zone WAN ipsec-group-vpn GROUP_ID-0001

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure interfaces, security zones, and security policies.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_LAN
user@host# set ge-0/0/0 unit 0 family inet address 172.16.101.1/24
user@host# set ge-0/0/1 unit 0 description To_SubSrv
user@host# set ge-0/0/1 unit 0 family inet address 10.18.101.1/24

[edit security zones security-zone LAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0

[edit security zones security-zone WAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/1.0

[edit security]
user@host# set address-book global address 172.16.0.0/12 172.16.0.0/12

[edit security policies from-zone LAN to-zone WAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init

[edit security policies from-zone WAN to-zone LAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count
```



```
[edit]
user@host# set security policies default-policy deny-all
```

2. Configure the IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn member ike policy SubSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"

[edit security group-vpn member ike gateway SubSrv]
user@host# set ike-policy SubSrv
user@host# set server-address 10.17.101.1
user@host# set server-address 10.17.102.1
user@host# set server-address 10.17.103.1
user@host# set server-address 10.17.104.1
user@host# set local-address 10.18.101.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway SubSrv
user@host# set group-vpn-external-interface ge-0/0/1.0
user@host# set group 1
user@host# set recovery-probe
```

4. Configure the IPsec policy.

```
[edit security ipsec-policy from-zone LAN to-zone WAN]
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_LAN;
    family inet {
      address 172.16.101.1/24;
```

```

    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_SubSrv;
    family inet {
      address 10.18.101.1/24;
    }
  }
}
[edit]
user@host# show security
address-book {
  global {
    address 172.16.0.0/12 172.16.0.0/12;
  }
}
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy SubSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
      }
      gateway SubSrv {
        ike-policy SubSrv;
        server-address [ 10.17.101.1 10.17.102.1 10.17.103.1 10.17.104.1 ];
        local-address 10.18.101.1;
      }
    }
  }
}
ipsec {
  vpn GROUP_ID-0001 {
    ike-gateway SubSrv;
    group-vpn-external-interface ge-0/0/1.0;
    group 1;
    recovery-probe;
  }
}
ipsec-policy {
  from-zone LAN to-zone WAN {
    ipsec-group-vpn GROUP_ID-0001;
  }
}
policies {
  from-zone LAN to-zone WAN {

```

```
policy 1 {
  match {
    source-address 172.16.0.0/12;
    destination-address 172.16.0.0/12;
    application any;
  }
  then {
    permit;
    log {
      session-init;
    }
  }
}
}
from-zone WAN to-zone LAN {
  policy 1 {
    match {
      source-address 172.16.0.0/12;
      destination-address 172.16.0.0/12;
      application any;
    }
    then {
      permit;
      log {
        session-init;
      }
    }
  }
}
}
global {
  policy 1000 {
    match {
      source-address any;
      destination-address any;
      application any;
      from-zone any;
      to-zone any;
    }
    then {
      deny;
      log {
        session-init;
      }
      count;
    }
  }
}
}
default-policy {
  deny-all;
}
}
zones {
  security-zone LAN {
    host-inbound-traffic {
      system-services {
```

```

        ike;
        ssh;
        ping;
    }
}
interfaces {
    ge-0/0/0.0;
}
}
security-zone WAN {
    host-inbound-traffic {
        system-services {
            ike;
            ssh;
            ping;
        }
    }
    interfaces {
        ge-0/0/1.0;
    }
}
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring GM-0002 (SRX Series Device or vSRX Instance)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces ge-0/0/0 unit 0 description To_LAN
set interfaces ge-0/0/0 unit 0 family inet address 172.16.102.1/24
set interfaces ge-0/0/1 unit 0 description To_SubSrv
set interfaces ge-0/0/1 unit 0 family inet address 10.18.102.1/24
set security zones security-zone LAN host-inbound-traffic system-services ike
set security zones security-zone LAN host-inbound-traffic system-services ssh
set security zones security-zone LAN host-inbound-traffic system-services ping
set security zones security-zone LAN interfaces ge-0/0/0.0
set security zones security-zone WAN host-inbound-traffic system-services ike
set security zones security-zone WAN host-inbound-traffic system-services ssh
set security zones security-zone WAN host-inbound-traffic system-services ping
set security zones security-zone WAN interfaces ge-0/0/1.0
set security address-book global address 172.16.0.0/12 172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match source-address
172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match destination-address
172.16.0.0/12
set security policies from-zone LAN to-zone WAN policy 1 match application any
set security policies from-zone LAN to-zone WAN policy 1 then permit
set security policies from-zone LAN to-zone WAN policy 1 then log session-init

```

```

set security policies from-zone WAN to-zone LAN policy 1 match source-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match destination-address
  172.16.0.0/12
set security policies from-zone WAN to-zone LAN policy 1 match application any
set security policies from-zone WAN to-zone LAN policy 1 then permit
set security policies from-zone WAN to-zone LAN policy 1 then log session-init
set security policies global policy 1000 match source-address any
set security policies global policy 1000 match destination-address any
set security policies global policy 1000 match application any
set security policies global policy 1000 match from-zone any
set security policies global policy 1000 match to-zone any
set security policies global policy 1000 then deny
set security policies global policy 1000 then log session-init
set security policies global policy 1000 then count
set security policies default-policy deny-all
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy SubSrv mode main
set security group-vpn member ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy SubSrv pre-shared-key ascii-text
  "$ABC123$ABC123"
set security group-vpn member ike gateway SubSrv ike-policy SubSrv
set security group-vpn member ike gateway SubSrv server-address 10.17.101.1
set security group-vpn member ike gateway SubSrv server-address 10.17.102.1
set security group-vpn member ike gateway SubSrv server-address 10.17.103.1
set security group-vpn member ike gateway SubSrv server-address 10.17.104.1
set security group-vpn member ike gateway SubSrv local-address 10.18.102.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway SubSrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group-vpn-external-interface
  ge-0/0/1.0
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 recovery-probe
set security ipsec-policy from-zone LAN to-zone WAN ipsec-group-vpn GROUP_ID-0001

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure interfaces, security zones, and security policies.

```

[edit interfaces]
user@host# set ge-0/0/0 unit 0 description To_LAN
user@host# set ge-0/0/0 unit 0 family inet address 172.16.102.1/24
user@host# set ge-0/0/1 unit 0 description To_SubSrv

```

```
user@host# set ge-0/0/1 unit 0 family inet address 10.18.102.1/24

[edit security zones security-zone LAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/0.0

[edit security zones security-zone WAN]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services ssh
user@host# set host-inbound-traffic system-services ping
user@host# set interfaces ge-0/0/1.0

[edit security]
user@host# set address-book global address 172.16.0.0/12 172.16.0.0/12

[edit security policies from-zone LAN to-zone WAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init

[edit security policies from-zone WAN to-zone LAN]
user@host# set policy 1 match source-address 172.16.0.0/12
user@host# set policy 1 match destination-address 172.16.0.0/12
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init

[edit security policies global]
user@host# set policy 1000 match source-address any
user@host# set policy 1000 match destination-address any
user@host# set policy 1000 match application any
user@host# set policy 1000 match from-zone any
user@host# set policy 1000 match to-zone any
user@host# set policy 1000 then deny
user@host# set policy 1000 then log session-init
user@host# set policy 1000 then count

[edit]
user@host# set security policies default-policy deny-all
```

2. Configure the IKE proposal, policy, and gateway.

```
[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc
```

```
[edit security group-vpn member ike policy SubSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"
```

```
[edit security group-vpn member ike gateway SubSrv]
user@host# set ike-policy SubSrv
user@host# set server-address 10.17.101.1
user@host# set server-address 10.17.102.1
user@host# set server-address 10.17.103.1
user@host# set server-address 10.17.104.1
user@host# set local-address 10.18.102.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway SubSrv
user@host# set group-vpn-external-interface ge-0/0/1.0
user@host# set group 1
user@host# set recovery-probe
```

4. Configure the IPsec policy.

```
[edit security ipsec-policy from-zone LAN to-zone WAN]
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
  unit 0 {
    description To_LAN;
    family inet {
      address 172.16.102.1/24;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    description To_SubSrv;
    family inet {
      address 10.18.102.1/24;
    }
  }
}
[edit]
```

```
user@host# show security
address-book {
  global {
    address 172.16.0.0/12 172.16.0.0/12;
  }
}
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy SubSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
      }
      gateway SubSrv {
        ike-policy SubSrv;
        server-address [ 10.17.101.1 10.17.102.1 10.17.103.1 10.17.104.1 ];
        local-address 10.18.102.1;
      }
    }
  }
  ipsec {
    vpn GROUP_ID-0001 {
      ike-gateway SubSrv;
      group-vpn-external-interface ge-0/0/1.0;
      group 1;
      recovery-probe;
    }
  }
}
ipsec-policy {
  from-zone LAN to-zone WAN {
    ipsec-group-vpn GROUP_ID-0001;
  }
}
policies {
  from-zone LAN to-zone WAN {
    policy 1 {
      match {
        source-address 172.16.0.0/12;
        destination-address 172.16.0.0/12;
        application any;
      }
      then {
        permit;
        log {
          session-init;
        }
      }
    }
  }
}
```



```

    }
  }
  from-zone WAN to-zone LAN {
    policy 1 {
      match {
        source-address 172.16.0.0/12;
        destination-address 172.16.0.0/12;
        application any;
      }
      then {
        permit;
        log {
          session-init;
        }
      }
    }
  }
}
global {
  policy 1000 {
    match {
      source-address any;
      destination-address any;
      application any;
      from-zone any;
      to-zone any;
    }
    then {
      deny;
      log {
        session-init;
      }
      count;
    }
  }
}
default-policy {
  deny-all;
}
}
zones {
  security-zone LAN {
    host-inbound-traffic {
      system-services {
        ike;
        ssh;
        ping;
      }
    }
    interfaces {
      ge-0/0/0.0;
    }
  }
  security-zone WAN {
    host-inbound-traffic {
      system-services {

```

```

        ike;
        ssh;
        ping;
    }
}
interfaces {
    ge-0/0/1.0;
}
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring GM-0003 (MX Series Device)

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet service output service-set GROUP_ID-0001
service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet address 10.18.103.1/24
set interfaces xe-0/0/2 unit 0 family inet address 172.16.103.1/24
set interfaces ms-0/2/0 unit 0 family inet
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
encryption-algorithm aes-256-cbc
set security group-vpn member ike policy SubSrv mode main
set security group-vpn member ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy SubSrv pre-shared-key ascii-text
"$ABC123$ABC123"
set security group-vpn member ike gateway SubSrv ike-policy SubSrv
set security group-vpn member ike gateway SubSrv server-address 10.17.101.1
set security group-vpn member ike gateway SubSrv server-address 10.17.102.1
set security group-vpn member ike gateway SubSrv server-address 10.17.103.1
set security group-vpn member ike gateway SubSrv server-address 10.17.104.1
set security group-vpn member ike gateway SubSrv local-address 10.18.103.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway SubSrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 match-direction output
set security group-vpn member ipsec vpn GROUP_ID-0001 tunnel-mtu 1400
set security group-vpn member ipsec vpn GROUP_ID-0001 df-bit clear
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
10.17.101.1/32

```

```

set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.102.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.103.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.104.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.101.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.102.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.103.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.104.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  source-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  destination-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 then service
set services service-set GROUP_ID-0001 interface-service service-interface ms-0/2/0.0
set services service-set GROUP_ID-0001 ipsec-group-vpn GROUP_ID-0001

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet service output service-set
  GROUP_ID-0001 service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet address 10.18.103.1/24
user@host# set xe-0/0/2 unit 0 family inet address 172.16.103.1/24
user@host# set ms-0/2/0 unit 0 family inet

```

2. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

[edit security group-vpn member ike policy SubSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256

```

```
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"
```

```
[edit security group-vpn member ike gateway SubSrv]
user@host# set ike-policy SubSrv
user@host# set server-address 10.17.101.1
user@host# set server-address 10.17.102.1
user@host# set server-address 10.17.103.1
user@host# set server-address 10.17.104.1
user@host# set local-address 10.18.103.1
```

3. Configure the IPsec SA.

```
[edit security group-vpn member ipsec vpn GROUP_ID-0001]
user@host# set ike-gateway SubSrv
user@host# set group 1
user@host# set match-direction output
user@host# set tunnel-mtu 1400
user@host# set df-bit clear
```

4. Configure the service filter.

```
[edit firewall family inet service-filter GroupVPN-KS]
user@host# set term inbound-ks from source-address 10.17.101.1/32
user@host# set term inbound-ks from source-address 10.17.102.1/32
user@host# set term inbound-ks from source-address 10.17.103.1/32
user@host# set term inbound-ks from source-address 10.17.104.1/32
user@host# set term inbound-ks then skip
user@host# set term outbound-ks from destination-address 10.17.101.1/32
user@host# set term outbound-ks from destination-address 10.17.102.1/32
user@host# set term outbound-ks from destination-address 10.17.103.1/32
user@host# set term outbound-ks from destination-address 10.17.104.1/32
user@host# set term outbound-ks then skip
user@host# set term GROUP_ID-0001 from source-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 from destination-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 then service
```

5. Configure the service set.

```
[edit services service-set GROUP_ID-0001]
user@host# set interface-service service-interface ms-0/2/0.0
user@host# set ipsec-group-vpn GROUP_ID-0001
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security**, **show services**, and **show firewall** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
```

```

user@host# show interfaces
xe-0/0/1 {
  unit 0 {
    family inet {
      service {
        input {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
        output {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
      }
    }
    address 10.18.103.1/24;
  }
}
xe-0/0/2 {
  unit 0 {
    family inet {
      address 172.16.103.1/24;
    }
  }
}
ms-0/2/0 {
  unit 0 {
    family inet;
  }
}
[edit]
user@host# show security
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy SubSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text "$ABC123$ABC123"; ## SECRET-DATA
      }
      gateway SubSrv {
        ike-policy SubSrv;
        server-address [ 10.17.101.1 10.17.102.1 10.17.103.1 10.17.104.1 ];
        local-address 10.18.103.1;
      }
    }
  }
  ipsec {
    vpn GROUP_ID-0001 {
      ike-gateway SubSrv;
      group 1;
      match-direction output;
    }
  }
}

```

```
        tunnel-mtu 1400;
        df-bit clear;
    }
}
}
[edit]
user@host# show services
service-set GROUP_ID-0001 {
    interface-service {
        service-interface ms-0/2/0.0;
    }
    ipsec-group-vpn GROUP_ID-0001;
}
[edit]
user@host# show firewall
family inet {
    service-filter GroupVPN-KS {
        term inbound-ks {
            from {
                source-address {
                    10.17.101.1/32;
                    10.17.102.1/32;
                    10.17.103.1/32;
                    10.17.104.1/32;
                }
            }
            then skip;
        }
        term outbound-ks {
            from {
                destination-address {
                    10.17.101.1/32;
                    10.17.102.1/32;
                    10.17.103.1/32;
                    10.17.104.1/32;
                }
            }
            then skip;
        }
        term GROUP_ID-0001 {
            from {
                source-address {
                    172.16.0.0/12;
                }
                destination-address {
                    172.16.0.0/12;
                }
            }
            then service;
        }
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring GM-0004 (MX Series Device)

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set interfaces xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet service output service-set GROUP_ID-0001
  service-filter GroupVPN-KS
set interfaces xe-0/0/1 unit 0 family inet address 10.18.104.1/24
set interfaces xe-0/0/2 unit 0 family inet address 172.16.104.1/24
set interfaces ms-0/2/0 unit 0 family inet
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-method pre-shared-keys
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256 dh-group
  group14
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  authentication-algorithm sha-256
set security group-vpn member ike proposal PSK-SHA256-DH14-AES256
  encryption-algorithm aes-256-cbc
set security group-vpn member ike policy SubSrv mode main
set security group-vpn member ike policy SubSrv proposals PSK-SHA256-DH14-AES256
set security group-vpn member ike policy SubSrv pre-shared-key ascii-text
  "$ABC123$ABC123"
set security group-vpn member ike gateway SubSrv ike-policy SubSrv
set security group-vpn member ike gateway SubSrv server-address 10.17.101.1
set security group-vpn member ike gateway SubSrv server-address 10.17.102.1
set security group-vpn member ike gateway SubSrv server-address 10.17.103.1
set security group-vpn member ike gateway SubSrv server-address 10.17.104.1
set security group-vpn member ipsec vpn GROUP_ID-0001 ike-gateway SubSrv
set security group-vpn member ipsec vpn GROUP_ID-0001 group 1
set security group-vpn member ipsec vpn GROUP_ID-0001 match-direction output
set security group-vpn member ipsec vpn GROUP_ID-0001 tunnel-mtu 1400
set security group-vpn member ipsec vpn GROUP_ID-0001 df-bit clear
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.101.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.102.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.103.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks from source-address
  10.17.104.1/32
set firewall family inet service-filter GroupVPN-KS term inbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.101.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.102.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.103.1/32
set firewall family inet service-filter GroupVPN-KS term outbound-ks from
  destination-address 10.17.104.1/32

```

```

set firewall family inet service-filter GroupVPN-KS term outbound-ks then skip
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  source-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 from
  destination-address 172.16.0.0/12
set firewall family inet service-filter GroupVPN-KS term GROUP_ID-0001 then service
set services service-set GROUP_ID-0001 interface-service service-interface ms-0/2/0.0
set services service-set GROUP_ID-0001 ipsec-group-vpn GROUP_ID-0001

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the Group VPNv2 member:

1. Configure the interfaces.

```

[edit interfaces]
user@host# set xe-0/0/1 unit 0 family inet service input service-set GROUP_ID-0001
  service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet service output service-set
  GROUP_ID-0001 service-filter GroupVPN-KS
user@host# set xe-0/0/1 unit 0 family inet address 10.18.104.1/24
user@host# set xe-0/0/2 unit 0 family inet address 172.16.104.1/24
user@host# set ms-0/2/0 unit 0 family inet

```

2. Configure the IKE proposal, policy, and gateway.

```

[edit security group-vpn member ike proposal PSK-SHA256-DH14-AES256]
user@host# set authentication-method pre-shared-keys
user@host# set dh-group group14
user@host# set authentication-algorithm sha-256
user@host# set encryption-algorithm aes-256-cbc

```

```

[edit security group-vpn member ike policy SubSrv]
user@host# set mode main
user@host# set proposals PSK-SHA256-DH14-AES256
user@host# set pre-shared-key ascii-text "$ABC123$ABC123"

```

```

[edit security group-vpn member ike gateway SubSrv]
user@host# set ike-policy SubSrv
user@host# set server-address 10.17.101.1
user@host# set server-address 10.17.102.1
user@host# set server-address 10.17.103.1
user@host# set server-address 10.17.104.1
user@host# set local-address 10.18.104.1

```

3. Configure the IPsec SA.

```

[edit security group-vpn member ipsec vpn GROUP_ID-0001]

```



```

user@host# set ike-gateway SubSrv
user@host# set group 1
user@host# set match-direction output
user@host# set tunnel-mtu 1400
user@host# set df-bit clear

```

4. Configure the service filter.

```

[edit firewall family inet service-filter GroupVPN-KS]
user@host# set term inbound-ks from source-address 10.17.101.1/32
user@host# set term inbound-ks from source-address 10.17.102.1/32
user@host# set term inbound-ks from source-address 10.17.103.1/32
user@host# set term inbound-ks from source-address 10.17.104.1/32
user@host# set term inbound-ks then skip
user@host# set term outbound-ks from destination-address 10.17.101.1/32
user@host# set term outbound-ks from destination-address 10.17.102.1/32
user@host# set term outbound-ks from destination-address 10.17.103.1/32
user@host# set term outbound-ks from destination-address 10.17.104.1/32
user@host# set term outbound-ks then skip
user@host# set term GROUP_ID-0001 from source-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 from destination-address 172.16.0.0/12
user@host# set term GROUP_ID-0001 then service

```

5. Configure the service set.

```

[edit services service-set GROUP_ID-0001]
user@host# set interface-service service-interface ms-0/2/0.0
user@host# set ipsec-group-vpn GROUP_ID-0001

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security**, **show services**, and **show firewall** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show interfaces
xe-0/0/1 {
  unit 0 {
    family inet {
      service {
        input {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
        output {
          service-set GROUP_ID-0001 service-filter GroupVPN-KS;
        }
      }
    }
    address 10.18.104.1/24;
  }
}

```

```

}
xe-0/0/2 {
  unit 0 {
    family inet {
      address 172.16.104.1/24;
    }
  }
}
ms-0/2/0 {
  unit 0 {
    family inet;
  }
}
[edit]
user@host# show security
group-vpn {
  member {
    ike {
      proposal PSK-SHA256-DH14-AES256 {
        authentication-method pre-shared-keys;
        dh-group group14;
        authentication-algorithm sha-256;
        encryption-algorithm aes-256-cbc;
      }
      policy SubSrv {
        mode main;
        proposals PSK-SHA256-DH14-AES256;
        pre-shared-key ascii-text ""$ABC123$ABC123"; ## SECRET-DATA
      }
      gateway SubSrv {
        ike-policy SubSrv;
        server-address [ 10.17.101.1 10.17.102.1 10.17.103.1 10.17.104.1 ];
        local-address 10.18.104.1;
      }
    }
  }
  ipsec {
    vpn GROUP_ID-0001 {
      ike-gateway SubSrv;
      group 1;
      match-direction output;
      tunnel-mtu 1400;
      df-bit clear;
    }
  }
}
[edit]
user@host# show services
service-set GROUP_ID-0001 {
  interface-service {
    service-interface ms-0/2/0.0;
  }
  ipsec-group-vpn GROUP_ID-0001;
}
[edit]

```

```
user@host# show firewall
family inet {
  service-filter GroupVPN-KS {
    term inbound-ks {
      from {
        source-address {
          10.17.101.1/32;
          10.17.102.1/32;
          10.17.103.1/32;
          10.17.104.1/32;
        }
      }
      then skip;
    }
    term outbound-ks {
      from {
        destination-address {
          10.17.101.1/32;
          10.17.102.1/32;
          10.17.103.1/32;
          10.17.104.1/32;
        }
      }
      then skip;
    }
    term GROUP_ID-0001 {
      from {
        source-address {
          172.16.0.0/12;
        }
        destination-address {
          172.16.0.0/12;
        }
      }
      then service;
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying Server Cluster Operation on page 864](#)
- [Verifying That SAs Are Distributed to Members on page 866](#)
- [Verifying IKE SAs on the Servers on page 868](#)
- [Verifying IPsec SAs on the Servers and Group Members on page 870](#)
- [Verifying IPsec Policies on Group Members on page 872](#)

Verifying Server Cluster Operation

Purpose Verify that devices in the server cluster recognize peer servers in the group. Ensure that the servers are active and roles in the cluster are properly assigned.

Action From operational mode, enter the **show security group-vpn server server-cluster**, **show security group-vpn server server-cluster detail**, and **show security group-vpn server statistics** commands on the root-server.

```
user@RootSrv> show security group-vpn server server-cluster
```

```
Group: GROUP_ID-0001, Group Id: 1
```

```
Role: Root-server, Version Number: 2,
```

Peer Gateway	Peer IP	Role	Status
SubSrv01	10.16.101.1	Sub-server	Active
SubSrv02	10.16.102.1	Sub-server	Active
SubSrv03	10.16.103.1	Sub-server	Active
SubSrv04	10.16.104.1	Sub-server	Active

```
user@RootSrv> show security group-vpn server server-cluster detail
```

```
Group: GROUP_ID-0001, Group Id: 1
```

```
Role: Root-server, Version Number: 2
```

```
Peer gateway: SubSrv01
```

```
Peer IP: 10.16.101.1, Local IP: 10.10.101.1, VR: default
```

```
Role: Sub-server, Status: Active
```

```

CLUSTER-INIT send:          0
CLUSTER-INIT rcv:          1
CLUSTER-INIT success:      1
CLUSTER-INIT fail:         0
CLUSTER-INIT dup:          0
CLUSTER-INIT abort:        0
CLUSTER-INIT timeout:      0
CLUSTER-UPDATE send:       2
CLUSTER-UPDATE rcv:        0
CLUSTER-UPDATE success:    2
CLUSTER-UPDATE fail:       0
CLUSTER-UPDATE abort:      0
CLUSTER-UPDATE timeout:    0
CLUSTER-UPDATE pending:    0
CLUSTER-UPDATE max retry reached: 0
DPD send:                   677
DPD send fail:              0
DPD ACK rcv:                677
DPD ACK invalid seqno:      0
IPsec SA policy mismatch:   0
IPsec SA proposal mismatch: 0
KEK SA proposal mismatch:   0

```

```
Peer gateway: SubSrv02
```

```
Peer IP: 10.16.102.1, Local IP: 10.10.102.1, VR: default
```

```
Role: Sub-server, Status: Active
```

```

CLUSTER-INIT send:          0
CLUSTER-INIT rcv:          1
CLUSTER-INIT success:      1

```

```

CLUSTER-INIT fail:          0
CLUSTER-INIT dup:          0
CLUSTER-INIT abort:        0
CLUSTER-INIT timeout:      0
CLUSTER-UPDATE send:       2
CLUSTER-UPDATE recv:       0
CLUSTER-UPDATE success:    2
CLUSTER-UPDATE fail:       0
CLUSTER-UPDATE abort:      0
CLUSTER-UPDATE timeout:    0
CLUSTER-UPDATE pending:    0
CLUSTER-UPDATE max retry reached: 0
DPD send:                   676
DPD send fail:              0
DPD ACK recv:               676
DPD ACK invalid seqno:      0
IPsec SA policy mismatch:   0
IPsec SA proposal mismatch: 0
KEK SA proposal mismatch:   0

```

```
user@RootSrv> show security group-vpn server statistics
```

```

Group: GROUP_ID-0001, Group Id: 1
Stats:
  Pull Succeeded           : 0
  Pull Failed              : 0
  Pull Exceed Member Threshold : 0
  Push Sent                : 0
  Push Acknowledged        : 0
  Push Unacknowledged      : 0

```

From operational mode, enter the **show security group-vpn server server-cluster**, **show security group-vpn server server-cluster detail**, and **show security group-vpn server statistics** commands on each sub-server.

```
user@SubSrv01> show security group-vpn server server-cluster
```

```

Group: GROUP_ID-0001, Group Id: 1
Role: Sub-server, Version Number: 2,

```

Peer Gateway	Peer IP	Role	Status
RootSrv	10.10.101.1	Root-server	Active

```
user@SubSrv01> show security group-vpn server server-cluster detail
```

```

Group: GROUP_ID-0001, Group Id: 1
Role: Sub-server, Version Number: 2

Peer gateway: RootSrv
Peer IP: 10.10.101.1, Local IP: 10.16.101.1, VR: default
Role: Root-server, Status: Active
CLUSTER-INIT send:          1
CLUSTER-INIT recv:         0
CLUSTER-INIT success:      1
CLUSTER-INIT fail:         0
CLUSTER-INIT dup:          0
CLUSTER-INIT abort:        0
CLUSTER-INIT timeout:      0

```

```

CLUSTER-UPDATE send:          0
CLUSTER-UPDATE recv:          2
CLUSTER-UPDATE success:       2
CLUSTER-UPDATE fail:          0
CLUSTER-UPDATE abort:         0
CLUSTER-UPDATE timeout:       0
CLUSTER-UPDATE pending:       0
CLUSTER-UPDATE max retry reached: 0
DPD send:                      812
DPD send fail:                 0
DPD ACK recv:                  812
DPD ACK invalid seqno:         0
IPsec SA policy mismatch:      0
IPsec SA proposal mismatch:    0
KEK SA proposal mismatch:      0

```

```
user@SubSrv01> show security group-vpn server statistics
```

```
Group: GROUP_ID-0001, Group Id: 1
```

```
Stats:
```

```

Pull Succeeded          : 4
Pull Failed             : 0
Pull Exceed Member Threshold : 0
Push Sent               : 8
Push Acknowledged       : 8
Push Unacknowledged     : 0

```

Verifying That SAs Are Distributed to Members

Purpose Verify that the sub-servers have received SAs for distribution to group members and the group members have received the SAs.

Action From operational mode, enter the **show security group-vpn server kek security-associations** and **show security group-vpn server kek security-associations detail** commands on the root-server.

```
user@RootSrv> show security group-vpn server kek security-associations
```

```

Index   Life:sec  Initiator cookie  Responder cookie  GroupId
738885  2888      5742c24020056c6a d6d479543b56404c 1

```

```
user@RootSrv> show security group-vpn server kek security-associations detail
```

```

Index 738885, Group Name: GROUP_ID-0001, Group Id: 1
Initiator cookie: 5742c24020056c6a, Responder cookie: d6d479543b56404c
Authentication method: RSA
Lifetime: Expires in 2883 seconds, Activated
Rekey in 2373 seconds
Algorithms:
  Sig-hash          : sha256
  Encryption        : aes256-cbc
Traffic statistics:
  Input bytes       : 0
  Output bytes      : 0
  Input packets     : 0
  Output packets    : 0

```

```

Server Member Communication: Unicast
Retransmission Period: 10, Number of Retransmissions: 2
Group Key Push sequence number: 0

```

```
PUSH negotiations in progress: 0
```

From operational mode, enter the **show security group-vpn server kek security-associations** and **show security group-vpn server kek security-associations detail** commands on each sub-server.

```
user@SubSrv01> show security group-vpn server kek security-associations
```

```

Index   Life:sec  Initiator cookie  Responder cookie  GroupId
738885  1575     5742c24020056c6a d6d479543b56404c 1

```

```
user@SubSrv01> show security group-vpn server kek security-associations detail
```

```

Index 738879, Group Name: GROUP_ID-0001, Group Id: 1
Initiator cookie: 114e4a214891e42f, Responder cookie: 4b2848d14372e5bd
Authentication method: RSA
Lifetime: Expires in 4186 seconds, Activated
Rekey in 3614 seconds
  Algorithms:
    Sig-hash      : sha256
    Encryption    : aes256-cbc
  Traffic statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  Server Member Communication: Unicast
  Retransmission Period: 10, Number of Retransmissions: 2
  Group Key Push sequence number: 0

```

```
PUSH negotiations in progress: 0
```

From operational mode, enter the **show security group-vpn member kek security-associations** and **show security group-vpn member kek security-associations detail** commands on each group member.

For SRX or vSRX group members:

```
user@GM-0001> show security group-vpn server kek security-associations
```

```

Index   Server Address  Life:sec  Initiator cookie  Responder cookie  GroupId
5455799 10.17.101.1     1466     5742c24020056c6a d6d479543b56404c 1

```

```
user@GM-0001> show security group-vpn server kek security-associations detail
```

```

Index 5455799, Group Id: 1
Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.101.1, GDOI Server: 10.17.101.1
Initiator cookie: 5742c24020056c6a, Responder cookie: d6d479543b56404c
Lifetime: Expires in 1464 seconds
Group Key Push Sequence number: 0

```

```

Algorithms:
  Sig-hash      : hmac-sha256-128
  Encryption    : aes256-cbc
Traffic statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets : 0
  Output packets: 0
Stats:
  Push received : 0
  Delete received: 0

```

For MX group members:

```
user@GM-0003> show security group-vpn member kek security-associations
```

Index	Server Address	Life:sec	Initiator cookie	Responder cookie	GroupId
5184329	10.17.101.1	1323	5742c24020056c6a	d6d479543b56404c	1

```
user@GM-0003> show security group-vpn member kek security-associations detail
```

```

Index 5184329, Group Id: 1
Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.103.1, GDOI Server: 10.17.101.1
Initiator cookie: 5742c24020056c6a, Responder cookie: d6d479543b56404c
Lifetime: Expires in 1321 seconds
Group Key Push Sequence number: 0

```

```

Algorithms:
  Sig-hash      : hmac-sha256-128
  Encryption    : aes256-cbc
Traffic statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets : 0
  Output packets: 0
Stats:
  Push received : 0
  Delete received: 0

```

Verifying IKE SAs on the Servers

Purpose Display IKE security associations (SAs) on the servers.

Action From operational mode, enter the **show security group-vpn server ike security-associations** and **show security group-vpn server ike security-associations detail** commands on the root-server.

```
user@RootSrv> show security group-vpn server ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
738880	UP	2221001e980eb08b	5af00708f5da289c	Main	10.16.104.1
738881	UP	59e8c1d328b1d9fd	d63e823fb8be1f22	Main	10.16.101.1
738883	UP	9cb3a49c6771819e	8df3be8c9ddeb2a7	Main	10.16.102.1
738882	UP	9a8a75f05a1384c5	c6d58696c896b730	Main	10.16.103.1


```

user@RootSrv> show security group-vpn server ike security-associations detail
IKE peer 10.16.101.1, Index 738881, Gateway Name: SubSrv01
Role: Responder, State: UP
Initiator cookie: 59e8c1d328b1d9fd, Responder cookie: d63e823fb8be1f22
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 10.10.101.1:848, Remote: 10.16.101.1:848
Lifetime: Expires in 21890 seconds
Peer ike-id: 10.16.101.1
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha256-128
Encryption          : aes256-cbc
Pseudo random function: hmac-sha256
Diffie-Hellman group : DH-group-14
Traffic statistics:
Input bytes  :          150112
Output bytes :          153472
Input packets:           1387
Output packets:          1387
Flags: IKE SA is created
IKE peer 10.16.102.1, Index 738883, Gateway Name: SubSrv02
Role: Responder, State: UP
Initiator cookie: 9cb3a49c6771819e, Responder cookie: 8df3be8c9ddeb2a7
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 10.10.102.1:848, Remote: 10.16.102.1:848
Lifetime: Expires in 21899 seconds
Peer ike-id: 10.16.102.1
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha256-128
Encryption          : aes256-cbc
Pseudo random function: hmac-sha256
Diffie-Hellman group : DH-group-14
Traffic statistics:
Input bytes  :          149788
Output bytes :          153148
Input packets:           1384
Output packets:          1384
Flags: IKE SA is created

```

From operational mode, enter the **show security group-vpn server ike security-associations** and **show security group-vpn server ike security-associations detail** commands on each sub-server.

```

user@SubSrv01> show security group-vpn server ike security-associations

```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
738878	UP	59e8c1d328b1d9fd	d63e823fb8be1f22	Main	10.10.101.1

```

user@SubSrv01> show security group-vpn server ike security-associations detail
IKE peer 10.10.101.1, Index 738878, Gateway Name: RootSrv
Role: Initiator, State: UP
Initiator cookie: 59e8c1d328b1d9fd, Responder cookie: d63e823fb8be1f22

```

```

Exchange type: Main, Authentication method: Pre-shared-keys
Local: 10.16.101.1:848, Remote: 10.10.101.1:848
Lifetime: Expires in 20589 seconds
Peer ike-id: 10.10.101.1
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha256-128
  Encryption          : aes256-cbc
  Pseudo random function: hmac-sha256
  Diffie-Hellman group : DH-group-14
Traffic statistics:
  Input bytes   :      181444
  Output bytes  :      178084
  Input packets:      1646
  Output packets:     1646
Flags: IKE SA is created

```

Verifying IPsec SAs on the Servers and Group Members

Purpose Display IPsec security associations (SAs) on the servers and group members.

Action From operational mode, enter the **show security group-vpn server ipsec security-associations** and **show security group-vpn server ipsec security-associations detail** commands on the root-server.

```
user@RootSrv> show security group-vpn server ipsec security-associations
```

```

Group: GROUP_ID-0001, Group Id: 1
Total IPsec SAs: 1
IPsec SA      Algorithm      SPI      Lifetime
GROUP_ID-0001 ESP:aes-256/sha256 dddef414 2773

```

```
user@RootSrv> show security group-vpn server ipsec security-associations detail
```

```

Group: GROUP_ID-0001, Group Id: 1
Total IPsec SAs: 1
IPsec SA: GROUP_ID-0001
  Protocol: ESP, Authentication: sha256, Encryption: aes-256
  Anti-replay: D3P enabled
  SPI: dddef414
  Lifetime: Expires in 1670 seconds, Activated
  Rekey in 1160 seconds
  Policy Name: 1
    Source: 172.16.0.0/12
    Destination: 172.16.0.0/12
    Source Port: 0
    Destination Port: 0
    Protocol: 0

```

From operational mode, enter the **show security group-vpn server ipsec security-associations** and **show security group-vpn server ipsec security-associations detail** commands on each sub-server.

```
user@SubSrv01> show security group-vpn server ipsec security-associations
```

```
Group: GROUP_ID-0001, Group Id: 1
```

```
Total IPsec SAs: 1
```

IPsec SA	Algorithm	SPI	Lifetime
GROUP_ID-0001	ESP:aes-256/sha256	dddef414	1520

```
user@SubSrv01> show security group-vpn server ipsec security-associations detail
```

```
Group: GROUP_ID-0001, Group Id: 1
```

```
Total IPsec SAs: 1
```

```
IPsec SA: GROUP_ID-0001
```

```
Protocol: ESP, Authentication: sha256, Encryption: aes-256
```

```
Anti-replay: D3P enabled
```

```
SPI: dddef414
```

```
Lifetime: Expires in 1518 seconds, Activated
```

```
Rekey in 1230 seconds
```

```
Policy Name: 1
```

```
Source: 172.16.0.0/12
```

```
Destination: 172.16.0.0/12
```

```
Source Port: 0
```

```
Destination Port: 0
```

```
Protocol: 0
```

From operational mode, enter the **show security group-vpn member ipsec security-associations** and **show security group-vpn member ipsec security-associations detail** commands on each group member

For SRX or vSRX group members:

```
user@GM-0001> show security group-vpn member ipsec security-associations
```

```
Total active tunnels: 1
```

ID	Server	Port	Algorithm	SPI	Life:sec/kb	GId	lsys
<>49152	10.17.101.1	848	ESP:aes-256/sha256-128	dddef414	1412/	unlim	1 root

```
user@GM-0001> show security group-vpn member ipsec security-associations detail
```

```
Virtual-system: root Group VPN Name: GROUP_ID-0001
```

```
Local Gateway: 10.18.101.1, GDOI Server: 10.17.101.1
```

```
Group Id: 1
```

```
Routing Instance: default
```

```
Recovery Probe: Enabled
```

```
DF-bit: clear
```

```
Stats:
```

Pull Succeeded	:	1
Pull Failed	:	0
Pull Timeout	:	0
Pull Aborted	:	0
Push Succeeded	:	2
Push Failed	:	0
Server Failover	:	0
Delete Received	:	0
Exceed Maximum Keys(4)	:	0
Exceed Maximum Policies(10)	:	0
Unsupported Algo	:	0

```
Flags:
```

```
Rekey Needed: no
```

```
List of policies received from server:
```

```
Tunnel-id: 49152
```

```

Source IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)
Destination IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)

Direction: bi-directional, SPI: dddef414
Protocol: ESP, Authentication: sha256-128, Encryption: aes-256
Hard lifetime: Expires in 1409 seconds, Activated
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1193 seconds
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled

```

For MX group members:

```
user@GM-0003> show security group-vpn member ipsec security-associations
```

```

Total active tunnels: 1
ID      Server          Port Algorithm      SPI      Life:sec/kb  GId lsys
<->10001 10.17.101.1      848  ESP:aes-256/sha256-128 dddef414 1308/ unlim 1 root

```

```
user@GM-0003> show security group-vpn member ipsec security-associations detail
```

```

Virtual-system: root Group VPN Name: GROUP_ID-0001
Local Gateway: 10.18.103.1, GDOI Server: 10.17.101.1
Group Id: 1
Rule Match Direction: output, Tunnel-MTU: 1400
Routing Instance: default
DF-bit: clear
Stats:
  Pull Succeeded           : 1
  Pull Failed              : 0
  Pull Timeout             : 0
  Pull Aborted             : 0
  Push Succeeded           : 2
  Push Failed              : 0
  Server Failover          : 0
  Delete Received          : 0
  Exceed Maximum Keys(4)   : 0
  Exceed Maximum Policies(1): 0
  Unsupported Algo         : 0
Flags:
  Rekey Needed: no

List of policies received from server:
Tunnel-id: 10001
Source IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)
Destination IP: ipv4_subnet(any:0,[0..7]=172.16.0.0/12)

Direction: bi-directional, SPI: dddef414
Protocol: ESP, Authentication: sha256-128, Encryption: aes-256
Hard lifetime: Expires in 1305 seconds, Activated
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1087 seconds
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled

```

Verifying IPsec Policies on Group Members

Purpose Display the IPsec policy on an SRX or vSRX group member.



NOTE: This command is not available for MX Series group members.

Action From operational mode, enter the **show security group-vpn member policy** command on SRX or vSRX group members.

```
user@GM-0001> show security group-vpn member policy
```

```
Group VPN Name: GROUP_ID-0001, Group Id: 1
From-zone: LAN, To-zone: WAN
  Tunnel-id: 49152, Policy type: Secure
    Source      : IP <172.16.0.0 - 172.31.255.255>, Port <0 - 65535>, Protocol
    <0>
    Destination : IP <172.16.0.0 - 172.31.255.255>, Port <0 - 65535>, Protocol
    <0>

  Tunnel-id: 63488, Policy type: Fail-close
    Source      : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
    Destination : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
```

- See Also**
- [Group VPNv2 Configuration Overview on page 752](#)
 - [Configuring Group VPNs in Group VPNv2 on Routing Device](#)

- Related Documentation**
- [Group VPNv1 on page 703](#)

CHAPTER 9

Configuring Remote Access VPNs

- [Remote Access VPNs with NCP Exclusive Remote Access Client on page 875](#)
- [Dynamic VPNs with Pulse Secure Clients on page 896](#)

Remote Access VPNs with NCP Exclusive Remote Access Client

The NCP Exclusive Remote Access Client is part of the NCP Exclusive Remote Access solution for Juniper SRX Series Gateways. The VPN client is only available with NCP Exclusive Remote Access Management. Use the NCP Exclusive Client to establish secure, IPsec -based data links from any location when connected with SRX Series Gateways.

- [Understanding IPsec VPNs with NCP Exclusive Remote Access Client on page 875](#)
- [Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880](#)
- [Example: Configuring the SRX Series Device for NCP Exclusive Remote Access Clients on page 883](#)

Understanding IPsec VPNs with NCP Exclusive Remote Access Client

This section describes IPsec VPN support on SRX Series devices for NCP Exclusive Remote Access Client software.

- [NCP Exclusive Remote Access Client on page 875](#)
- [Licensing on page 876](#)
- [AutoVPN on page 876](#)
- [Traffic Selectors on page 876](#)
- [NCP Exclusive Remote Access Client Authentication on page 877](#)
- [Remote Access Client Attribute and IP Address Assignment on page 878](#)
- [Supported Features on page 879](#)
- [Caveats on page 879](#)

NCP Exclusive Remote Access Client

Users running NCP Exclusive Remote Access Client software on Windows and MAC OS devices can establish IKEv1 or IKEv2 IPsec VPN connections with SRX Series devices.

NCP Exclusive Remote Access Client software is available for download at <https://www.ncp-e.com/ncp-exclusive-remote-access-client/>.

Licensing

A two-user license is supplied by default on an SRX Series device. A license is required for additional users. Contact your Juniper Networks representative for license information.

Licensing is based on the number of users. For example, if the number of licenses installed is for 100 users, then 100 different users can establish VPN connections. Because of traffic selectors, each user can establish multiple tunnels. When a user disconnects, their license is released one minute after the IKE and IPsec security associations (SAs) expire.

License enforcement is verified only after Phase 2 negotiation is completed. This means that a remote access user can connect to the SRX Series device and IKE and IPsec SAs can be established, but if the user exceeds the licensed user limit, the user is disconnected.

Licensing for vSRX instances is subscription-based: connected remote access users are not disconnected immediately when an installed license expires. When a remote access user disconnects and the corresponding IKE and IPsec SAs expire, subsequent reconnection of the user depends on whether the currently installed license is expired or not.

AutoVPN

The NCP Exclusive Remote Access Client is supported with AutoVPN in point-to-point secure tunnel interface mode. AutoVPN is only supported on route-based IPsec VPNs on the SRX Series device.

Traffic Selectors

Traffic selectors configured on the SRX Series device and the NCP client determine the client traffic that is sent through the IPsec VPN tunnel. Traffic in and out of the tunnel is allowed only for the negotiated traffic selectors. If the route lookup for a packet's destination address points to an st0 interface (on which traffic selectors are configured) and the packet's traffic selector does not match the negotiated traffic selector, the packet is dropped. Multiple Phase 2 IPsec SAs and auto route insertion (ARI) are supported with the NCP Exclusive Remote Access Client. Traffic selector flexible match with port and protocols is not supported. For this feature, the remote address of the traffic selector must be 0.0.0.0/0.

In many cases, all traffic from remote access clients is sent through VPN tunnels. The local address configured in the traffic selector can be 0.0.0.0/0 or a specific address, as explained in the next sections.

Configuring a traffic selector on the SRX Series device with the remote address 0.0.0.0/0 is supported for NCP Exclusive Remote Access Client connections. After VPN negotiation is completed, the remote address for the traffic selector is expected to be a single IP address (the address of the remote access client assigned by either a RADIUS server or the local address pool).

Split Tunneling

Split tunneling uses a shorter prefix than 0.0.0.0/0 as the protected resource's address for the local address in a traffic selector configured on the SRX Series device. A corresponding traffic selector can be configured on the remote access client. The SRX Series device allows traffic on the VPN tunnel that matches the results of the flexible match from both traffic selectors. If the traffic selector configured on the remote access client cannot be matched with the traffic selector configured on the SRX Series device, tunnel negotiation fails. For IKEv1, the local and remote addresses in the client's traffic selector configuration must be the same addresses or a subset of the addresses in the corresponding traffic selector configured on the SRX Series device.

Multiple Subnetworks

On the SRX Series device, one traffic selector can be configured for each protected subnetwork. Subnetworks cannot overlap. On the NCP Exclusive Remote Access Client, one traffic selector must be configured for each traffic selector configured on the SRX Series device. Addresses that are configured in the split tunnel window of the NCP Exclusive Remote Access Client are used as the client's remote traffic selector; these addresses must be the same addresses or a subset of the addresses in the corresponding traffic selector configured on the SRX Series device. One IPsec SA pair is created for each traffic selector.

NCP Exclusive Remote Access Client Authentication

There are two forms of extended authentication of the NCP Exclusive Remote Access Client, depending on the IKE version of the client:

- IKEv1 NCP Exclusive Remote Access Client authentication is supported with XAuth using either a RADIUS server or a local access profile. For IKEv1 remote access connections, preshared keys are used for IKE Phase 1 authentication. Extended Authentication (XAuth) is used to authenticate the remote access user. The SRX Series device must be configured for IKE aggressive mode.



NOTE: For the IKEv1 NCP Exclusive Remote Access Client, preshared key authentication is supported with AutoVPN. For AutoVPN deployments that do not use user-based authentication, only certificate authentication is supported.

- IKEv2 NCP Exclusive Remote Access Client authentication requires a RADIUS server that supports EAP. The SRX Series device acts as a pass-through authenticator to relay EAP messages between the NCP Exclusive Remote Access Client and the RADIUS server. The following EAP authentication types are supported:
 - EAP-MSCHAPv2



NOTE: A master session key must be generated by the RADIUS server for EAP-MSCHAPv2.

- EAP-MD5
- EAP-TLS

For the IKEv2 NCP Exclusive Remote Access Client, a digital certificate is used to authenticate the SRX Series device. Extensible Authentication Protocol (EAP) is used to authenticate the remote access client.

Remote Access Client Attribute and IP Address Assignment

Attribute Assignment

For IKEv1 or IKEv2 remote access clients, attributes can be assigned through a RADIUS server or through local network attributes configuration. If a RADIUS server is used for authentication but no network attributes are assigned, network attributes (including IP addresses) can be configured locally if needed.

The following client attributes are based on RFC 2865, *Virtual Private Networks Identifier*, and are supported with IKEv1 and IKEv2 NCP Exclusive Remote Access Client:

- Framed-IP-Address
- Framed-IP-Netmask

The following Juniper vendor-specific attributes (VSAs) are supported with IKEv1 and IKEv2 NCP Exclusive Remote Access Client:

- Juniper-Primary-DNS
- Juniper-Primary-Wins
- Juniper-Secondary-DNS (only available with IKEv2)
- Juniper-Secondary-Wins (only available with IKEv2)



NOTE: The VSA Juniper-Local-Group-Name is not supported.

IP Address Assignment

If an IP address is allocated from both a local address pool and by a RADIUS server, the IP address allocated by the RADIUS server takes precedence. If the RADIUS server does not return an IP address and there is a user-configured local address pool, an IP address is assigned to the remote client from the local pool.



NOTE: The number of addresses in the local address pool or RADIUS server address pool should be larger than the number of remote access client users. This is because when a user disconnects, it can take up to one minute for the user to be logged off.

When an IP address is assigned from an external RADIUS server or a local address pool, an IP address with a 32-bit mask is passed to the NCP Exclusive Remote Access Client.

After the tunnel is established, auto route insertion (ARI) automatically inserts a static route to the remote client's IP address so that traffic from behind the SRX Series device can be sent into the VPN tunnel to the client's IP address.

The configured traffic selectors might not cover the IP addresses allocated by the RADIUS server or a local address pool. In this case, a remote client may not be able to reach an IP address for another remote client in the subnetwork through a VPN tunnel. A traffic selector must be explicitly configured that matches the IP address allocated to the other remote client by the RADIUS server or local address pool.

Supported Features

The following features are supported on the SRX Series device with the NCP Exclusive Remote Access Client:

- Traffic initiation from the SRX Series device as well as the NCP Exclusive Remote Access Client
- Remote access clients behind a NAT device (NAT-T)
- Dead peer detection
- Chassis cluster configuration of the SRX Series device

Caveats

The following features are not supported on the SRX Series device with the NCP Exclusive Remote Access Client:

- Routing protocols
- AutoVPN with the st0 interface in point-to-multipoint mode
- Auto Discovery VPN (ADVPN)
- IKEv2 EAP with preshared keys



NOTE: The IKEv2 NCP Exclusive Remote Access Client must use certificates for authenticating the SRX Series device.

- Policy-based VPN
- IPv6 traffic
- VPN monitoring
- Next-hop tunnel binding (NHTB), both auto and manual
- Multiple traffic selectors in negotiation
- Traffic selectors received from the NCP Exclusive Remote Access Client in the same virtual router must not contain overlapping IP addresses

See Also • [Understanding Traffic Selectors in Route-Based VPNs on page 204](#)

Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client

In many public hotspot environments, UDP traffic is blocked while TCP connections over port 443 are normally allowed. For these environments, SRX Series devices can support SSL Remote Access VPNs by encapsulating IPsec messages within a TCP connection. This implementation is compatible with the third-party NCP Exclusive Remote Access Client. This section describes the support for NCP Exclusive Remote Access Client on SRX Series devices.

- [Benefits of SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880](#)
- [NCP Exclusive Remote Access Client on page 880](#)
- [Licensing on page 881](#)
- [Operation on page 881](#)
- [Supported Features on page 881](#)
- [Caveats on page 882](#)

Benefits of SSL Remote Access VPNs with NCP Exclusive Remote Access Client

- Secure remote access is ensured even when a device between the client and the gateway blocks Internet Key Exchange (IKE) (UDP port 500).
- Users retain secure access to business applications and resources in all working environments.

NCP Exclusive Remote Access Client

Users running NCP Exclusive Remote Access Client software on Windows, macOS, Apple iOS, and Android devices can establish TCP connections over port 443 with SRX Series devices to exchange encapsulated IPsec traffic.

NCP Exclusive Remote Access Client runs in either of the two following modes:

- NCP Path Finder v1, which supports IPsec messages encapsulated within a TCP connection over port 443
- NCP Path Finder v2, which supports IPsec messages with an SSL/TLS connection (NCP Path Finder v2 uses TLSv1.0.)

A proper SSL handshake takes place using RSA certificates. IPsec messages are encrypted with keys exchanged during the SSL handshake. This results in double encryption, once for the SSL tunnel and again for the IPsec tunnel.



NOTE: For NCP Path Finder v2 mode support, RSA certificates have to be loaded on the SRX Series device and an SSL termination profile that references the certificate must be configured.

The NCP Exclusive Remote Access Client provides a fallback mechanism in case regular IPsec connection attempts fail due to firewall or proxy servers blocking the IPsec traffic.

The NCP Path Finder v2 mode is an enhancement offering full TLS communication, which will not be blocked by highly restrictive application level firewall or proxies. If a regular IPsec connection cannot be established, then the NCP Exclusive Remote Access Client will automatically switch to NCP Path Finder v1 mode. If the client still cannot get through to the gateway, NCP will enable NCP Path Finder v2 mode using the full TLS negotiation.

Licensing

A two-user license is supplied by default on an SRX Series device. A license must be purchased and installed for additional concurrent users.

Operation

On an SRX Series device, a *TCP encapsulation profile* defines the data encapsulation operation for remote access clients. Multiple TCP encapsulation profiles can be configured to handle different sets of clients. For each profile, the following information is configured:

- Name of the profile.
- Optional logging of remote access client connections.
- Tracing options.
- SSL termination profile for SSL connections.



NOTE: TCP connections from NCP Exclusive Remote Access Client are accepted on port 443 on the SRX Series device.

The TCP encapsulation profile is configured with the **tcp-encap** statement at the [edit **security**] hierarchy level. The encapsulation profile is then specified with the **tcp-encap-profile** statement at the [edit **security ike gateway gateway-name**] hierarchy level. You include the TCP encapsulation profile in the IKE gateway configuration. For example:

```
user@host# set security tcp-encap profile ncp
user@host# set security tcp-encap profile ncp ssl-profile RemoteAccess
user@host# set security ike gateway RA tcp-encap-profile ncp
user@host# set security zones security-zone zone-name interfaces interface-name
host-inbound-traffic system-services ike
user@host# set security zones security-zone zone-name interfaces interface-name
host-inbound-traffic system-services tcp-encap
```

Supported Features

The following features are supported on an SRX Series device with NCP Exclusive Remote Access Client:

- AutoVPN in point-to-point mode with IPsec tunnels based on traffic selectors
- Traffic initiation from devices behind the gateway on an SRX Series device

- Dead peer detection
- Chassis cluster configuration of an SRX Series device

Caveats

TCP connections from NCP Exclusive Remote Access Clients use port 443 on SRX Series devices. The J-Web device management port should be changed from default port 443, `tcp-encap` must be configured for host-inbound system services. Use the **`set security zones security-zone zone host-inbound-traffic system-services tcp-encap`** command. (IKE must also be configured for host-inbound system services using the **`set security zones security-zone zone host-inbound-traffic system-services ike`** command.)



NOTE: NCP Exclusive Remote Access Clients and J-Web connections cannot use the same TCP port 443.

Tunnels that use TCP connections might not survive ISSU if the dead peer detection (DPD) timeout is not large enough. To survive ISSU, increase the DPD timeout to a value greater than 120 seconds. The DPD timeout is a product of the configured DPD interval and threshold. For example, if the DPD interval is 32 and the threshold is 4, the timeout is 128.

The default DPD settings on the NCP Exclusive Remote Access Client specify sending messages at 20-second intervals for a maximum of eight times. When chassis cluster failover occurs, the SRX Series devices might not recover within the parameters specified by the DPD settings and the tunnel goes down. In this case, increase the DPD interval on the NCP Exclusive Remote Access Client to 60 seconds.

NAT-T is disabled during negotiation with clients where the configuration uses `tcp-encap`, because NAT-T is not required for these tunnels.

The following features are not supported on an SRX Series device with NCP Exclusive Remote Access Clients:

- Routing protocols
- AutoVPN with the `st0` interface in point-to-multipoint mode
- Auto Discovery VPN (ADVPN)
- Policy-based VPN
- IPv6 traffic
- VPN monitoring
- Next-hop tunnel binding (NHTB), both automatic and manual

See Also

- [tcp-encap on page 1243](#)
- [tcp-encap-profile on page 1244](#)

Example: Configuring the SRX Series Device for NCP Exclusive Remote Access Clients

This example shows how to configure an SRX Series device or a vSRX instance to support IKEv2 IPsec VPN connections from NCP Exclusive Remote Access Clients. The configuration also supports TCP encapsulated traffic from NCP Exclusive Remote Access Clients.

- [Requirements on page 883](#)
- [Overview on page 884](#)
- [Configuration on page 885](#)
- [Verification on page 894](#)

Requirements

This example uses the following hardware and software components:

- Supported SRX Series device or vSRX instance running Junos OS Release 15.1X49-D80 or later.
- NCP Exclusive Remote Access Client software must be downloaded on supported user devices.

A two-user license is supplied by default on an SRX Series device. A license must be purchased and installed for additional users. Contact your Juniper Networks representative for license information.

Before you begin:

- On the SRX Series device:
 - Configure network interfaces.



NOTE: TCP connections from NCP Exclusive Remote Access Clients use port 443 on SRX Series devices. Device management on TCP connections, such as J-Web, can use port 443 on SRX Series devices. TCP encapsulation system service must be configured for host inbound traffic on the zone in which NCP Exclusive Remote Access Client connections are received (the untrust zone in this example). If J-Web is used on port 443, Web management system service must be configured for host inbound traffic on the required zone.

- Configure the NCP Exclusive Remote Access Client. See the documentation for the NCP Exclusive Remote Access Client for information on how to do this.



NOTE: The configuration of the NCP Exclusive Remote Access Client profile must match the VPN configuration on the SRX Series device.

- In this example, an external RADIUS server (such as an Active Directory server) authenticates IKEv2 Exclusive Remote Access Client users using the EAP-TLS protocol. In this example, the RADIUS server is configured with the IP address 192.0.2.12. See your RADIUS server documentation for information on configuring user authentication.

Overview

In this example, IKEv2 Exclusive Remote Access Client users are authenticated with an external RADIUS server using EAP-TLS. An authenticated client is assigned an IP address and a primary DNS server from a local address pool configured on the SRX Series device. The traffic selector is configured with 0.0.0.0/0 for the remote and local addresses, which means that any traffic is permitted on the tunnel.

TCP encapsulation and IKE host inbound system services are configured on the untrust security zone. If J-Web is used on port 443, HTTPS host inbound system service should also be configured.



NOTE: In this example, the security policies permit all traffic. More restrictive security policies should be configured for production environments.

Table 89 on page 884 shows the IKE and IPsec values configured on the SRX Series device to support NCP Exclusive Remote Access Client connections in this example.

Table 89: IKE and IPsec Options on the SRX Series Device for NCP Exclusive Remote Access Client Connections

Option	Value
<i>IKE proposal:</i>	
Authentication method	rsa-signatures
Diffie-Hellman (DH) group	group19
Encryption algorithm	aes-256-gcm
<i>IKE policy:</i>	
Certificate	local-certificate
<i>IKE gateway:</i>	
Dynamic	user-at-hostname
IKE user type	group-ike-id
Version	v2-only
<i>IPsec proposal:</i>	
Protocol	esp

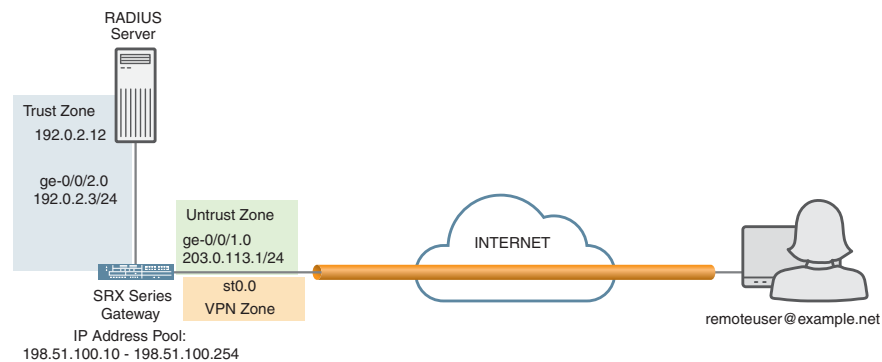
Table 89: IKE and IPsec Options on the SRX Series Device for NCP Exclusive Remote Access Client Connections (continued)

Option	Value
Encryption algorithm	aes-256-gcm
<i>IPsec policy:</i>	
Perfect Forward Secrecy (PFS) group	group19

Topology

Figure 60 on page 885 shows the network connections in this example.

Figure 60: NCP Exclusive Remote Client Connection to the SRX Series VPN Gateway



Configuration

- [Enroll Certificates in the SRX Series Device on page 885](#)
- [Configure the SRX Series Device for Remote Clients on page 886](#)

Enroll Certificates in the SRX Series Device

Step-by-Step Procedure

In this example, the first step is to enroll a certificate authority (CA) certificate and a local certificate in the SRX Series device. The local certificate is used to authenticate the SRX Series device to remote clients using a Microsoft Certificate Authority. Else the URL below will be different. Keep in mind that below example require the CA server to support SCEP.

1. Configure the CA profile.

The configuration of the CA profile depends on the CA server used. In this example, CRL is used to check certificate revocation. Use the appropriate enrollment and CRL URLs for your environment.

```
[edit]
user@host# set security pki ca-profile CA_Server ca-identity CA_Server
user@host# set security pki ca-profile CA_Server enrollment url
http://192.0.2.12/certsrv/mscep/mscep.dll
```

```
user@host# set security pki ca-profile CA_Server revocation-check url
http://192.0.2.12/crl
user@host$ commit
```

The CA profile configuration must be committed before you can proceed.

2. Enroll the CA certificate.

```
user@host> request security pki ca-certificate enroll ca-profile CA_Server
```

Type **yes** at the prompt to load the CA certificate, if the value is trusted.

3. Verify the CA certificate by checking its revocation status.

```
user@host> request security pki ca-certificate verify ca-profile CA_Server
```

4. Generate a key pair for the local certificate.

```
user@host> request security pki generate-key-pair certificate-id RemoteAccessNCP
size 2048 bytes type rsa
```

5. Enroll the local certificate. In this example, the certificate is enrolled using Simple Certificate Enrollment Protocol (SCEP).

```
user@host> request security pki local-certificate enroll scep ca-profile CA_Server
certificate-id RemoteAccessNCP domain-name example.net subject
DC=example.net,L=Sunnyvale,O=example,OU=example challenge-password
<password>
```

6. Verify the local certificate by checking its revocation status.

```
user@host> request security pki local-certificate verify certificate-id
RemoteAccessNCP
```

Configure the SRX Series Device for Remote Clients

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set access address-assignment pool RA_LOCAL-IP-POOL family inet network
198.51.100.0/24
set access address-assignment pool RA_LOCAL-IP-POOL family inet range
REMOTEACCESS low 198.51.100.10
set access address-assignment pool RA_LOCAL-IP-POOL family inet range
REMOTEACCESS high 198.51.100.254
```

```

set access address-assignment pool RA_LOCAL-IP-POOL family inet xauth-attributes
  primary-dns 192.0.2.12/32
set access profile RA_EXTERNAL-AUTH authentication-order radius
set access profile RA_EXTERNAL-AUTH address-assignment pool RA_LOCAL-IP-POOL
set access profile RA_EXTERNAL-AUTH radius-server 192.0.2.12 secret "$ABC123"
set security tcp-encap profile NCP
set services ssl termination profile RemoteAccess server-certificate RemoteAccessNCP
set security tcp-encap profile NCP ssl-profile RemoteAccess
set interfaces ge-0/0/1 unit 0 family inet address 203.0.113.1/24
set interfaces ge-0/0/2 unit 0 family inet address 192.0.2.3/24
set interfaces st0 unit 0 family inet
set security ike proposal CERT-DH19-AES256GCM authentication-method rsa-signatures
set security ike proposal CERT-DH19-AES256GCM dh-group group19
set security ike proposal CERT-DH19-AES256GCM encryption-algorithm aes-256-gcm
set security ike policy RA_IKEv2_EXT-AUTH proposals CERT-DH19-AES256GCM
set security ike policy RA_IKEv2_EXT-AUTH certificate local-certificate RemoteAccessNCP
set security ike gateway RA_IKEv2_EXT-AUTH ike-policy RA_IKEv2_EXT-AUTH
set security ike gateway RA_IKEv2_EXT-AUTH dynamic user-at-hostname
  "remoteuser@example.net"
set security ike gateway RA_IKEv2_EXT-AUTH dynamic ike-user-type group-ike-id
set security ike gateway RA_IKEv2_EXT-AUTH external-interface ge-0/0/1.0
set security ike gateway RA_IKEv2_EXT-AUTH aaa access-profile RA_EXTERNAL-AUTH
set security ike gateway RA_IKEv2_EXT-AUTH version v2-only
set security ike gateway RA_IKEv2_EXT-AUTH tcp-encap-profile NCP
set security ipsec proposal ESP-AES256GCM protocol esp
set security ipsec proposal ESP-AES256GCM encryption-algorithm aes-256-gcm
set security ipsec policy RemoteAccess perfect-forward-secrecy keys group19
set security ipsec policy RemoteAccess proposals ESP-AES256GCM
set security ipsec vpn RA_IKEv2_EXT-AUTH bind-interface st0.0
set security ipsec vpn RA_IKEv2_EXT-AUTH ike gateway RA_IKEv2_EXT-AUTH
set security ipsec vpn RA_IKEv2_EXT-AUTH ike ipsec-policy RemoteAccess
set security ipsec vpn RA_IKEv2_EXT-AUTH traffic-selector NO-SPLIT local-ip 0.0.0.0/0
set security ipsec vpn RA_IKEv2_EXT-AUTH traffic-selector NO-SPLIT remote-ip 0.0.0.0/0
set security zones security-zone Untrust interfaces ge-0/0/1.0
set security zones security-zone Untrust host-inbound-traffic system-services ike
set security zones security-zone Untrust host-inbound-traffic system-services tcp-encap
set security zones security-zone Trust interfaces ge-0/0/2.0
set security zones security-zone VPN interfaces st0.0
set security address-book global address RemoteAccessNetworks 198.51.100.0/24
set security policies from-zone VPN to-zone Trust policy 1 match source-address
  RemoteAccessNetworks
set security policies from-zone VPN to-zone Trust policy 1 match destination-address
  any
set security policies from-zone VPN to-zone Trust policy 1 match application any
set security policies from-zone VPN to-zone Trust policy 1 then permit
set security policies from-zone VPN to-zone Trust policy 1 then log session-init
set security policies from-zone VPN to-zone Trust policy 1 then log session-close
set security policies from-zone Trust to-zone VPN policy 1 match source-address any
set security policies from-zone Trust to-zone VPN policy 1 match destination-address
  RemoteAccessNetworks
set security policies from-zone Trust to-zone VPN policy 1 match application any
set security policies from-zone Trust to-zone VPN policy 1 then permit
set security policies from-zone Trust to-zone VPN policy 1 then log session-init
set security policies from-zone Trust to-zone VPN policy 1 then log session-close

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the SRX Series device to support NCP Exclusive Remote Access Clients:

1. Configure the local address pool.

```
[edit access address-assignment pool RA_LOCAL-IP-POOL]
user@host# set family inet network 198.51.100.0/24
user@host# set family inet range REMOTEACCESS low 198.51.100.10
user@host# set family inet range REMOTEACCESS high 198.51.100.254
user@host# set family inet xauth-attributes primary-dns 192.0.2.12/32
```

2. Configure the local access profile.

```
[edit access profile RA_EXTERNAL-AUTH]
user@host# set authentication-order radius
user@host# set address-assignment pool RA_LOCAL-IP-POOL
user@host# set radius-server 192.0.2.12 secret "$ABC123"
```

3. Configure the TCP encapsulation profile.

```
[edit]
user@host# set security tcp-encap profile NCP
```

4. Create SSL termination profile.

```
[edit]
user@host# set services ssl termination profile RemoteAccess server-certificate
RemoteAccessNCP
```



NOTE: When SSL termination profile is not configured then the only NCP Path Finder v1 mode is supported. NCP Path Finder v2 support needs SSL termination profile configured. NCP Path Finder v1 is supported when SSL termination profile is configured.

5. Attach SSL profile to tcp-encap profile.

```
[edit]
user@host# set security tcp-encap profile NCP ssl-profile RemoteAccess
```

6. Configure interfaces.

```
[edit interfaces]
user@host# set interfaces ge-0/0/1 unit 0 family inet address 203.0.113.1/24
```

```
user@host# set interfaces ge-0/0/2 unit 0 family inet address 192.0.2.3/24
user@host# set interfaces st0 unit 0 family inet
```

7. Configure the IKE proposal, policy, and gateways.

```
[edit security ike proposal CERT-DH19-AES256GCM]
user@host# set authentication-method rsa-signatures
user@host# set dh-group group19
user@host# set encryption-algorithm aes-256-gcm

[edit security ike policy RA_IKEv2_EXT-AUTH]
user@host# set proposals CERT-DH19-AES256_SHA256
user@host# set certificate local-certificate RemoteAccessNCP

[edit security ike gateway RA_IKEv2_EXT-AUTH]
user@host# set ike-policy RA_IKEv2_EXT-AUTH
user@host# set dynamic user-at-hostname "remoteuser@example.com"
user@host# set dynamic ike-user-type group-ike-id
user@host# set external-interface ge-0/0/1.0
user@host# set aaa access-profile RA_EXTERNAL-AUTH
user@host# set version v2-only
user@host# set tcp-encap-profile NCP
```

8. Configure the IPsec proposal, policy, and VPN.

```
[edit security ipsec proposal ESP-AES256GCM]
user@host# set protocol esp
user@host# set encryption-algorithm aes-256-gcm

[edit security ipsec policy RemoteAccess]
user@host# set perfect-forward-secrecy keys group19
user@host# set proposals ESP-AES256GCM

[edit security ipsec vpn RA_IKEv2_EXT-AUTH]
user@host# set bind-interface st0.0
user@host# set ike gateway RA_IKEv2_EXT-AUTH
user@host# set ike ipsec-policy RemoteAccess
user@host# set traffic-selector NO-SPLIT local-ip 0.0.0.0/0
user@host# set traffic-selector NO-SPLIT remote-ip 0.0.0.0/0
```

9. Configure zones.

```
[edit security zones security-zone Untrust]
user@host# set interfaces ge-0/0/1.0
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services tcp-encap

[edit security zones security-zone Trust]
user@host# set interfaces ge-0/0/2.0
```

```
[edit security zones security-zone VPN]
user@host# set interfaces st0.0
```

10. Configure an address book for the IP addresses assigned to remote access users.

```
[edit security address-book global]
user@host# set address RemoteAccessNetworks 198.51.100.0/24
```

11. Configure security policies.

```
[edit security policies from-zone VPN to-zone Trust]
user@host# set policy 1 match source-address RemoteAccessNetworks
user@host# set policy 1 match destination-address any
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init
user@host# set policy 1 then log session-close

[edit security policies from-zone Trust to-zone VPN]
user@host# set policy 1 match source-address any
user@host# set policy 1 match destination-address RemoteAccessNetworks
user@host# set policy 1 match application any
user@host# set policy 1 then permit
user@host# set policy 1 then log session-init
user@host# set policy 1 then log session-close
```

Results From configuration mode, confirm your configuration by entering the **show access** and **show security** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show access
profile RA_EXTERNAL-AUTH {
  authentication-order radius;
  radius-server {
    198.51.100.169 {
      port 1812;
      secret 192.0.2.12 secret "$ABC123"; ## SECRET-DATA
    }
  }
}
address-assignment {
  pool RA_LOCAL-IP-POOL {
    family inet {
      network 198.51.100.0/24;
      xauth-attributes {
        primary-dns 192.0.2.12/32;
      }
    }
  }
}
```

```
}
firewall-authentication {
  web-authentication {
    default-profile xauth-users;
  }
}
user@host# show security
pki {
  ca-profile root-ca {
    ca-identity root-ca;
    revocation-check {
      disable;
    }
  }
  ca-profile CA_Server {
    ca-identity CA_Server;
    enrollment {
      url http://192.0.2.12/certsrv/mscep/mscep.dll;
    }
    revocation-check {
      crl {
        url http://192.0.2.12/crl;
      }
    }
  }
  traceoptions {
    flag all;
  }
}
ike {
  traceoptions {
    file size 100m;
    flag all;
    level 15;
  }
  proposal CERT-DH19-AES256GCM {
    authentication-method rsa-signatures;
    dh-group group19;
    authentication-algorithm sha-256;
    encryption-algorithm aes-256-gcm;
    lifetime-seconds 28800;
  }
  policy RA_IKEv2_EXT-AUTH {
    proposals CERT-DH19-AES256GCM;
    certificate {
      local-certificate RemoteAccessNCP;
    }
  }
  gateway RA_IKEv2_EXT-AUTH {
    ike-policy RA_IKEv2_EXT-AUTH;
    dynamic {
      user-at-hostname "remoteuser@example.net";
      ike-user-type group-ike-id;
    }
    dead-peer-detection {
```

```
        always-send;
        interval 60;
        threshold 5;
    }
    external-interface ge-0/0/1.0;
    aaa {
        access-profile RA_EXTERNAL-AUTH;
    }
    version v2-only;
    tcp-encap-profile NCP;
}
}
ipsec {
    proposal ESP-AES256GCM {
        protocol esp;
        encryption-algorithm aes-256-gcm;
    }
    policy RemoteAccess {
        perfect-forward-secrecy {
            keys group19;
        }
        proposals ESP-AES256GCM;
    }
    vpn RA_IKEv2_EXT-AUTH {
        bind-interface st0.0;
        ike {
            gateway RA_IKEv2_EXT-AUTH;
            ipsec-policy RemoteAccess;
        }
        traffic-selector NO-SPLIT {
            local-ip 0.0.0.0/0;
            remote-ip 0.0.0.0/0;
        }
    }
}
}
address-book {
    global {
        address RemoteAccessNetworks 198.51.100.0/24;
    }
}
}
flow {
    traceoptions {
        file flowd size 1g files 2;
        flag all;
        trace-level {
            detail;
        }
    }
}
tcp-mss {
    ipsec-vpn {
        mss 1350;
    }
}
}
tcp-session {
    maximum-window 1M;
}
```



```

    }
  }
  policies {
    from-zone VPN to-zone Trust {
      policy 1 {
        match {
          destination-address any;
          application any;
        }
        then {
          permit;
          log {
            session-init;
            session-close;
          }
        }
      }
    }
    from-zone Trust to-zone VPN {
      policy 1 {
        match {
          source-address any;
          destination-address RemoteAccessNetworks;
          application any;
        }
        then {
          permit;
          log {
            session-init;
            session-close;
          }
        }
      }
    }
  }
  tcp-encap {
    traceoptions {
      file tcp-encap-log;
      level verbose;
      flag all;
    }
    profile NCP {
      ssl-profile RemoteAccess;
    }
  }
  traceoptions {
    file ipsec size 10m;
    flag all;
  }
  zones {
    security-zone Untrust {
      host-inbound-traffic {
        system-services {
          ike;
          tcp-encap;
        }
      }
    }
  }

```

```

    }
  }
  interfaces {
    ge-0/0/1.0;
  }
}
security-zone Trust {
  interfaces {
    ge-0/0/2.0;
  }
}
security-zone VPN {
  interfaces {
    st0.0;
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying That IKE SAs Are Established on page 894](#)
- [Verifying Remote Users and Their IP Connections on page 895](#)
- [Verifying TCP Encapsulation Sessions on page 895](#)

Verifying That IKE SAs Are Established

Purpose Display information about IKE SAs.

Action From operational mode, enter the **show security ike security-associations** command.

```

user@host> show security ike security-associations
Index   State Initiator cookie Responder cookie Mode      Remote
Address
2203522 UP      c31358637e7a8e0d  ac2aba751adeea8a IKEv2     198.51.100.200

```

From operational mode, enter the **show security ike security-associations detail** command.

```

user@host> show security ike security-associations detail
IKE peer 172.16.12.200, Index 2203522, Gateway Name: RA_IKEv2_EXT-AUTH
Role: Responder, State: UP
Initiator cookie: c31358637e7a8e0d, Responder cookie: ac2aba751adeea8a
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.0.1:500, Remote: 192.51.100.200:10952
Lifetime: Expires in 28719 seconds
Reauth Lifetime: Disabled
IKE Fragmentation: Enabled, Size: 576
Remote Access Client Info: Exclusive Client
Peer ike-id: remoteuser@example.net
AAA assigned IP: 198.51.100.23

```

```

Algorithms:
Authentication      : hmac-sha256-128
Encryption          : aes256-gcm
Pseudo random function: hmac-sha256
Diffie-Hellman group : DH-group-19
Traffic statistics:
Input bytes       : 3384
Output bytes      : 4923
Input packets     : 9
Output packets    : 13
Input fragmented packets: 2
Output fragmented packets: 7
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 192.51.100.500, Remote: 192.51.100.200:10952
Local identity: 192.51.100.59
Remote identity: remoteuser@example.net
Flags: IKE SA is created

```

Verifying Remote Users and Their IP Connections

Purpose Display the list of connected active users with details about the peer addresses and ports they are using.

Action From operational mode, enter the **show security ike active-peer** command.

```

user@host> show security ike active-peer
Remote Address      Port    Peer IKE-ID
AAA username        Assigned IP
192.51.100.200      56789   remoteuser@example.net
bob                 192.51.100.23

```

From operational mode, enter the **show security ike active-peer detail** command.

```

user@host> show security ike active-peer detail
Peer address: 192.0.2.200, Port: 56789,
Peer IKE-ID : remoteuser@example.net
AAA username: bob
Assigned network attributes:
IP Address      : 192.0.2.23 , netmask      : 233.252.0.0
DNS Address     : 192.0.2.12 , DNS2 Address : 0.0.0.0
WINS Address    : 0.0.0.0 , WINS2 Address : 0.0.0.0

Previous Peer address : 0.0.0.0, Port      : 0
Active IKE SA indexes : 42203522
IKE SA negotiated     : 1
IPSec tunnels active  : 1, IPSec Tunnel IDs : 67108891

```

Verifying TCP Encapsulation Sessions

Purpose Display information about TCP encapsulation sessions.

Action From operational mode, enter the **show security tcp-encap connections** command.

```
user@host> show security tcp-encap connections
Location: FPC: 0, PIC: 0, PIC-NAME: fpc0

Total active connections: 1
Session-Id  Client          Gateway
2          NCP-Pathfinder-v2  203.0.113.0
```

From operational mode, enter the **show security tcp-encap statistics** command.

```
user@host> show security tcp-encap statistics
Location: FPC: 0, PIC: 0, PIC-NAME: fpc0
TCP encapsulation statistics:
Policy Matched:          4
TCP sessions:            4
```

See Also • [Understanding IKE and IPsec Packet Processing on page 38](#)

Related Documentation • [IPsec VPN Configuration Overview on page 54](#)

Dynamic VPNs with Pulse Secure Clients

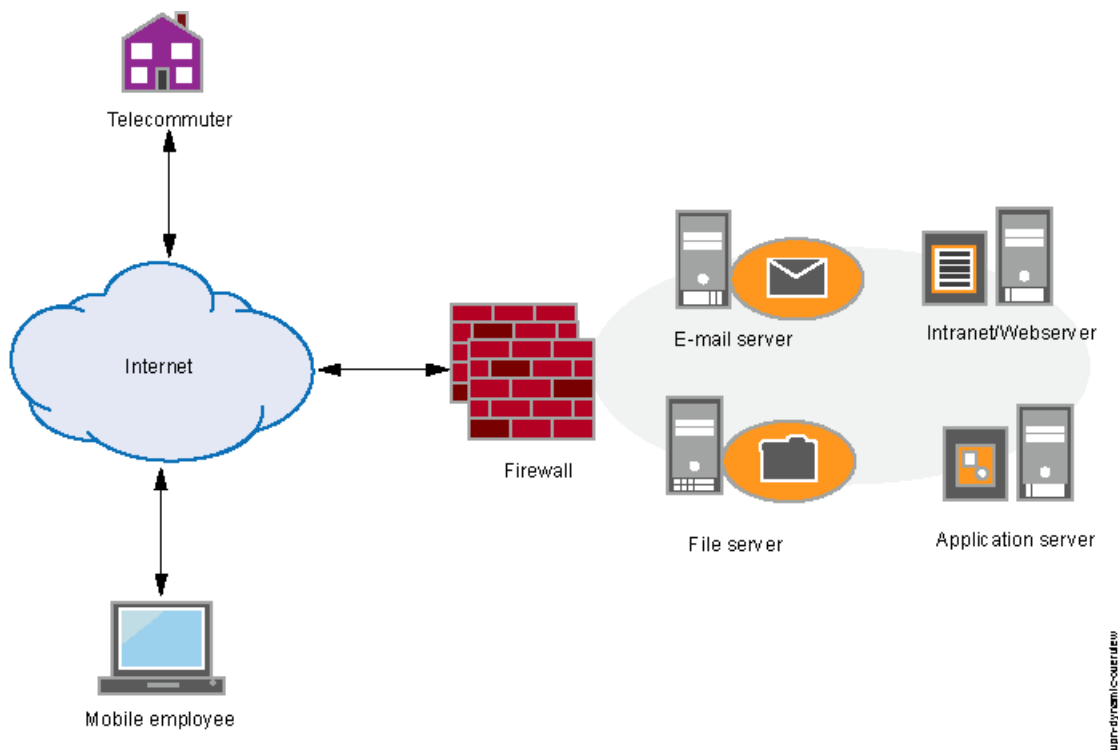
Dynamic VPN enables Pulse Secure clients to establish IPsec VPN tunnels to SRX services gateways without manually configuring VPN settings on their PCs. User authentication is supported through a RADIUS server or a local IP address pool.

- [Dynamic VPN Overview on page 896](#)
- [Example: Configuring Dynamic VPN on page 906](#)
- [Example: Configuring Local Authentication and Address Pool on page 916](#)
- [Example: Configuring a Group IKE ID for Multiple Users on page 919](#)
- [Example: Configuring Individual IKE IDs for Multiple Users on page 926](#)

Dynamic VPN Overview

A VPN tunnels enable users to securely access assets such as e-mail servers and application servers that reside behind a firewall. End-to-site VPN tunnels are particularly helpful to remote users such as telecommuters because a single tunnel enables access to all of the resources on a network—the users do not need to configure individual access settings to each application and server. See [Figure 61 on page 897](#).

Figure 61: Using a VPN Tunnel to Enable Remote Access to a Corporate Network



The dynamic VPN feature is also known as remote access VPN or IPsec VPN client. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices. Pulse Secure client software is used for VPN access. User authentication is supported through an external RADIUS server or a local IP address pool configured on the SRX gateway. The Layer 3 remote access client uses client-side configuration settings that it receives from the SRX Series gateway to create and manage a secure end-to-site VPN tunnel to the gateway.

If more than two simultaneous user connections are required, a dynamic VPN license must be installed on the SRX Series gateway. See the *Software Installation and Upgrade Guide* for information about installing and managing licenses. The maximum number of user connections supported depends on the SRX Series device.

The dynamic VPN feature is disabled by default on the device. To enable dynamic VPN, you must configure the feature using the **dynamic-vpn** configuration statement at the **[edit security]** hierarchy level.

Understanding Dynamic VPN Tunnel Support

Dynamic VPN tunnels are configured in the same way as traditional IPsec VPN tunnels. However, not all IPsec VPN options are supported. This feature is supported on SRX100, SRX110, SRX210, SRX220, SRX240, SRX300, SRX320, SRX340, SRX345, SRX550, SRX550HM, and SRX650 devices.

The following list describes the requirements and supported options when configuring dynamic VPN tunnels:

- Only policy-based VPNs are supported. Route-based VPNs are not supported with dynamic VPN tunnels. Routing protocols are not supported.
- Only IKEv1 is supported. IKEv2 is not supported.
- Only IPv4 traffic and IPv4-in-IPv4 tunnels are supported. IPv6 traffic and tunnels are not supported.
- Only preshared keys are supported for authentication. PKI is not supported.
- Aggressive mode is supported for IKE phase 1 exchanges. Main mode is not supported.
- VPN traffic can only be initiated from the remote client. VPN traffic initiated from the SRX gateway is not supported.
- Dead peer detection (DPD) is supported. VPN monitoring is not supported.
- Extended authentication (XAuth) with mode configuration is supported.
- Authentication is supported from a local profile. Attributes can be provided from a local address pool. Authentication and attributes can be provided from a RADIUS server.
- Chassis clusters are supported.
- NAT-T is supported.
- IKE in virtual routers or in virtual routing and forwarding instances is supported.
- AutoVPN is not supported.
- Auto route insertion (ARI) is not supported.
- Administrator rights are required to install Pulse client software, administrator rights are required.
- Users need to reauthenticate during IKE phase 1 rekeys. The rekey time is configurable.

Shared or group IKE IDs can be used to configure a single VPN that is shared by all remote clients. When a single VPN is shared, the total number of simultaneous connections to the gateway cannot be greater than the number of dynamic VPN licenses installed. When configuring a shared or group IKE ID gateway, you can configure the maximum number of connections to be greater than the number of installed dynamic VPN licenses. However, if a new connection exceeds the number of licensed connections, the connection will be denied. You can view dynamic VPN license information with the **show system license usage** command.

Understanding Remote Client Access to the VPN

A common dynamic VPN deployment is to provide VPN access to remote clients connected through a public network such as the Internet. IPsec access is provided through a gateway on the Juniper Networks device. Pulse Secure client software is used for VPN access. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.



NOTE: Pulse Secure client software can be obtained from the Juniper Networks Download Software site at <https://www.juniper.net/support/downloads/?p=pulse#sw>.

The following describes the process for a Pulse Secure remote client to access the VPN:



NOTE: For detailed instructions about connecting the remote client program to the SRX Series device, see [KB17641](#). Also see the Pulse Secure documentation for current client information.

1. The user downloads and installs the Pulse Secure client software onto their device.
2. The user starts the Pulse Secure remote client program.

In the Pulse Secure remote client program, the user does the following:

- a. Click **Add connection**.
- b. For Type, select **Firewall (SRX)**.
- c. For Name, enter the hostname of the SRX gateway.



NOTE: On the SRX Series device, this hostname is configured with the `set security ike gateway gateway-name dynamic hostname hostname` command. The SRX administrator must provide the hostname to remote users.

- d. For Server URL Name, enter the IP address of the SRX gateway.



NOTE: On the SRX Series device, this IP address is the IP address of the external-interface configured with the `set security ike gateway gateway-name` command. The SRX administrator must provide the IP address to remote users.

3. Click **Add**, then click **Connect**. The Pulse Secure remote client program connects to the SRX Series using HTTPS.
4. Enter your username and password when prompted. Configuration information is downloaded from the SRX Series device to the remote client to enable the client to establish an IKE SA with the SRX Series device.

5. If you are accessing dynamic VPN for the first time, enter your user credentials again to establish an IPsec SA. An IP address is assigned to the remote client from a local address pool or from an external RADIUS server.



NOTE: The user credentials you enter in step 4 are used to download the configuration to the remote client and establish an IKE SA between the client and the SRX Series device. The user credentials entered in this step are used to establish an IPsec SA. The user credentials can be the same or different, based on the configuration on the SRX Series device.

6. Upon successful authentication and address assignment, a tunnel is established.

Dynamic VPN Proposal Sets

This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices. Configuring custom Internet Key Exchange (IKE) and IP Security (IPsec) proposals for IKE and IPsec policies can be tedious and time-consuming when there are many dynamic VPN clients. The administrator can select basic, compatible, or standard proposal sets for dynamic VPN clients. Each proposal set consists of two or more predefined proposals. The server selects one predefined proposal from the set and pushes it to the client in the client configuration. The client uses this proposal in negotiations with the server to establish the connection.

The default values for IKE and IPsec security association (SA) rekey timeout are as follows:

- For IKE SAs, the rekey timeout is 28,800 seconds.
- For IPsec SAs, the rekey timeout is 3600 seconds.



NOTE: Because proposal set configuration does not allow for configuration of rekey timeout, these values are included in the client configuration that is sent to the client at client download time.

The basic use cases for proposals are as follows:

- IKE and IPsec both use proposal sets.

The server selects a predefined proposal from the proposal set and sends it to the client, along with the default rekey timeout value.

- IKE uses a proposal set, and IPsec uses a custom proposal.

The server sends a predefined IKE proposal from the configured IKE proposal set to the client, along with the default rekey timeout value. For IPsec, the server sends the setting that is configured in the IPsec proposal.

- IKE uses a custom proposal, and IPsec uses a proposal set.

The server sends a predefined IPsec proposal from the configured IPsec proposal set to the client, along with the default rekey timeout value. For IKE, the server sends the setting that is configured in the IKE proposal.



NOTE: If IPsec uses a standard proposal set and perfect forward secrecy (PFS) is not configured, then the default Perfect Forward Secrecy (PFS) is group2. For other proposal sets, PFS will not be set, because it is not configured. Also, for the IPsec proposal set, the group configuration in ipsec policy `perfect-forward-secrecy` keys overrides the Diffie-Hellman (DH) group setting in the proposal sets.

Because the client accepts only one proposal for negotiating tunnel establishment with the server, the server internally selects one proposal from the proposal set to send to the client. The selected proposal for each set is listed as follows:

For IKE

- Sec-level basic: preshared key, g1, des, sha1
- Sec-level compatible: preshared key, g2, 3des, sha1
- Sec-level standard: preshared key, g2, aes128, sha1

For IPsec

- Sec-level basic: esp, no pfs (if not configured) or groupx (if configured), des, sha1
- Sec-level compatible: esp, no pfs (if not configured) or groupx (if configured), 3des, sha1
- Sec-level standard: esp, g2 (if not configured) or groupx (if configured), aes128, sha1

Dynamic VPN Configuration Overview

Dynamic VPN allows you to provide IPsec access for remote users to a gateway on a Juniper Networks device. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

There are two cases to consider when configuring dynamic VPN:

- When users are configured locally, they are configured at the `[edit access profile profile-name client client-name]` hierarchy level and arranged into user groups using the `client-group` configuration option.
- Users can be configured on an external authentication server, such as a RADIUS server. Users configured on an external authentication server do not need to be configured at the `[edit access profile profile-name]` hierarchy level.

For locally-configured users, the user group needs to be specified in the dynamic VPN configuration so that a user can be associated with a client configuration. You specify a user group with the `user-groups` option at the `[edit security dynamic-vpn clients configuration-name]` hierarchy level.

When a user is authenticated, the user group is included in the authentication reply. This information is extracted and user groups configured at the **[edit security dynamic-vpn clients configuration-name]** hierarchy level are searched to determine which client configuration to retrieve and return to the client for tunnel establishment.

If a user is associated with more than one user group, the first matching user group configuration is used. If a user creates a second connection, then the next matching user group configuration is used. Subsequent user connections use the next matching user group configuration until there are no more matching configurations.

The following procedure lists the tasks for configuring dynamic VPN.

1. Configure authentication and address assignment for the remote clients:
 - a. Configure an XAuth profile to authenticate users and assign addresses. Either local authentication or an external RADIUS server can be used. Use the **profile** configuration statement at the **[edit access]** hierarchy level to configure the XAuth profile.
 - b. Assign IP addresses from a local address pool if local authentication is used. Use the **address-assignment pool** configuration statement at the **[edit access]** hierarchy level. A subnet or a range of IP addresses can be specified. IP addresses for DNS and WINS servers can also be specified.
2. Configure the VPN tunnel:
 - a. Configure the IKE policy. The mode must be aggressive. Basic, compatible, or standard proposal sets can be used. Only preshared keys are supported for Phase 1 authentication. Use the **policy** configuration statement at the **[edit security ike]** hierarchy level.
 - b. Configure the IKE gateway. Either shared or group IKE IDs can be used. You can configure the maximum number of simultaneous connections to the gateway. Use the **gateway** configuration statement at the **[edit security ike]** hierarchy level.
 - c. Configure the IPsec VPN. Basic, compatible, or standard proposal sets can be specified with the **policy** configuration statement at the **[edit security ipsec]** hierarchy level. Use the **vpn** configuration statement at the **[edit security ipsec]** hierarchy level to configure the IPsec gateway and policy.



NOTE: A configuration check can be performed to verify that all IKE and IPsec parameters needed for dynamic VPN are correctly configured. If the configuration is invalid for IKE or IPsec, an error message is displayed. You enable the configuration check with the **set security dynamic-vpn config-check** command.

- d. Configure a security policy to allow traffic from the remote clients to the IKE gateway. Use the **policy** configuration statement at the **[edit security policies from-zone zone to-zone zone]** hierarchy level.



NOTE: Configure the security policy with the match criteria **source-address any**, **destination-address any**, and **application any** and the action **permit tunnel ipsec-vpn** with the name of the dynamic VPN tunnel. Place this policy at the end of the policy list.

- e. Configure host inbound traffic to allow specific traffic to reach the device from systems that are connected to its interfaces. For example, IKE and HTTPS traffic must be allowed. See *Understanding How to Control Inbound Traffic Based on Traffic Types*.
 - f. (Optional) If the client address pool belongs to a subnet that is directly connected to the device, the device would need to respond to ARP requests to addresses in the pool from other devices in the same zone. Use the **proxy-arp** configuration statement at the **[edit security nat]** hierarchy level. Specify the interface that directly connects the subnet to the device and the addresses in the pool.
3. Associate the dynamic VPN with remote clients:
 - a. Specify the access profile for use with dynamic VPN. Use the **access-profile** configuration statement at the **[edit security dynamic-vpn]** hierarchy level.
 - b. Configure the clients who can use the dynamic VPN. Specify protected resources (traffic to the protected resource travels through the specified dynamic VPN tunnel and is therefore protected by the firewall's security policies) or exceptions to the protected resources list (traffic that does not travel through the dynamic VPN tunnel and is sent in cleartext). These options control the routes that are pushed to the client when the tunnel is up, therefore controlling the traffic that is sent through the tunnel. Use the **clients** configuration statement at the **[edit security dynamic-vpn]** hierarchy level.
 4. To log dynamic VPN messages, configure the **traceoptions** statement at the **[edit security dynamic-vpn]** hierarchy level.

Understanding Local Authentication and Address Assignment

This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices. A client application can request an IP address on behalf of a client. This request is made at the same time as the client authentication request. Upon successful authentication of the client, an IP address can be assigned to the client from a predefined address pool or a specific IP address can be assigned. Other attributes, such as WINS or DNS server IP addresses, can also be provided to the client.

Address pools are defined with the **pool** configuration statement at the **[edit access address-assignment]** hierarchy level. An address pool definition contains network information (IP address with optional netmask), optional range definitions, and DHCP or XAuth attributes that can be returned to the client. If all addresses in a pool are assigned, a new request for a client address will fail even if the client is successfully authenticated.

Access profiles are defined with the **profile** configuration statement at the **[edit access]** hierarchy. A defined address pool can be referenced in an access profile configuration.

You can also bind a specific IP address to a client in an access profile with the **xauth ip-address address** option. The IP address must be in the range of addresses specified in the address pool. It must also be different from the IP address specified with the **host** configuration statement at the **[edit access profile address-assignment pool pool-name family inet]** hierarchy level. For any application, if one IP address has been assigned, it will not be reassigned again until it is released.

Understanding Group and Shared IKE IDs

This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices. With dynamic VPN, a unique Internet Key Exchange (IKE) ID is used for each user connection. When there are a large number of users who need to access the VPN, configuring an individual IKE gateway, IPsec VPN, and a security policy for each user can be cumbersome. The group IKE ID and shared IKE ID features allow a number of users to share an IKE gateway configuration, thus reducing the number of VPN configurations required.



NOTE: We recommend that you configure group IKE IDs for dynamic VPN deployments because group IKE IDs provide a unique preshared key and IKE ID for each user.

This topic includes the following sections:

- [Group IKE IDs on page 904](#)
- [Shared IKE IDs on page 905](#)

Group IKE IDs

When group IKE IDs are configured, the IKE ID of each user is a concatenation of a user-specific part and a part that is common to all group IKE ID users. For example, the user Bob might use "Bob.example.net" as his full IKE ID, where ".example.net" is common to all users. The full IKE ID is used to uniquely identify each user connection.

Although group IKE IDs do not require XAuth, XAuth is required by dynamic VPN to retrieve network attributes like client IP addresses. A warning is displayed if XAuth is not configured for a dynamic VPN that uses group IKE IDs.



NOTE: We recommend that users use the same credentials for both WebAuth and XAuth authentication when group IKE IDs are configured.

Multiple users can use the same group IKE ID, but a single user cannot use the same group IKE ID for different connections. If a user needs to have connections from different remote clients, they need to have different group IKE IDs configured, one for each connection. If a user only has one group IKE ID configured and attempts a second

connection from another PC, the first connection will be terminated to allow the second connection to go through.

To configure a group IKE ID:

- Configure **ike-user-type group-ike-id** at the [**edit security ike gateway gateway-name dynamic**] hierarchy level.
- Configure the **hostname** configuration statement at the [**edit security ike gateway gateway-name dynamic**] hierarchy level. This configuration is the common part of the full IKE ID for all users.
- Configure the **pre-shared-key** configuration statement at the [**edit security ike policy policy-name**] hierarchy level. The configured preshared key is used to generate the actual preshared key.

Shared IKE IDs

When a shared IKE ID is configured, all users share a single IKE ID and a single IKE preshared key. Each user is authenticated through the mandatory XAuth phase, where the credentials of individual users are verified either with an external RADIUS server or with a local access database. XAuth is required for shared IKE IDs.

The XAuth user name together with the configured shared IKE ID is used to distinguish between different user connections. Because the user name is used to identify each user connection, both the WebAuth user name and XAuth user name must be the same.

Multiple users can use the same shared IKE ID, but a single user cannot use the same shared IKE ID for different connections. If a user needs to have connections from different remote clients, they need to have different shared IKE IDs configured, one for each connection. If a user has only one shared IKE ID configured and attempts a second connection from another client, the first connection will be terminated to allow the second connection to go through. Also, because the user name is needed to identify each user connection along with the IKE ID, the user must use the same credentials for both WebAuth and XAuth authentication.

To configure a shared IKE ID:

- Configure **ike-user-type shared-ike-id** at the [**edit security ike gateway gateway-name dynamic**] hierarchy level.
- Configure the **hostname** configuration statement at the [**edit security ike gateway gateway-name dynamic**] hierarchy level. The configured hostname is shared by all users configured in the dynamic VPN access profile.
- Configure the **pre-shared-key** configuration statement at the [**edit security ike policy policy-name**] hierarchy level. The configured preshared key is shared by all users configured in the dynamic VPN access profile.

See Also

Example: Configuring Dynamic VPN

This example shows how to configure a dynamic VPN on a Juniper Networks device to provide VPN access to remote clients. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

- [Requirements on page 906](#)
- [Overview on page 906](#)
- [Configuration on page 909](#)
- [Verification on page 915](#)

Requirements

Before you begin:

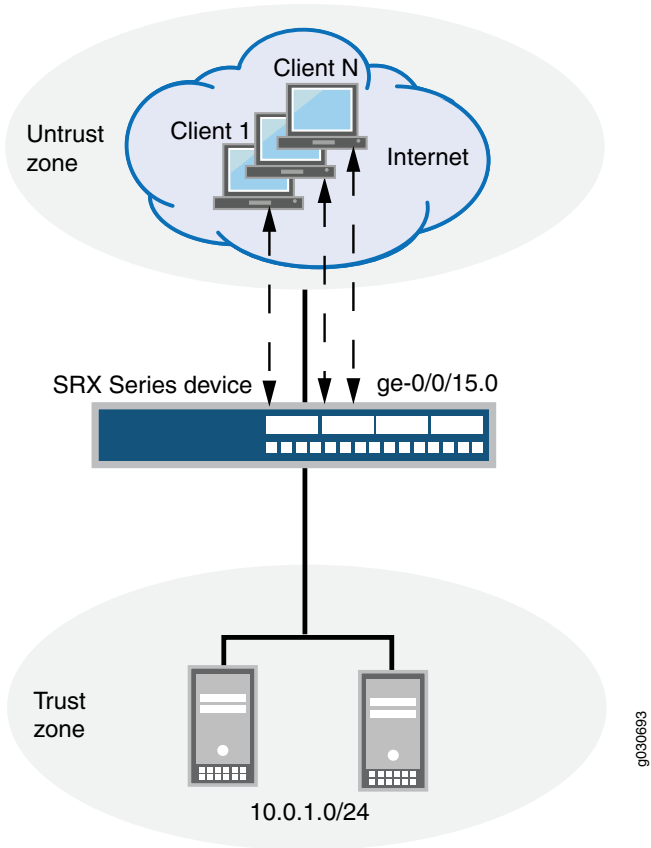
1. Configure network interfaces on the device. See *Interfaces Feature Guide for Security Devices*.
2. Create security zones and assign interfaces to them. See “Understanding Security Zones” on page 111.
3. If there will be more than two simultaneous user connections, install a Dynamic VPN license in the device. See *Software Installation and Upgrade Guide*.

Overview

A common deployment scenario for dynamic VPN is to provide VPN access to remote clients that are connected through a public network such as the Internet. A public IP address is assigned to one of the gateway’s interfaces; this interface is normally part of the untrust zone. After the client software is installed, the remote user can access the VPN by either logging in to the Web portal or by launching the client directly. In either case, the remote client authenticates with the SRX Series device and downloads the latest configuration available.

[Figure 62 on page 907](#) illustrates this deployment topology. The ge-0/0/15.0 interface on the SRX Series device is the termination point for the dynamic VPN tunnel. Remote clients in the untrust zone access the ge-0/0/15.0 interface through a Pulse Secure client.

Figure 62: Dynamic VPN Deployment Topology



In this example, XAuth client authentication is performed locally and client IP addresses are assigned from an address pool configured on the SRX Series device. See [Table 90 on page 907](#).

Then, standard proposal sets are used for both IKE and IPsec negotiations. For dynamic VPN tunnels, aggressive mode must be configured and only preshared keys are supported for Phase 1 authentication. A group IKE ID is used and the maximum number of connections is set to 10. Because dynamic VPNs must be policy-based VPNs, a security policy must be configured to forward traffic to the tunnel. IKE and HTTPS traffic must be allowed for host inbound traffic. See [Table 91 on page 908](#).

Finally, the XAuth profile configured for remote clients is specified for the dynamic VPN. Remote users are associated with the configured IPsec VPN. Also configured are remote protected resources (the destination addresses of traffic that is always sent through the tunnel) and remote exceptions (the destination addresses of traffic that is sent in cleartext instead of through the tunnel). See [Table 92 on page 908](#).

Table 90: Remote Client Authentication and Address Assignment Configuration

Feature	Name	Configuration Parameters
IP address pool	dyn-vpn-address-pool	<ul style="list-style-type: none">Addresses: 10.10.10.0/24DNS server address: 192.0.2.1/32.

Table 90: Remote Client Authentication and Address Assignment Configuration (continued)

Feature	Name	Configuration Parameters
XAuth profile	dyn-vpn-access-profile	<ul style="list-style-type: none"> Remote client username: 'client1' with password \$ABC123 Remote client username: 'client2' with password \$ABC456 IP address pool reference: dyn-vpn-address-pool This profile is the default profile for web authentication.

Table 91: VPN Tunnel Configuration Parameters

Feature	Name	Configuration Parameters
IKE policy (Phase 1)	ike-dyn-vpn-policy	<ul style="list-style-type: none"> Mode: aggressive Proposal set: standard Preshared key: (ASCII) \$ABC789
IKE gateway (Phase 1)	dyn-vpn-local-gw	<ul style="list-style-type: none"> IKE policy reference: ike-dyn-vpn-policy Dynamic hostname: dynvpn IKE user type: group IKE ID Maximum number of concurrent connections: 10 External interface: ge-0/0/15.0 Access profile reference: dyn-vpn-access-profile
IPsec policy (Phase 2)	ipsec-dyn-vpn-policy	Proposal set: standard
IPsec VPN (Phase 2)	dyn-vpn	<ul style="list-style-type: none"> IKE gateway reference: dyn-vpn-local-gw IPsec policy reference: ipsec-dyn-vpn-policy
Security policy (permits traffic from the untrust zone to the trust zone)	dyn-vpn-policy	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source address any destination address any application any Permit action: tunnel ipsec-vpn dyn-vpn
Host inbound traffic		<p>Allow the following types of traffic to the ge-0/0/15.0 interface in the untrust zone:</p> <ul style="list-style-type: none"> IKE HTTPS ping

Table 92: Dynamic VPN Configuration for Remote Clients

Feature	Name	Configuration Parameters
Access profile for remote clients		Access profile reference: dyn-vpn-access-profile

Table 92: Dynamic VPN Configuration for Remote Clients (continued)

Feature	Name	Configuration Parameters
Remote clients	all	<ul style="list-style-type: none"> IPsec VPN reference: dyn-vpn User name reference: client1 and client2 Remote protected resources: 10.0.0.0/8 Remote exceptions: 0.0.0.0/0

Configuration

- [Configuring the Remote User Authentication and Address Assignment on page 909](#)
- [Configuring the VPN Tunnel on page 911](#)
- [Associate the Dynamic VPN with Remote Clients on page 914](#)

Configuring the Remote User Authentication and Address Assignment

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set access profile dyn-vpn-access-profile client client1 firewall-user password "$ABC123"
set access profile dyn-vpn-access-profile client client2 firewall-user password "$ABC456"
set access profile dyn-vpn-access-profile address-assignment pool dyn-vpn-address-pool
set access address-assignment pool dyn-vpn-address-pool family inet network
10.10.10.0/24
set access address-assignment pool dyn-vpn-address-pool family inet xauth-attributes
primary-dns 192.0.2.1/32
set access firewall-authentication web-authentication default-profile
dyn-vpn-access-profile
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure remote user authentication and address assignment:

1. Create the address assignment pool.

```
[edit access address-assignment]
user@host# set pool dyn-vpn-address-pool family inet network 10.10.10.0/24
user@host# set pool dyn-vpn-address-pool family inet xauth-attributes primary-dns
192.0.2.1/32
```

2. Configure the XAuth profile.

```
[edit access]
user@host# set profile dyn-vpn-access-profile client client1 firewall-user password
"$ABC123"
```

```

user@host# set profile dyn-vpn-access-profile client client2 firewall-user password
"$ABC456"
user@host# set profile dyn-vpn-access-profile address-assignment pool
dyn-vpn-address-pool

```

3. Configure Web authentication using the XAuth profile.

```

[edit access firewall-authentication]
user@host# set web-authentication default-profile dyn-vpn-access-profile

```

Results From configuration mode, confirm your configuration by entering the **show access** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show access
profile dyn-vpn-access-profile {
  client client1 {
    firewall-user {
      password "$ABC123"; ## SECRET-DATA
    }
  }
  client client2 {
    firewall-user {
      password "$ABC456"; ## SECRET-DATA
    }
  }
  address-assignment {
    pool dyn-vpn-address-pool;
  }
}
address-assignment {
  pool dyn-vpn-address-pool {
    family inet {
      network 10.10.10.0/24;
      xauth-attributes {
        primary-dns 192.02.1/32;
      }
    }
  }
}
firewall-authentication {
  web-authentication {
    default-profile dyn-vpn-access-profile;
  }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring the VPN Tunnel

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
[edit]
set security ike policy ike-dyn-vpn-policy mode aggressive
set security ike policy ike-dyn-vpn-policy proposal-set standard
set security ike policy ike-dyn-vpn-policy pre-shared-key ascii-text "$ABC789"
set security ike gateway dyn-vpn-local-gw ike-policy ike-dyn-vpn-policy
set security ike gateway dyn-vpn-local-gw dynamic hostname dynvpn
set security ike gateway dyn-vpn-local-gw dynamic connections-limit 10
set security ike gateway dyn-vpn-local-gw dynamic ike-user-type group-ike-id
set security ike gateway dyn-vpn-local-gw external-interface ge-0/0/15.0
set security ike gateway dyn-vpn-local-gw aaa access-profile dyn-vpn-access-profile
set security ipsec policy ipsec-dyn-vpn-policy proposal-set standard
set security ipsec vpn dyn-vpn ike gateway dyn-vpn-local-gw
set security ipsec vpn dyn-vpn ike ipsec-policy ipsec-dyn-vpn-policy
set security policies from-zone untrust to-zone trust policy dyn-vpn-policy match
  source-address any
set security policies from-zone untrust to-zone trust policy dyn-vpn-policy match
  destination-address any
set security policies from-zone untrust to-zone trust policy dyn-vpn-policy match
  application any
set security policies from-zone untrust to-zone trust policy dyn-vpn-policy then permit
  tunnel ipsec-vpn dyn-vpn
set security zones security-zone untrust interfaces ge-0/0/15.0 host-inbound-traffic
  system-services ike
set security zones security-zone untrust interfaces ge-0/0/15.0 host-inbound-traffic
  system-services https
set security zones security-zone untrust interfaces ge-0/0/15.0 host-inbound-traffic
  system-services ping
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the VPN tunnel:

1. Configure the IKE policy.

```
[edit security ike]
user@host# set policy ike-dyn-vpn-policy mode aggressive
user@host# set policy ike-dyn-vpn-policy proposal-set standard
user@host# set policy ike-dyn-vpn-policy pre-shared-key ascii-text "$ABC789"
```

2. Configure the IKE gateway.

```
[edit security ike]
```

```

user@host# set gateway dyn-vpn-local-gw ike-policy ike-dyn-vpn-policy
user@host# set gateway dyn-vpn-local-gw dynamic hostname dynvpn
user@host# set gateway dyn-vpn-local-gw dynamic ike-user-type group-ike-id
user@host# set gateway dyn-vpn-local-gw dynamic connections-limit 10
user@host# set gateway dyn-vpn-local-gw external-interface ge-0/0/15.0
user@host# set gateway dyn-vpn-local-gw aaa access-profile
dyn-vpn-access-profile

```

3. Configure IPsec.

```

[edit security ipsec]
user@host# set policy ipsec-dyn-vpn-policy proposal-set standard
user@host# set vpn dyn-vpn ike gateway dyn-vpn-local-gw
user@host# set vpn dyn-vpn ike ipsec-policy ipsec-dyn-vpn-policy

```

4. Configure the security policy.

```

[edit security policies from-zone untrust to-zone trust]
user@host# set policy dyn-vpn-policy match source-address any destination-address
any application any
user@host# set policy dyn-vpn-policy then permit tunnel ipsec-vpn dyn-vpn

```

5. Configure host inbound traffic.

```

[edit security zones security-zone untrust interfaces ge-0/0/15.0]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services https
user@host# set host-inbound-traffic system-services ping

```

Results From configuration mode, confirm your configuration by entering the **show security ike**, **show security ipsec**, **show security policies**, and **show security zones** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show security ike
policy ike-dyn-vpn-policy {
  mode aggressive;
  proposal-set standard;
  pre-shared-key ascii-text "$ABC789"; ## SECRET-DATA
}
gateway dyn-vpn-local-gw {
  ike-policy ike-dyn-vpn-policy;
  dynamic {
    hostname dynvpn;
    connections-limit 10;
    ike-user-type group-ike-id;
  }
}

```

```
external-interface ge-0/0/15.0;
aaa access-profile dyn-vpn-access-profile;
}
```

```
[edit]
user@host# show security ipsec
policy ipsec-dyn-vpn-policy {
  proposal-set standard;
}
vpn dyn-vpn {
  ike {
    gateway dyn-vpn-local-gw;
    ipsec-policy ipsec-dyn-vpn-policy;
  }
}
```

```
[edit]
user@host# show security policies
from-zone untrust to-zone trust {
  policy dyn-vpn-policy {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn dyn-vpn;
        }
      }
    }
  }
}
[edit]
user@host# show security zones
security-zone untrust {
  interfaces {
    ge-0/0/15.0 {
      host-inbound-traffic {
        system-services {
          ike;
          https;
          ping;
        }
      }
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Associate the Dynamic VPN with Remote Clients

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security dynamic-vpn access-profile dyn-vpn-access-profile
set security dynamic-vpn clients all remote-protected-resources 10.0.0.0/8
set security dynamic-vpn clients all remote-exceptions 0.0.0.0/0
set security dynamic-vpn clients all ipsec-vpn dyn-vpn
set security dynamic-vpn clients all user client1
set security dynamic-vpn clients all user client2
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To associate the dynamic VPN with remote clients:

1. Specify the access profile to use with dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set access-profile dyn-vpn-access-profile
```

2. Configure the clients who can use the dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set clients all ipsec-vpn dyn-vpn
user@host# set clients all user client1
user@host# set clients all user client2
user@host# set clients all remote-protected-resources 10.0.0.0/8
user@host# set clients all remote-exceptions 0.0.0.0/0
```

Results From configuration mode, confirm your configuration by entering the **show security dynamic-vpn** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security dynamic-vpn
access-profile dyn-vpn-access-profile;
clients {
  all {
    remote-protected-resources {
      10.0.0.0/8;
    }
    remote-exceptions {
      0.0.0.0/0;
    }
  }
}
```

```

    }
    ipsec-vpn dyn-vpn;
    user {
        client1;
        client2;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Dynamic VPN tunnels can be monitored with the same commands used to monitor traditional IPsec VPN tunnels. To confirm that the configuration is working properly, perform these tasks:

- [Verifying IKE Phase 1 Status on page 915](#)
- [Verifying Connected Clients and Assigned Addresses on page 915](#)
- [Verifying IPsec Phase 2 Status on page 916](#)
- [Verifying Concurrent Connections and Parameters for Each User on page 916](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status of the security associations.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
18	172.19.100.99	UP	37b45aa1469e488b	7d4454404002e2e6	Aggressive

Verifying Connected Clients and Assigned Addresses

Purpose Verify that the remote clients and the IP addresses assigned to them are using XAuth.

Action From operational mode, enter the **show security ike active-peer** command.

```
user@host> show security ike active-peer
```

Remote Address IP	Port	Peer IKE-ID	XAUTH username	Assigned
172.19.100.99	500	testdynvpn	test	10.10.10.2

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status of the security associations.

Action From operational mode, enter the **show security ipsec security-associations** command.

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 1
ID      Gateway      Port Algorithm      SPI      Life:sec/kb Mon vsys
<133955586 172.19.100.99 500 ESP:aes-128/sha1 9c23b7a9 2862/ 449996 - root
>133955586 172.19.100.99 500 ESP:aes-128/sha1 c72c8f88 2862/ 449996 - root
```

Verifying Concurrent Connections and Parameters for Each User

Purpose Verify the number of concurrent connections and the negotiated parameters for each user.

Action From operational mode, enter the **show security dynamic-vpn users** command.

```
user@host> show security dynamic-vpn users
```

```
User: test , User group: group-one, Number of connections: 1
Remote IP: 172.19.100.99
IPSEC VPN: dyn-vpn
IKE gateway: dyn-vpn-local-gw
IKE ID : testdynvpn
IKE Lifetime: 28800
IPSEC Lifetime: 3600
Status: CONNECTED
```

See Also • [Dynamic VPN Overview on page 896](#)

Example: Configuring Local Authentication and Address Pool

This example shows how to create an address pool and how to assign client IP addresses in an access profile. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

Requirements

Before you begin, configure primary and secondary DNS and WINS servers and assign IP addresses to them.

Overview

This example creates an address pool **xauth1** that consists of the IP addresses in the 192.0.2.0/24 subnet. The **xauth1** pool also assigns IP addresses for primary and secondary DNS and WINS servers.

The access profile **dvpn-auth** references the **xauth1** pool. The **dvpn-auth** access profile configures two clients:

- **jason**: The IP address 192.0.2.1 is bound to this client. Upon successful authentication, the client is assigned the IP address 192.0.2.1. If the client logs in again before logging out, the client is assigned an IP address from the **xauth1** pool.
- **jacky**: Upon successful authentication, the client is assigned an IP address from the **xauth1** pool.

In addition, the **dvpn-auth** access profile specifies that password authentication is used to verify clients at login. Additional authentication methods can be specified; the software tries the authentication methods in order, from first to last, for each client login attempt.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set access profile dvpn-auth authentication-order password
set access profile dvpn-auth client jacky firewall-user password "$ABC123"
set access profile dvpn-auth client jason xauth ip-address 192.0.2.1/32
set access profile dvpn-auth client jason firewall-user password "$ABC456"
set access profile dvpn-auth address-assignment pool xauth1
set access address-assignment pool xauth1 family inet network 192.0.2.0/24
set access address-assignment pool xauth1 family inet xauth-attributes primary-dns
192.0.2.250/32
set access address-assignment pool xauth1 family inet xauth-attributes secondary-dns
192.0.2.251/32
set access address-assignment pool xauth1 family inet xauth-attributes primary-wins
192.0.2.253/32
set access address-assignment pool xauth1 family inet xauth-attributes secondary-wins
192.0.2.254/32
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure an address pool and an access profile that uses the address pool:

1. Create the address pool.

```
[edit access address-assignment]
user@host# set pool xauth1 family inet network 192.0.2.0/24 xauth-attributes
primary-dns 192.0.2.250 secondary-dns 192.0.2.251 primary-wins 192.0.2.253
secondary-wins 192.0.2.254
```

2. Configure the access profile.

```
[edit access]
user@host# set profile dvpn-auth address-assignment pool xauth1
user@host# set profile dvpn-auth authentication-order password
user@host# set profile dvpn-auth client jason xauth ip-address 192.0.2.1
user@host# set profile dvpn-auth client jason firewall-user password jason
user@host# set profile dvpn-auth client jacky firewall-user password jacky
```

Results From configuration mode, confirm your configuration by entering the **show access** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show access
profile dvpn-auth {
  authentication-order password;
  client jacky {
    firewall-user {
      password "$ABC123"; ## SECRET-DATA
    }
  }
  client jason {
    xauth {
      ip-address 192.0.2.1/32;
    }
    firewall-user {
      password "$ABC456"; ## SECRET-DATA
    }
  }
  address-assignment {
    pool xauth1;
  }
}
address-assignment {
  pool xauth1 {
    family inet {
      network 192.0.2.0/24;
      xauth-attributes {
        primary-dns 192.0.2.250/32;
        secondary-dns 192.0.2.251/32;
        primary-wins 192.0.2.253/32;
        secondary-wins 192.0.2.254/32;
      }
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying Address Assignment on page 919](#)

Verifying Address Assignment

Purpose Verify address assignment. For XAuth, the hardware address is always shown as NA. If a static IP address is assigned to a specific user, the user name and profile name (in the format user@profile) is displayed in the "Host/User" column. If a client is assigned an IP address from the pool, the username is displayed; if the username does not exist, NA is displayed. For other applications (for example, DHCP), the hostname is displayed if configured; if the hostname is not configured, NA is displayed.

Action From operational mode, enter the **show network-access address-assignment pool** command.

```
user
```

```
user@host> show network-access address-assignment pool xauth1
```

IP address	Hardware address	Host/User	Type
192.0.2.1	NA	jason@dvpn-auth	XAUTH
192.0.2.2	NA	jacky	XAUTH

See Also

Example: Configuring a Group IKE ID for Multiple Users

This example shows how to configure a group IKE ID that is used by multiple users. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

- [Requirements on page 919](#)
- [Overview on page 920](#)
- [Configuration on page 921](#)
- [Verification on page 925](#)

Requirements

Before you begin:

- Configure network interfaces on the device. See the *Interfaces Feature Guide for Security Devices*.
- Create security zones and assign interfaces to them. See *Understanding Security Zones*.
- If there will be more than two simultaneous user connections, install a Dynamic VPN license in the device. See *Software Installation and Upgrade Guide*.

Overview

In this example, you configure two remote dynamic VPN users who use a single IKE ID and a single IKE preshared key (see [Table 93 on page 920](#) and [Table 94 on page 920](#)). An external RADIUS server is used to authenticate users and assign IP addresses to clients (see [Table 95 on page 921](#)).

Table 93: Group IKE ID VPN Tunnel Configuration Parameters

Feature	Name	Configuration Parameters
IKE policy (Phase 1)	clientpol-group	<ul style="list-style-type: none"> Mode: aggressive Proposal set: compatible Preshared key: (ASCII) for-everyone-in-access-profile
IKE gateway (Phase 1)	groupgw	<ul style="list-style-type: none"> IKE policy reference: clientpol-group Dynamic hostname: example.net IKE user type: group IKE ID Maximum number of concurrent connections: 50 External interface: ge-0/0/0.0 Access profile reference: radius-profile
IPsec policy (Phase 2)	clientlvpnPol	Proposal set: compatible
IPsec VPN (Phase 2)	groupvpn	<ul style="list-style-type: none"> IKE gateway reference: groupgw IPsec policy reference: clientlvpnPol
Security policy (permits traffic from the untrust zone to the trust zone)	group-sec-policy	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source address any destination address any application any Permit action: tunnel ipsec-vpn groupvpn
Host inbound traffic		<p>Allow the following types of traffic to the ge-0/0/0.0 interface in the untrust zone:</p> <ul style="list-style-type: none"> IKE HTTPS ping SSH

Table 94: Group IKE ID Dynamic VPN Configuration for Remote Clients

Feature	Name	Configuration Parameters
Access profile for remote clients		Access profile reference: radius-profile
Remote clients	groupcfg	<ul style="list-style-type: none"> IPsec VPN reference: groupvpn User name reference: derek and chris Remote protected resources: 10.100.100.0/24 Remote exceptions: 0.0.0.0/0, 192.0.2.1/24, 0.0.0.0/32

Table 95: RADIUS Server User Authentication (Group IKE ID)

Feature	Name	Configuration Parameters
XAuth profile	radius-profile	<ul style="list-style-type: none"> RADIUS is the authentication method used to verify user credentials. The RADIUS server IP address is 10.100.100.250 and the password is "\$ABC123". This profile is the default profile for Web authentication.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set access profile radius-profile authentication-order radius
set access profile radius-profile radius-server 10.100.100.250 secret "$ABC123"
set access firewall-authentication web-authentication default-profile radius-profile
set security ike policy clientpol-group mode aggressive
set security ike policy clientpol-group proposal-set compatible
set security ike policy clientpol-group pre-shared-key ascii-text "$ABC456"
set security ike gateway groupgw ike-policy clientpol-group
set security ike gateway groupgw dynamic hostname example.net
set security ike gateway groupgw dynamic connections-limit 50
set security ike gateway groupgw dynamic ike-user-type group-ike-id
set security ike gateway groupgw external-interface ge-0/0/0.0
set security ike gateway groupgw aaa access-profile radius-profile
set security ipsec policy client1vpnPol proposal-set compatible
set security ipsec vpn groupvpn ike gateway groupgw
set security ipsec vpn groupvpn ike ipsec-policy client1vpnPol
set security policies from-zone untrust to-zone trust policy group-sec-policy match
  source-address any
set security policies from-zone untrust to-zone trust policy group-sec-policy match
  destination-address any
set security policies from-zone untrust to-zone trust policy group-sec-policy match
  application any
set security policies from-zone untrust to-zone trust policy group-sec-policy then permit
  tunnel ipsec-vpn groupvpn
set security dynamic-vpn access-profile radius-profile
set security dynamic-vpn clients groupcfg remote-protected-resources 10.100.100.0/24
set security dynamic-vpn clients groupcfg remote-exceptions 0.0.0.0/0
set security dynamic-vpn clients groupcfg remote-exceptions 192.0.2.1/24
set security dynamic-vpn clients groupcfg remote-exceptions 0.0.0.0/32
set security dynamic-vpn clients groupcfg ipsec-vpn groupvpn
set security dynamic-vpn clients groupcfg user chris
set security dynamic-vpn clients groupcfg user derek
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services ike
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services https
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services ping

```

```
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
system-services ssh
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a group IKE ID for multiple users:

1. Configure the XAuth profile.

```
[edit access]
user@host# set profile radius-profile authentication-order radius
user@host# set profile radius-profile radius-server 10.100.100.250 secret "$ABC123"
user@host# set firewall-authentication web-authentication default-profile
radius-profile
```

2. Configure the IKE policy.

```
[edit security ike]
user@host# set policy clientpol-group mode aggressive
user@host# set policy clientpol-group proposal-set compatible
user@host# set policy clientpol-group pre-shared-key ascii-text
for-everyone-in-access-profile
```

3. Configure the IKE gateway.

```
[edit security ike]
user@host# set gateway groupgw ike-policy clientpol-group
user@host# set gateway groupgw dynamic hostname example.net
user@host# set gateway groupgw dynamic ike-user-type group-ike-id
user@host# set gateway groupgw dynamic connections-limit 50
user@host# set gateway groupgw external-interface ge-0/0/0.0
user@host# set gateway groupgw aaa access-profile radius-profile
```

4. Configure IPsec.

```
[edit security ipsec]
user@host# set policy client1vpnPol proposal-set compatible
user@host# set vpn groupvpn ike gateway groupgw
user@host# set vpn groupvpn ike ipsec-policy client1vpnPol
```

5. Configure the security policy.

```
[edit security policies from-zone untrust to-zone trust]
user@host# set policy group-sec-policy match source-address any
destination-address any application any
user@host# set policy group-sec-policy then permit tunnel ipsec-vpn groupvpn
```

6. Configure host inbound traffic.

```
[edit security zones security-zone untrust interfaces ge-0/0/0.0]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services https
user@host# set host-inbound-traffic system-services ping
user@host# set host-inbound-traffic system-services ssh
```

7. Specify the access profile to use with dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set access-profile radius-profile
```

8. Configure the clients who can use the dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set clients groupcfg ipsec-vpn groupvpn
user@host# set clients groupcfg user derek
user@host# set clients groupcfg user chris
user@host# set clients groupcfg remote-protected-resources 10.100.100.0/24
user@host# set clients groupcfg remote-exceptions 0.0.0.0/0
user@host# set clients groupcfg remote-exceptions 192.0.2.1/24
user@host# set clients groupcfg remote-exceptions 0.0.0.0/32
```

Results From configuration mode, confirm your configuration by entering the **show security ike**, **show security ipsec**, **show security policies**, **show security zones**, and **show security dynamic-vpn** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show access
profile radius-profile {
  authentication-order radius;
  radius-server {
    10.100.100.250 secret "$ABC123"; ## SECRET-DATA
  }
}
firewall-authentication {
  web-authentication {
    default-profile radius-profile;
  }
}
[edit]
user@host# show security ike
ike {
  policy clientpol-group {
    mode aggressive;
    proposal-set compatible;
    pre-shared-key ascii-text
      "$ABC456"; ## SECRET-DATA
```

```
}
gateway groupgw {
    ike-policy clientpol-group;
    dynamic {
        hostname example.net;
        connections-limit 50;
        ike-user-type group-ike-id;
    }
    external-interface ge-0/0/0.0;
    aaa access-profile radius-profile;
}
}
[edit]
user@host# show security ipsec
ipsec {
    policy client1vpnPol {
        proposal-set compatible;
    }
    vpn groupvpn {
        ike {
            gateway groupgw;
            ipsec-policy client1vpnPol;
        }
    }
}
[edit]
user@host# show security policies
from-zone untrust to-zone trust {
    policy group-sec-policy {
        match {
            source-address any;
            destination-address any;
            application any;
        }
        then {
            permit {
                tunnel {
                    ipsec-vpn groupvpn;
                }
            }
        }
    }
}
}
[edit]
user@host# show security zones
security-zone untrust {
    interfaces {
        ge-0/0/0.0 {
            host-inbound-traffic {
                system-services {
                    ike;
                    https;
                    ping;
                    ssh;
                }
            }
        }
    }
}
```



```

    }
  }
}
}
[edit]
user@host# show security dynamic-vpn
dynamic-vpn {
  access-profile radius-profile;
  clients {
    groupcfg {
      remote-protected-resources {
        10.100.100.0/24;
      }
      remote-exceptions {
        0.0.0.0/0;
        192.0.2.1/24;
        0.0.0.0/32;
      }
      ipsec-vpn groupvpn;
      user {
        chris;
        derek;
      }
    }
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Dynamic VPN tunnels can be monitored with the same commands used to monitor traditional IPsec VPN tunnels. To confirm that the configuration is working properly, perform these tasks:

- [Verifying IKE Phase 1 Status on page 925](#)
- [Verifying Connected Clients and Assigned Addresses on page 925](#)
- [Verifying IPsec Phase 2 Status on page 926](#)
- [Verifying Concurrent Connections and Parameters for Each User on page 926](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status of the security associations.

Action From operational mode, enter the **show security ike security-associations** command.

Verifying Connected Clients and Assigned Addresses

Purpose Verify that the remote clients and the IP addresses assigned to them are using XAuth.

Action From operational mode, enter the **show security ike active-peer** command.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status of the security associations.

Action From operational mode, enter the **show security ipsec security-associations** command.

Verifying Concurrent Connections and Parameters for Each User

Purpose Verify the number of concurrent connections and the negotiated parameters for each user.

Action From operational mode, enter the **show security dynamic-vpn users** command.

See Also

Example: Configuring Individual IKE IDs for Multiple Users

This example shows how to configure individual IKE IDs for multiple users. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.



NOTE: When there are a large number of users who need to access the VPN, configuring an individual IKE gateway, IPsec VPN, and a security policy for each user can be cumbersome. The group IKE ID feature allows a number of users to share an IKE gateway configuration, thus reducing the number of VPN configurations required.

-
- [Requirements on page 926](#)
 - [Overview on page 927](#)
 - [Configuration on page 929](#)
 - [Verification on page 937](#)

Requirements

Before you begin:

- Configure network interfaces on the device. See *Interfaces Feature Guide for Security Devices*.
- Create security zones and assign interfaces to them. See *Understanding Security Zones*.
- If there will be more than two simultaneous user connections, install a Dynamic VPN license in the device. See *Software Installation and Upgrade Guide*.

Overview

The following example shows the configuration for two remote dynamic VPN users. For each user, an IKE policy and gateway, IPsec policy and VPN, and a security policy must be configured (see [Table 96 on page 927](#) and [Table 97 on page 928](#)). An external RADIUS server is used to authenticate users and assign IP addresses to clients (see [Table 98 on page 928](#)).

Table 96: Client 1 Configuration Parameters

Feature	Name	Configuration Parameters
IKE policy (Phase 1)	client1pol	<ul style="list-style-type: none"> Mode: aggressive Proposal set: compatible Preshared key: (ASCII) for-client1
IKE gateway (Phase 1)	client1gw	<ul style="list-style-type: none"> IKE policy reference: client1pol Dynamic hostname: example.net External interface: ge-0/0/0.0 Access profile reference: radius-profile
IPsec policy (Phase 2)	client1vpnPol	Proposal set: compatible
IPsec VPN (Phase 2)	client1vpn	<ul style="list-style-type: none"> IKE gateway reference: client1gw IPsec policy reference: client1vpnPol
Security policy (permits traffic from the untrust zone to the trust zone)	client1-policy	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source address any destination address any application any Permit action: tunnel ipsec-vpn client1vpn
Host inbound traffic		<p>Allow the following types of traffic to the ge-0/0/0.0 interface in the untrust zone:</p> <ul style="list-style-type: none"> IKE HTTPS ping SSH
Access profile for remote clients		Access profile reference: radius-profile
Remote clients	cfg1	<ul style="list-style-type: none"> IPsec VPN reference: client1vpn User name reference: derek Remote protected resources: 10.100.100.0/24 Remote exceptions: 0.0.0.0/0, 192.0.2.1/24, 0.0.0.0/32

Table 97: Client 2 Configuration Parameters

Feature	Name	Configuration Parameters
IKE policy (Phase 1)	client2pol	<ul style="list-style-type: none"> Mode: aggressive Proposal set: compatible Preshared key: (ASCII) for-client2
IKE gateway (Phase 1)	client2gw	<ul style="list-style-type: none"> IKE policy reference: client2pol Dynamic hostname: example.net External interface: ge-0/0/0.0 Access profile reference: radius-profile
IPsec policy (Phase 2)	client2vpnPol	Proposal set: compatible
IPsec VPN (Phase 2)	client2vpn	<ul style="list-style-type: none"> IKE gateway reference: client2gw IPsec policy reference: client2vpnPol
Security policy (permits traffic from the untrust zone to the trust zone)	client2-policy	<ul style="list-style-type: none"> Match criteria: <ul style="list-style-type: none"> source address any destination address any application any Permit action: tunnel ipsec-vpn client2vpn
Host inbound traffic		<p>Allow the following types of traffic to the ge-0/0/0.0 interface in the untrust zone:</p> <ul style="list-style-type: none"> IKE HTTPS ping SSH
Access profile for remote clients		Access profile reference: radius-profile
Remote clients	cfg2	<ul style="list-style-type: none"> IPsec VPN reference: client2vpn User name reference: chris Remote protected resources: 10.100.100.0/24 Remote exceptions: 0.0.0.0/0, 192.0.2.1/24

Table 98: RADIUS Server User Authentication (Individual IKE ID)

Feature	Name	Configuration Parameters
XAuth profile	radius-profile	<ul style="list-style-type: none"> RADIUS is the authentication method used to verify user credentials. RADIUS server IP address is 10.100.100.250 and the password is "\$ABC123". This profile is the default profile for Web authentication.

Configuration

- [Configuring the XAuth Profile on page 929](#)
- [Configuring Client 1 on page 930](#)
- [Configuring Client 2 on page 933](#)

Configuring the XAuth Profile

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set access profile radius-profile authentication-order radius
set access profile radius-profile radius-server 10.100.100.250 secret "$ABC123"
set access firewall-authentication web-authentication default-profile radius-profile
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure the XAuth profile:

1. Configure the access profile.

```
[edit access]
user@host# set profile radius-profile authentication-order radius
user@host# set profile radius-profile radius-server 10.100.100.250 secret "$ABC123"
```

2. Configure Web authentication using the XAuth profile.

```
[edit access]
user@host# set firewall-authentication web-authentication default-profile
radius-profile
```

Results

From configuration mode, confirm your configuration by entering the **show access** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show access
  profile radius-profile {
    authentication-order radius;
    radius-server {
      10.100.100.250 secret "$ABC123"; ## SECRET-DATA
    }
  }
  firewall-authentication {
```

```

web-authentication {
    default-profile radius-profile;
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Client 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike policy client1pol mode aggressive
set security ike policy client1pol proposal-set compatible
set security ike policy client1pol pre-shared-key ascii-text "$ABC456"
set security ike gateway client1gw ike-policy client1pol
set security ike gateway client1gw dynamic hostname example.net
set security ike gateway client1gw external-interface ge-0/0/0.0
set security ike gateway client1gw aaa access-profile radius-profile
set security ipsec policy client1vpnPol proposal-set compatible
set security ipsec vpn client1vpn ike gateway client1gw
set security ipsec vpn client1vpn ike ipsec-policy client1vpnPol
set security policies from-zone untrust to-zone trust policy client1-sec-policy match
    source-address any
set security policies from-zone untrust to-zone trust policy client1-sec-policy match
    destination-address any
set security policies from-zone untrust to-zone trust policy client1-sec-policy match
    application any
set security policies from-zone untrust to-zone trust policy client1-sec-policy then permit
    tunnel ipsec-vpn client1vpn
set security dynamic-vpn access-profile radius-profile
set security dynamic-vpn clients cfg1 remote-protected-resources 10.100.100.0/24
set security dynamic-vpn clients cfg1 remote-exceptions 0.0.0.0/0
set security dynamic-vpn clients cfg1 remote-exceptions 192.0.2.1/24
set security dynamic-vpn clients cfg1 remote-exceptions 0.0.0.0/32
set security dynamic-vpn clients cfg1 ipsec-vpn client1vpn
set security dynamic-vpn clients cfg1 user derek
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
    system-services ike
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
    system-services https
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
    system-services ping
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
    system-services ssh

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure dynamic VPN for a single user:

1. Configure the IKE policy.

```
[edit security ike]
user@host# set policy client1pol mode aggressive
user@host# set policy client1pol proposal-set compatible
user@host# set policy client1pol pre-shared-key ascii-text for-client1
```

2. Configure the IKE gateway.

```
[edit security ike]
user@host# set gateway client1gw ike-policy client1pol
user@host# set gateway client1gw dynamic hostname example.net
user@host# set gateway client1gw external-interface ge-0/0/0.0
user@host# set gateway client1gw aaa access-profile radius-profile
```

3. Configure IPsec.

```
[edit security ipsec]
user@host# set policy client1vpnPol proposal-set compatible
user@host# set vpn client1vpn ike gateway client1gw
user@host# set vpn client1vpn ike ipsec-policy client1vpnPol
```

4. Configure the security policy.

```
[edit security policies from-zone untrust to-zone trust]
user@host# set policy client1-sec-policy match source-address any
destination-address any application any
user@host# set policy client1-sec-policy then permit tunnel ipsec-vpn client1vpn
```

5. Configure host inbound traffic.

```
[edit security zones security-zone untrust interfaces ge-0/0/0.0]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services https
user@host# set host-inbound-traffic system-services ping
user@host# set host-inbound-traffic system-services ssh
```

6. Specify the access profile to use with dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set access-profile radius-profile
```

7. Configure the clients who can use the dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set clients cfg1 ipsec-vpn client1vpn
user@host# set clients cfg1 user derek
user@host# set clients cfg1 remote-protected-resources 10.100.100.0/24
user@host# set clients cfg1 remote-exceptions 0.0.0.0/0
user@host# set clients cfg1 remote-exceptions 192.0.2.1/24
user@host# set clients cfg1 remote-exceptions 0.0.0.0/32
```

Results From configuration mode, confirm your configuration by entering the **show security ike**, **show security ipsec**, **show security policies**, **show security zones**, and **show security dynamic-vpn** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
policy client1pol {
  mode aggressive;
  proposal-set compatible;
  pre-shared-key ascii-text "$ABC456"; ## SECRET-DATA
}
gateway client1gw {
  ike-policy client1pol;
  dynamic hostname example.net;
  external-interface ge-0/0/0.0;
  aaa access-profile radius-profile;
}
{edit}
user@host# show security ipsec
policy client1vpnPol {
  proposal-set compatible;
}
vpn client1vpn {
  ike {
    gateway client1gw;
    ipsec-policy client1vpnPol;
  }
}
{edit}
user@host# show security policies
from-zone untrust to-zone trust {
  policy client1-sec-policy {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn client1vpn;
        }
      }
    }
  }
}
```



```

    }
  }
}
}
{edit}
user@host# show security zones
security-zone untrust {
  interfaces {
    ge-0/0/0.0 {
      host-inbound-traffic {
        system-services {
          ike;
          https;
          ping;
          ssh;
        }
      }
    }
  }
}
{edit}
user@host# show security dynamic-vpn
access-profile radius-profile;
clients {
  cfg1 {
    remote-protected-resources {
      10.100.100.0/24;
    }
    remote-exceptions {
      0.0.0.0/0;
      192.0.2.1/24;
      0.0.0.0/32;
    }
    ipsec-vpn client1vpn;
    user {
      derek;
    }
  }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Client 2

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```

set security ike policy client2pol mode aggressive
set security ike policy client2pol proposal-set compatible
set security ike policy client2pol pre-shared-key ascii-text "$ABC789"

```

```

set security ike gateway client2gw ike-policy client2pol
set security ike gateway client2gw dynamic hostname example.net
set security ike gateway client2gw external-interface ge-0/0/0.0
set security ike gateway client2gw aaa access-profile radius-profile
set security ipsec policy client2vpnPol proposal-set compatible
set security ipsec vpn client2vpn ike gateway client2gw
set security ipsec vpn client2vpn ike ipsec-policy client2vpnPol
set security policies from-zone untrust to-zone trust policy client2-sec-policy match
  source-address any
set security policies from-zone untrust to-zone trust policy client2-sec-policy match
  destination-address any
set security policies from-zone untrust to-zone trust policy client2-sec-policy match
  application any
set security policies from-zone untrust to-zone trust policy client2-sec-policy then permit
  tunnel ipsec-vpn client1vpn
set security dynamic-vpn access-profile radius-profile
set security dynamic-vpn clients cfg2 remote-protected-resources 10.100.100.0/24
set security dynamic-vpn clients cfg2 remote-exceptions 192.0.2.1/24
set security dynamic-vpn clients cfg2 remote-exceptions 0.0.0.0/32
set security dynamic-vpn clients cfg2 ipsec-vpn client2vpn
set security dynamic-vpn clients cfg2 user chris
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services ike
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services https
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services ping
set security zones security-zone untrust interfaces ge-0/0/0.0 host-inbound-traffic
  system-services ssh

```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure dynamic VPN for a single user:

1. Configure the IKE policy.

```

[edit security ike]
user@host# set policy client2pol mode aggressive
user@host# set policy client2pol proposal-set compatible
user@host# set policy client2pol pre-shared-key ascii-text for-client2

```

2. Configure the IKE gateway.

```

[edit security ike]
user@host# set gateway client2gw ike-policy client2pol
user@host# set gateway client2gw dynamic hostname example.net
user@host# set gateway client2gw external-interface ge-0/0/0.0
user@host# set gateway client2gw aaa access-profile radius-profile

```

3. Configure IPsec.

```
[edit security ipsec]
user@host# set policy client2vpnPol proposal-set compatible
user@host# set vpn client2vpn ike gateway client2gw
user@host# set vpn client2vpn ike ipsec-policy client2vpnPol
```

4. Configure the security policy.

```
[edit security policies from-zone untrust to-zone trust]
user@host# set policy client2-sec-policy match source-address any
destination-address any application any
user@host# set policy client2-sec-policy then permit tunnel ipsec-vpn client2vpn
```

5. Configure host inbound traffic.

```
[edit security zones security-zone untrust interfaces ge-0/0/0.0]
user@host# set host-inbound-traffic system-services ike
user@host# set host-inbound-traffic system-services https
user@host# set host-inbound-traffic system-services ping
user@host# set host-inbound-traffic system-services ssh
```

6. Specify the access profile to use with dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set access-profile radius-profile
```

7. Configure the clients who can use the dynamic VPN.

```
[edit security dynamic-vpn]
user@host# set clients cfg2 ipsec-vpn client1vpn
user@host# set clients cfg2 user chris
user@host# set clients cfg2 remote-protected-resources 10.100.100.0/24
user@host# set clients cfg2 remote-exceptions 192.0.2.1/24
user@host# set clients cfg2 remote-exceptions 0.0.0.0/32
```

Results From configuration mode, confirm your configuration by entering the **show security ike**, **show security ipsec**, **show security policies**, **show security zones**, and **show security dynamic-vpn** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show security ike
policy client2pol {
  mode aggressive;
  proposal-set compatible;
  pre-shared-key ascii-text "$ABC789"; ## SECRET-DATA
}
gateway client2gw {
```

```
ike-policy client2pol;
dynamic hostname example.net;
external-interface ge-0/0/0.0;
aaa access-profile radius-profile;
}
[edit]
user@host# show security ipsec
policy client2vpnPol {
  proposal-set compatible;
}
vpn client2vpn {
  ike {
    gateway client2gw;
    ipsec-policy client2vpnPol;
  }
}
[edit]
user@host# show security policies
from-zone untrust to-zone trust {
  policy client2-sec-policy {
    match {
      source-address any;
      destination-address any;
      application any;
    }
    then {
      permit {
        tunnel {
          ipsec-vpn client2vpn;
        }
      }
    }
  }
}
[edit]
user@host# show security zones
security-zone untrust {
  interfaces {
    ge-0/0/0.0 {
      host-inbound-traffic {
        system-services {
          ike;
          https;
          ping;
          ssh;
        }
      }
    }
  }
}
[edit]
user@host# show security dynamic-vpn
access-profile radius-profile;
clients {
  cfg2 {
```

```

remote-protected-resources {
  10.100.100.0/24;
}
remote-exceptions {
  192.0.2.1/24;
  0.0.0.0/32;
}
ipsec-vpn client2vpn;
user {
  chris;
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Dynamic VPN tunnels can be monitored with the same commands used to monitor traditional IPsec VPN tunnels. To confirm that the configuration is working properly, perform these tasks:

- [Verifying IKE Phase 1 Status on page 937](#)
- [Verifying Connected Clients and Assigned Addresses on page 937](#)
- [Verifying IPsec Phase 2 Status on page 937](#)
- [Verifying Concurrent Connections and Parameters for Each User on page 938](#)

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status of the security associations.

Action From operational mode, enter the **show security ike security-associations** command.

Verifying Connected Clients and Assigned Addresses

Purpose Verify that the remote clients and the IP addresses assigned to them are using XAuth.

Action From operational mode, enter the **show security ike active-peer** command.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status of the security associations.

Action From operational mode, enter the **show security ipsec security-associations** command.

Verifying Concurrent Connections and Parameters for Each User

Purpose Verify the number of concurrent connections and the negotiated parameters for each user.

Action From operational mode, enter the **show security dynamic-vpn users** command.

See Also

Related Documentation

- [IPsec VPN Configuration Overview on page 54](#)

CHAPTER 10

Monitoring and Improving VPN Traffic Performance

- [Monitoring VPN Traffic on page 939](#)
- [Improving IPsec VPN Traffic Performance on page 951](#)

Monitoring VPN Traffic

VPN monitoring enables you to determine the reachability of peer devices by sending Internet Control Message Protocol (ICMP) requests to the peers.

- [Understanding VPN Alarms and Auditing on page 939](#)
- [Understanding VPN Monitoring on page 941](#)
- [Understanding Tunnel Events on page 946](#)
- [Example: Setting an Audible Alert as Notification of a Security Alarm on page 946](#)
- [Example: Generating Security Alarms in Response to Potential Violations on page 947](#)

Understanding VPN Alarms and Auditing

Configure the following command to enable security event logging during the initial set up of the device. This feature is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.

set security log cache

The administrators (audit, cryptographic, IDS and security) cannot modify the security event logging configuration if the above command is configured and each administrator role is configured to have a distinct, unique set of privileges apart from all other administrative roles.

Alarms are triggered by a VPN failure. A VPN alarm is generated when the system monitors any of the following audited events:

- **Authentication failures**—You can configure the device to generate a system alarm when the packet authentication failures reaches a specified number.
- **Encryption and decryption failures**—You can configure the device to generate a system alarm when encryption or decryption failures exceed a specified number.

- **IKE Phase 1 and IKE Phase 2 failures**—Internet Key Exchange (IKE) Phase 1 negotiations are used to establish IKE security associations (SAs). These SAs protect the IKE Phase 2 negotiations. You can configure the device to generate a system alarm when IKE Phase 1 or IKE Phase 2 failures exceed a specified number.
- **Self-test failures**—Self-tests are tests that a device runs upon power on or reboot to verify whether security software is implemented correctly on your device.

Self-tests ensure the correctness of cryptographic algorithms. The Junos-FIPS image performs self-tests automatically upon power-on, and continuously for key-pair generation. In either domestic or FIPS images, self-tests can be configured to be performed according to a defined schedule, upon demand or immediately after key generation.

You can configure the device to generate a system alarm when a self-test failure occurs.

- **IDP flow policy attacks**—An intrusion detection and prevention (IDP) policy allows you to enforce various attack detection and prevention techniques on network traffic. You can configure the device to generate a system alarm when IDP flow policy violations occur.
- **Replay attacks**—A replay attack is a network attack in which a valid data transmission is maliciously or fraudulently repeated or delayed. You can configure the device to generate a system alarm when a replay attack occurs.

The syslog messages are included in the following cases:

- Failed symmetric key generation
- Failed asymmetric key generation
- Failed manual key distribution
- Failed automated key distribution
- Failed key destruction
- Failed key handling and storage
- Failed data encryption or decryption
- Failed signature
- Failed key agreement
- Failed cryptographic hashing
- IKE failure
- Failed authentication of the received packets
- Decryption error due to invalid padding content
- Mismatch in the length specified in the alternative subject field of the certificate received from a remote VPN peer device.

Alarms are raised based on syslog messages. Every failure is logged, but an alarm is generated only when a threshold is reached.

To view the alarm information, run the **show security alarms** command. The violation count and the alarm do not persist across system reboots. After a reboot, the violation count resets to zero, and the alarm is cleared from the alarm queue.

After appropriate actions have been taken, you can clear the alarm. The alarm remains in the queue until you clear it (or until you reboot the device). To clear the alarm, run the **clear security alarms** command.

- See Also**
- [IPsec VPN Overview on page 31](#)
 - [IPsec VPN Topologies on SRX Series Devices on page 37](#)

Understanding VPN Monitoring

VPN monitoring uses ICMP echo requests (or pings) to determine if a VPN tunnel is up. When VPN monitoring is enabled, the security device sends pings through the VPN tunnel to the peer gateway or to a specified destination at the other end of the tunnel. Pings are sent by default at intervals of 10 seconds for up to 10 consecutive times. If no reply is received after 10 consecutive pings, the VPN is considered to be down and the IPsec security association (SA) is cleared.

VPN monitoring is enabled for a specified VPN by configuring the **vpn-monitor** option at the **[edit security ipsec vpn vpn-name]** hierarchy level. The peer gateway's IP address is the default destination; however, you can specify a different destination IP address (such as a server) at the other end of the tunnel. The local tunnel endpoint is the default source interface, but you can specify a different interface name.



NOTE: VPN monitoring of an externally connected device (such as a PC) is not supported on SRX5400, SRX5600, and SRX5800 devices. The destination for VPN monitoring must be a local interface on the SRX5400, SRX5600, or SRX5800 device.

The VPN monitoring **optimized** option sends pings only when there is outgoing traffic and no incoming traffic through the VPN tunnel. If there is incoming traffic through the VPN tunnel, the security device considers the tunnel to be active and does not send pings to the peer. Configuring the **optimized** option can save resources on the security device because pings are only sent when peer liveliness needs to be determined. Sending pings can also activate costly backup links that would otherwise not be used.

You can configure the interval at which pings are sent and the number of consecutive pings that are sent without a reply before the VPN is considered to be down. These are configured with the **interval** and **threshold** options, respectively, at the **[edit security ipsec vpn-monitor-options]** hierarchy level.



NOTE: VPN monitoring can cause tunnel flapping in some VPN environments if ping packets are not accepted by the peer based on the packet's source or destination IP address.

Understanding IPsec Datapath Verification

- [Overview on page 942](#)
- [Caveats on page 942](#)

Overview

By default, the state of the secure tunnel (st0) interfaces configured in point-to-point mode in route-based VPNs is based on the state of the VPN tunnel. Soon after the IPsec SA is established, routes associated with the st0 interface are installed in the Junos OS forwarding table. In certain network topologies, such as where a transit firewall is located between the VPN tunnel endpoints, IPsec data traffic that uses active routes for an established VPN tunnel on the st0 interface may be blocked by the transit firewall. This can result in traffic loss.

When you enable the IPsec datapath verification, the st0 interface is not brought up and activated until the datapath is verified. The verification is configured with the **set security ipsec vpn vpn-name vpn-monitor verify-path** statement for route-based, site-to-site, and dynamic endpoint VPN tunnels.

If there is a NAT device in front of the peer tunnel endpoint, the IP address of the peer tunnel endpoint is translated to the IP address of the NAT device. For the VPN monitor ICMP request to reach the peer tunnel endpoint, you need to explicitly specify the original, untranslated IP address of the peer tunnel endpoint behind the NAT device. This is configured with the **set security ipsec vpn vpn-name vpn-monitor verify-path destination-ip** configuration.

Starting in Junos OS Release 15.1X49-D120, you can configure the size of the packet that is used to verify an IPsec datapath before the st0 interface is brought up. Use the **set security ipsec vpn vpn-name vpn-monitor verify-path packet-size** configuration. The configurable packet size ranges from 64 to 1350 bytes; the default is 64 bytes.

Caveats

The source interface and destination IP addresses that can be configured for VPN monitor operation have no effect on the IPsec datapath verification. The source for the ICMP requests in the IPsec datapath verification is the local tunnel endpoint.

When you enable IPsec datapath verification, VPN monitoring is automatically activated and used after the st0 interface is brought up. We recommend that you configure the VPN monitor optimized option with the **set security ipsec vpn vpn-name vpn-monitor optimized** command whenever you enable IPsec datapath verification.

If a chassis cluster failover occurs during the IPsec datapath verification, the new active node starts the verification again. The st0 interface is not activated until the verification succeeds.

No IPsec datapath verification is performed for IPsec SA rekeys, because the st0 interface state does not change for rekeys.

IPsec datapath verification is not supported on st0 interfaces configured in point-to-multipoint mode that are used with AutoVPN, Auto Discovery VPN, and multiple

traffic selectors. VPN monitoring and IPsec datapath verification do not support IPv6 addresses, so IPsec datapath verification cannot be used with IPv6 tunnels.

Understanding Global SPI and VPN Monitoring Features

You can monitor and maintain the efficient operation of your VPN using the following global VPN features:

- **SPI**—Peers in a security association (SA) can become unsynchronized when one of the peers fails. For example, if one of the peers reboots, it might send an incorrect security parameter index (SPI). You can enable the device to detect such an event and resynchronize the peers by configuring the bad SPI response feature.
- **VPN monitoring**—You can use the global VPN monitoring feature to periodically send Internet Control Message Protocol (ICMP) requests to the peer to determine if the peer is reachable.

Understanding VPN Monitoring and DPD

VPN monitoring and dead peer detection (DPD) are features available on SRX Series devices to verify the availability of VPN peer devices. This section compares the operation and configuration of these features.



NOTE: The SRX Series device responds to DPD messages sent by VPN peers even if DPD is not configured on the device. You can configure the SRX Series device to initiate DPD messages to VPN peers. You can also configure DPD and VPN monitoring to operate simultaneously on the same SRX Series device, although the number of peers that can be monitored with either method is reduced.

VPN monitoring is a Junos OS mechanism that monitors only Phase 2 security associations (SAs). VPN monitoring is enabled on a per-VPN basis with the **vpn-monitor** statement at the **[edit security ipsec vpn vpn-name]** hierarchy level. The destination IP and source interface must be specified. The **optimized** option enables the device to use traffic patterns as evidence of peer liveliness; ICMP requests are suppressed.

VPN monitoring options are configured with the **vpn-monitor-options** statement at the **[edit security ipsec]** hierarchy level. These options apply to all VPNs for which VPN monitoring is enabled. Options you can configure include the interval at which ICMP requests are sent to the peer (the default is 10 seconds) and the number of consecutive ICMP requests sent without receiving a response before the peer is considered unreachable (the default is 10 consecutive requests).

DPD is an implementation of RFC 3706, *A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers*. It operates at the IKE level and monitors the peer based on both IKE and IPsec traffic activity.

DPD is configured on an individual IKE gateway with the **dead-peer-detection** statement at the **[edit security ike gateway gateway-name]** hierarchy level. You can configure DPD modes of operation. The default (optimized) mode sends DPD messages to the peer if

there is no incoming IKE or IPsec traffic within a configured interval after the local device sends outgoing packets to the peer. Other configurable options include the interval at which DPD messages are sent to the peer (the default is 10 seconds) and the number of consecutive DPD messages sent without receiving a response before the peer is considered unavailable (the default is five consecutive requests).

Understanding Dead Peer Detection

Dead peer detection (DPD) is a method that network devices use to verify the current existence and availability of other peer devices.

You can use DPD as an alternative to VPN monitoring. VPN monitoring applies to an individual IPsec VPN, while DPD is configured only in an individual IKE gateway context.

A device performs DPD verification by sending encrypted IKE Phase 1 notification payloads (R-U-THERE messages) to a peer and waiting for DPD acknowledgments (R-U-THERE-ACK messages) from the peer. The device sends an R-U-THERE message only if it has not received any traffic from the peer during a specified DPD interval. If the device receives an R-U-THERE-ACK message from the peer during this interval, it considers the peer alive. If the device receives traffic on the tunnel from the peer, it resets its R-U-THERE message counter for that tunnel, thus starting a new interval. If the device does not receive an R-U-THERE-ACK message during the interval, it considers the peer dead. When the device changes the status of a peer device to be dead, the device removes the Phase 1 security association (SA) and all Phase 2 SAs for that peer.

The following DPD modes are supported on the SRX Series devices:

- Optimized—R-U-THERE messages are triggered if there is no incoming IKE or IPsec traffic within a configured interval after the device sends outgoing packets to the peer. This is the default mode.
- Probe idle tunnel—R-U-THERE messages are triggered if there is no incoming or outgoing IKE or IPsec traffic within a configured interval. R-U-THERE messages are sent periodically to the peer until there is traffic activity. This mode helps in early detection of a downed peer and makes the tunnel available for data traffic.



NOTE: When multiple traffic selectors are configured for a VPN, multiple tunnels can be established for the same IKE SA. In this scenario, the probe idle tunnel mode triggers R-U-THERE messages to be sent if any tunnel associated with the IKE SA becomes idle, even though there may be traffic in another tunnel for the same IKE SA.

- Always send—R-U-THERE messages are sent at configured intervals regardless of traffic activity between the peers.



NOTE: We recommend that the probe idle tunnel mode be used instead of the always-send mode.

DPD timers are active as soon as the Phase 1 SA is established. The DPD behavior is the same for both IKEv1 and IKEv2 protocols.

You can configure the following DPD parameters:

- The interval parameter specifies the amount of time (expressed in seconds) the device waits for traffic from its peer before sending an R-U-THERE message. The default interval is 10 seconds. Starting with Junos OS Release 15.1X49-D130, the permissible interval parameter range at which R-U-THERE messages are sent to the peer device is reduced from 10 through 60 seconds to 2 seconds through 60 seconds. The minimum threshold parameter should be 3, when the DPD interval parameter is set less than 10 seconds.
- The threshold parameter specifies the maximum number of times to send the R-U-THERE message without a response from the peer before considering the peer dead. The default number of transmissions is five times, with a permissible range of 1 to 5 retries.

Note the following considerations before configuring DPD:

- When a DPD configuration is added to an existing gateway with active tunnels, R-U-THERE messages are started without clearing Phase 1 or Phase 2 SAs.
- When a DPD configuration is deleted from an existing gateway with active tunnels, R-U-THERE messages are stopped for the tunnels. IKE and IPsec SAs are not affected.
- Modifying any DPD configuration option such as the mode, interval, or threshold values updates the DPD operation without clearing Phase 1 or Phase 2 SAs.
- If the IKE gateway is configured with DPD and VPN monitoring but the option to establish tunnels immediately is not configured, DPD does not initiate Phase 1 negotiation. When DPD is configured, the establish tunnels immediately option must also be configured at the same time to tear down the st0 interface when there are no phase 1 and phase 2 SAs available.
- If the IKE gateway is configured with multiple peer IP addresses and DPD but Phase 1 SA fails to be established to the first peer IP address, a Phase 1 SA is attempted with the next peer IP address. DPD is active only after a Phase 1 SA is established.
- If the IKE gateway is configured with multiple peer IP addresses and DPD but DPD fails with the current peer's IP address, the Phase 1 and Phase 2 SAs are cleared and a failover to the next peer IP address is triggered.
- More than one Phase 1 or Phase 2 SA can exist with the same peer because of simultaneous negotiations. In this case, R-U-THERE messages are sent on all Phase 1 SAs. Failure to receive DPD responses for the configured number of consecutive times clears the Phase 1 SA and the associated Phase 2 SA (for IKEv2 only).

See Also • [verify-path on page 1262](#)

- [IPsec VPN Overview on page 31](#)
- [Example: Configuring a Policy-Based VPN with Both an Initiator and a Responder Behind a NAT Device on page 599](#)

Understanding Tunnel Events

When there is a network problem related to a VPN, after the tunnel comes up only the tunnel status is tracked. Many issues can occur before the tunnel comes up. Hence, instead of tracking only the tunnel status, tunnel down issues, or negotiation failures, successful events such as successful IPsec SA negotiations, IPsec rekey, and IKE SA rekeys are now tracked. These events are called tunnel events.

For Phase 1 and Phase 2, negotiation events for a given tunnel are tracked along with the events that occur in external daemons like AUTHD or PKID. When a tunnel event occurs multiple times, only one entry is maintained with the updated time and the number of times that event occurred.

Overall, 16 events are tracked: eight events for Phase 1 and eight events for Phase 2. Some events can reoccur and fill up the event memory, resulting in important events being removed. To avoid overwriting, an event is not stored unless a tunnel is down.

The following special events fall into this category:

- Lifetime in kilobytes expired for IPsec SA
- Hard lifetime of IPsec SA expired
- IPsec SA delete payload received from peer, corresponding IPsec SAs cleared
- Cleared unused redundant backup IPsec SA pairs
- IPsec SAs cleared as corresponding IKE SA deleted

AutoVPN tunnels are created and removed dynamically and consequently tunnel events corresponding to these tunnels are short lived. Sometimes these tunnel events cannot be associated with any tunnel so system logging is used for debugging instead.

See Also • [IPsec VPN Overview on page 31](#)

Example: Setting an Audible Alert as Notification of a Security Alarm

This example shows how to configure a device to generate a system alert beep when a new security event occurs. By default, alarms are not audible. This feature is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.

- [Requirements on page 946](#)
- [Overview on page 947](#)
- [Configuration on page 947](#)
- [Verification on page 947](#)

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

In this example, you set an audible beep to be generated in response to a security alarm.

Configuration

Step-by-Step Procedure

To set an audible alarm:

1. Enable security alarms.

```
[edit]
user@host# edit security alarms
```

2. Specify that you want to be notified of security alarms with an audible beep.

```
[edit security alarms]
user@host# set audible
```

3. If you are done configuring the device, commit the configuration.

```
[edit security alarms]
user@host# commit
```

Verification

To verify the configuration is working properly, enter the **show security alarms detail** command.

See Also • [IPsec VPN Overview on page 31](#)

Example: Generating Security Alarms in Response to Potential Violations

This example shows how to configure the device to generate a system alarm when a potential violation occurs. By default, no alarm is raised when a potential violation occurs. This feature is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.

- [Requirements on page 947](#)
- [Overview on page 948](#)
- [Configuration on page 948](#)
- [Verification on page 950](#)

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

In this example, you configure an alarm to be raised when:

- The number of authentication failures exceeds 6.
- The cryptographic self-test fails.
- The non-cryptographic self-test fails.
- The key generation self-test fails.
- The number of encryption failures exceeds 10.
- The number of decryption failures exceeds 1.
- The number of IKE Phase 1 failures exceeds 10.
- The number of IKE Phase 2 failure exceeds 1.
- A replay attack occurs.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security alarms potential-violation authentication 6
set security alarms potential-violation cryptographic-self-test
set security alarms potential-violation non-cryptographic-self-test
set security alarms potential-violation key-generation-self-test
set security alarms potential-violation encryption-failures threshold 10
set security alarms potential-violation decryption-failures threshold 1
set security alarms potential-violation ike-phase1-failures threshold 10
set security alarms potential-violation ike-phase2-failures threshold 1
set security alarms potential-violation replay-attacks
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure alarms in response to potential violations:

1. Enable security alarms.

```
[edit]
user@host# edit security alarms
```

2. Specify that an alarm should be raised when an authentication failure occurs.

```
[edit security alarms potential-violation]
```



```
user@host# set authentication 6
```

3. Specify that an alarm should be raised when a cryptographic self-test failure occurs.

```
[edit security alarms potential-violation]  
user@host# set cryptographic-self-test
```

4. Specify that an alarm should be raised when a non-cryptographic self-test failure occurs.

```
[edit security alarms potential-violation]  
user@host# set non-cryptographic-self-test
```

5. Specify that an alarm should be raised when a key generation self-test failure occurs.

```
[edit security alarms potential-violation]  
user@host# set key-generation-self-test
```

6. Specify that an alarm should be raised when an encryption failure occurs.

```
[edit security alarms potential-violation]  
user@host# set encryption-failures threshold 10
```

7. Specify that an alarm should be raised when a decryption failure occurs.

```
[edit security alarms potential-violation]  
user@host# set decryption-failures threshold 1
```

8. Specify that an alarm should be raised when an IKE Phase 1 failure occurs.

```
[edit security alarms potential-violation]  
user@host# set ike-phase1-failures threshold 10
```

9. Specify that an alarm should be raised when an IKE Phase 2 failure occurs.

```
[edit security alarms potential-violation]  
user@host# set ike-phase2-failures threshold 1
```

10. Specify that an alarm should be raised when a replay attack occurs.

```
[edit security alarms potential-violation]  
user@host# set replay-attacks
```

Results From configuration mode, confirm your configuration by entering the **show security alarms** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
potential-violation {
  authentication 6;
  cryptographic-self-test;
  decryption-failures {
    threshold 1;
  }
  encryption-failures {
    threshold 10;
  }
  ike-phase1-failures {
    threshold 10;
  }
  ike-phase2-failures {
    threshold 1;
  }
  key-generation-self-test;
  non-cryptographic-self-test;
  replay-attacks;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, from operational mode, enter the **show security alarms** command.

See Also • [Understanding VPN Support for Inserting Services Processing Cards on page 52](#)

Release History Table

Release	Description
15.1X49-D130	Starting with Junos OS Release 15.1X49-D130, the permissible interval parameter range at which R-U-THERE messages are sent to the peer device is reduced from 10 through 60 seconds to 2 seconds through 60 seconds. The minimum threshold parameter should be 3, when the DPD interval parameter is set less than 10 seconds.
15.1X49-D120	Starting in Junos OS Release 15.1X49-D120, you can configure the size of the packet that is used to verify an IPsec datapath before the st0 interface is brought up.

Related Documentation • [IPsec VPN Overview on page 31](#)

Improving IPsec VPN Traffic Performance

The performance of IPsec VPN traffic to minimize packet forwarding overhead can be optimized by enabling VPN session affinity and performance acceleration.

- [Understanding VPN Session Affinity on page 951](#)
- [Enabling VPN Session Affinity on page 952](#)
- [Accelerating the IPsec VPN Traffic Performance on page 955](#)
- [Improving IPsec Performance with PowerMode IPsec on page 956](#)
- [Example: Configuring Behavior Aggregate Classifier in PMI on page 958](#)
- [Example: Configuring and Applying a Firewall Filter for a Multifield Classifier in PMI on page 962](#)
- [Example: Configuring and Applying Rewrite Rules on a Security Device in PMI on page 967](#)
- [Configuring Security Flow PMI on page 970](#)
- [Understanding the Loopback Interface for a High Availability VPN on page 971](#)

Understanding VPN Session Affinity

VPN session affinity occurs when a cleartext session is located in a Services Processing Unit (SPU) that is different from the SPU where the IPsec tunnel session is located. The goal of VPN session affinity is to locate the cleartext and IPsec tunnel session in the same SPU. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices.

Without VPN session affinity, a cleartext session created by a flow might be located in one SPU and the tunnel session created by IPsec might be located in another SPU. An SPU to SPU forward or hop is needed to route cleartext packets to the IPsec tunnel.

By default, VPN session affinity is disabled on SRX Series devices. When VPN session affinity is enabled, a new cleartext session is placed on the same SPU as the IPsec tunnel session. Existing cleartext sessions are not affected.

Junos OS Release 15.1X49-D10 introduces the SRX5K-MPC3-100G10G (IOC3) and the SRX5K-MPC3-40G10G (IOC3) for SRX5400, SRX5600, and SRX5800 devices.

The SRX5K-MPC (IOC2) and the IOC3 support VPN session affinity through improved flow module and session cache. With IOCs, the flow module creates sessions for IPsec tunnel-based traffic before encryption and after decryption on its tunnel-anchored SPU and installs the session cache for the sessions so that the IOC can redirect the packets to the same SPU to minimize packet forwarding overhead. Express Path (previously known as services offloading) traffic and NP cache traffic share the same session cache table on the IOCs.

To display active tunnel sessions on SPUs, use the **show security ipsec security-association** command and specify the Flexible PIC Concentrator (FPC) and Physical Interface Card (PIC) slots that contain the SPU. For example:

```
user@host> show security ipsec security-association fpc 3 pic 0
```

```

Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon vsys Port  Gateway
<131073 ESP:aes-128/sha1 18c4fd00 491/    128000 - root 500   203.0.113.11
>131073 ESP:aes-128/sha1 188c0750 491/    128000 - root 500   203.0.113.11

```



NOTE: You need to evaluate the tunnel distribution and traffic patterns in your network to determine if VPN session affinity should be enabled.

Starting with Junos OS Release 12.3X48-D50, Junos OS Release 15.1X49-D90, and Junos OS Release 17.3R1, if VPN session affinity is enabled on SRX5400, SRX5600, and SRX5800 devices, the tunnel overhead is calculated according to the negotiated encryption and authentication algorithms on the anchor Services Processing Unit (SPU). If the configured encryption or authentication changes, the tunnel overhead is updated on the anchor SPU when a new IPsec security association is established.

The VPN session affinity limitations are as follows:

- Traffic across logical systems is not supported.
- If there is a route change, established cleartext sessions remain on an SPU and traffic is rerouted if possible. Sessions created after the route change can be set up on a different SPU.
- VPN session affinity only affects self traffic that terminates on the device (also known as host-inbound traffic); self traffic that originates from the device (also known as host-outbound traffic) is not affected.
- Multicast replication and forwarding performance is not affected.

- See Also**
- *Understanding Traffic Processing on SRX5000 Line Devices*
 - *Understanding Session Cache*
 - *Express Path Overview*
 - *Example: Enabling Express Path in Security Policies*
 - *Example: Configuring SRX5K-MPC3-100G10G (IOC3) and SRX5K-MPC3-40G10G (IOC3) on an SRX5000 Line Device to Support Express Path*

Enabling VPN Session Affinity

By default, VPN session affinity is disabled on SRX Series devices. Enabling VPN session affinity can improve VPN throughput under certain conditions. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices. This section describes how to use the CLI to enable VPN session affinity.

Determine if clear-text sessions are being forwarded to IPsec tunnel sessions on a different SPU. Use the **show security flow session** command to display session information about clear-text sessions.

```

user@host> show security flow session
Flow Sessions on FPC3 PIC0:

Session ID: 60000001, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/6204 --> 203.0.113.6/41264;esp, If: ge-0/0/2.0, Pkts: 0,
  Bytes: 0

Session ID: 60000002, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0

Session ID: 60000003, Policy name: self-traffic-policy/1, Timeout: 58, Valid
  In: 203.0.113.6/500 --> 203.0.113.11/500;udp, If: .local..0, Pkts: 105386,
  Bytes: 12026528
  Out: 203.0.113.11/500 --> 203.0.113.6/500;udp, If: ge-0/0/2.0, Pkts: 106462,
  Bytes: 12105912

Session ID: 60017354, Policy name: N/A, Timeout: 1784, Valid
  In: 0.0.0.0/0 --> 0.0.0.0/0;0, If: N/A, Pkts: 0, Bytes: 0
  Out: 198.51.100.156/23 --> 192.0.2.155/53051;tcp, If: N/A, Pkts: 0, Bytes:
  0
Total sessions: 4

Flow Sessions on FPC6 PIC0:

Session ID: 120000001, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0

Session ID: 120000002, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0

Session ID: 120031730, Policy name: default-policy-00/2, Timeout: 1764, Valid
  In: 192.0.2.155/53051 --> 198.51.100.156/23;tcp, If: ge-0/0/1.0, Pkts: 44,
  Bytes: 2399
  Out: 198.51.100.156/23 --> 192.0.2.155/53051;tcp, If: st0.0, Pkts: 35, Bytes:
  2449
Total sessions: 3

```

In the example, there is a tunnel session on FPC 3, PIC 0 and a clear-text session on FPC 6, PIC 0. A forwarding session (session ID 60017354) is set up on FPC 3, PIC 0.



NOTE: Junos OS Release 15.1X49-D10 introduces session affinity support on IOCs (SRX5K-MPC [IOC2], SRX5K-MPC3-100G10G [IOC3], and SRX5K-MPC3-40G10G [IOC3]) and Junos OS Release 12.3X48-D30 introduces session affinity support on IOC2. You can enable session affinity for the IPsec tunnel session on the IOC FPCs. To enable IPsec VPN affinity, you must also enable the session cache on IOCs by using the `set chassis fpc fpc-slot np-cache` command.

To enable VPN session affinity:

1. In configuration mode, use the `set` command to enable VPN session affinity.

```
[edit]
user@host# set security flow load-distribution session-affinity ipsec
```

2. Check your changes to the configuration before committing.

```
[edit]
user@host# commit check
```

3. Commit the configuration.

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

After enabling VPN session affinity, use the **show security flow session** command to display session information about clear-text sessions.

```
user@host> show security flow session
Flow Sessions on FPC3 PIC0:

Session ID: 60000001, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/6352 --> 203.0.113.6/7927;esp, If: ge-0/0/2.0, Pkts: 0,
  Bytes: 0

Session ID: 60000002, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0

Session ID: 60000003, Policy name: self-traffic-policy/1, Timeout: 56, Valid
  In: 203.0.113.6/500 --> 203.0.113.11/500;udp, If: .local..0, Pkts: 105425,
  Bytes: 12031144
  Out: 203.0.113.11/500 --> 203.0.113.6/500;udp, If: ge-0/0/2.0, Pkts: 106503,
  Bytes: 12110680

Session ID: 60017387, Policy name: default-policy-00/2, Timeout: 1796, Valid
  In: 192.0.2.155/53053 --> 198.51.100.156/23;tcp, If: ge-0/0/1.0, Pkts: 10,
  Bytes: 610
  Out: 198.51.100.156/23 --> 192.0.2.155/53053;tcp, If: st0.0, Pkts: 9, Bytes:
  602
Total sessions: 4

Flow Sessions on FPC6 PIC0:

Session ID: 120000001, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0

Session ID: 120000002, Policy name: N/A, Timeout: N/A, Valid
  In: 203.0.113.11/0 --> 203.0.113.6/0;esp, If: ge-0/0/2.0, Pkts: 0, Bytes:
  0
Total sessions: 2
```

After VPN session affinity is enabled, the clear-text session is always located on FPC 3, PIC 0.

- See Also**
- *Understanding Session Cache*
 - *Express Path Overview*

Accelerating the IPsec VPN Traffic Performance

You can accelerate IPsec VPN performance by configuring the performance acceleration parameter. By default, VPN performance acceleration is disabled on SRX Series devices. Enabling the VPN performance acceleration can improve the VPN throughput with VPN session affinity enabled. This feature is only supported on SRX5400, SRX5600, and SRX5800 devices.

This topic describes how to use the CLI to enable VPN performance acceleration.



NOTE: To enable performance acceleration, you must ensure that cleartext sessions and IPsec tunnel sessions are established on the same Services Processing Unit (SPU). Starting with Junos OS Release 17.4R1, IPsec VPN performance is optimized when the VPN session affinity and performance acceleration features are enabled. For more information on enabling session affinity, see [“Understanding VPN Session Affinity” on page 951](#).

To enable IPsec VPN performance acceleration:

1. Enable VPN session affinity.

```
[edit]
user@host# set security flow load-distribution session-affinity ipsec
```

2. Enable IPsec performance acceleration.

```
[edit]
user@host# set security flow ipsec-performance-acceleration
```

3. Check your changes to the configuration before committing.

```
[edit]
user@host# commit check
```

4. Commit the configuration.

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

After enabling VPN performance acceleration, use the **show security flow status** command to display flow status.

```
Flow forwarding mode:
  Inet forwarding mode: flow based
  Inet6 forwarding mode: drop
  MPLS forwarding mode: drop
  ISO forwarding mode: drop
Flow trace status
  Flow tracing status: off
Flow session distribution
  Distribution mode: Hash-based
  Flow packet ordering
  Ordering mode: Hardware
Flow ipsec performance acceleration: on
```

- See Also**
- [ipsec-performance-acceleration \(Security Flow\) on page 1163](#)
 - *show security flow status*

Improving IPsec Performance with PowerMode IPsec

PowerMode IPsec (PMI) is a new mode of operation that provides IPsec performance improvements using Vector Packet Processing and Intel AES-NI instructions. PMI utilizes a small software block inside the Packet Forwarding Engine that bypasses flow processing and utilizes the AES-NI instruction set for optimized performance of IPsec processing and is activated when PMI is enabled.

Starting from Junos OS Release 18.3R1, PMI is supported on vSRX instances.

Starting from Junos OS Release 18.4R1, PMI is supported on SRX4100 and SRX4200 devices.

Starting from Junos OS Releases 18.2R2 and 19.1R1, PMI is supported on SRX5400, SRX5600, and, SRX5800 devices.

Starting from Junos OS Releases 19.1R1, PMI is supported on SRX4600 devices.

You enable PMI processing by using the **set security flow power-mode-ipsec** configuration mode command.

To disable PMI processing, use the **delete security flow power-mode-ipsec** configuration mode command to delete the statement from the configuration.



NOTE: For SRX4100, SRX4200 devices running Junos OS Release 18.4R1 and vSRX instances running Junos OS Release 18.3R1, after you enable or disable the PMI, you must reboot the device for the configuration to take effect.

Packets cannot go through the PMI when firewall or advanced security services are combined with IPsec. Hence, PMI must not be used when firewall or advanced security services are combined with IPsec.

You can verify the PMI status by using the **show security flow status** operational mode command.

A tunnel session can either be PMI or non-PMI. If a session is configured with any of the non-supported features listed in [Table 99 on page 957](#), the session is marked as non-PMI and the tunnel will go into non-PMI mode. Once the tunnel goes into the non-PMI mode, it will not go back to the PMI mode.

[Table 99 on page 957](#) summarizes the features supported in PMI, along with the features that are not supported.

Table 99: Summary of Features Supported in PowerMode IPsec

Supported Features in PowerMode IPsec	Non-Supported Features in PowerMode IPsec
Internet Key Exchange (IKE) functionality	IPsec-in-IPsec tunnels
AutoVPN with traffic selectors	Layer 4 - 7 applications: application firewall and AppSecure
High availability	GPRS tunneling protocol (GTP) and Stream Control Transmission Protocol (SCTP) firewalls
IPv6	Host traffic
Stateful firewall	Multicast
st0 interface	NAT
Traffic selectors	Nested tunnels
-	
-	Screen options

Note the following usage considerations with PMI:

- Antireplay maximum window size supported is 64 packets.
- PMI does a pre-fragmentation and post-fragmentation check. If the PMI detects pre-fragmentation and post-fragmentation packets, packets are not allowed through the PMI mode. The packets will return to non-PMI mode.
- Any fragments received on an interface will not go through PMI.
- PMI is supported on link aggregation group (LAG) and redundant Ethernet (reth) interfaces with only one member.

Starting in Junos OS Release 19.1R1, Class of Service (CoS) supports configuration of behavior aggregate (BA) classifier, multifield (MF) classifier, and rewrite-rule functions in PMI on SPC3 cards.

Benefits of PowerMode IPsec

- Enhances the performance of IPsec.

See Also • [IPsec VPN Overview on page 31](#)

Example: Configuring Behavior Aggregate Classifier in PMI

This example shows how to configure behavior aggregate (BA) classifiers for a SRX device to determine forwarding treatment of packets in PowerMode IPsec (PMI).

- [Requirements on page 958](#)
- [Overview on page 958](#)
- [Configuration on page 959](#)
- [Verification on page 961](#)

Requirements

This example uses the following hardware and software components:

- SRX Series device.
- Junos OS Release 19.1R1 and later releases.

Before you begin:

- Determine the forwarding class and PLP that are assigned by default to each well-known DSCP that you want to configure for the behavior aggregate classifier.

Overview

Configure behavior aggregate classifiers to classify the packets that contain valid DSCPs to appropriate queues. Once configured, you apply the behavior aggregate classifier to the correct interfaces. You override the default IP precedence classifier by defining a classifier and applying it to a logical interface. To define new classifiers for all code point types, include the **classifiers** statement at the **[edit class-of-service]** hierarchy level.

In this example, set the DSCP behavior aggregate classifier to **ba-classifier** as the default DSCP map. Set a best-effort forwarding class as **be-class**, an expedited forwarding class as **ef-class**, an assured forwarding class as **af-class**, and a network control forwarding class as **nc-class**. Finally, apply the behavior aggregate classifier to the interface ge-0/0/0.

Table 2 shows how the behavior aggregate classifier assigns loss priorities, to incoming packets in the four forwarding classes.

Table 100: Sample ba-classifier Loss Priority Assignments

mf-classifier Forwarding Class	For CoS Traffic Type	ba-classifier Assignments
be-class	Best-effort traffic	High-priority code point: 000001
ef-class	Expedited forwarding traffic	High-priority code point: 101111
af-class	Assured forwarding traffic	High-priority code point: 001100
nc-class	Network control traffic	High-priority code point: 110001

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service classifiers dscp ba-classifier import default
set class-of-service classifiers dscp ba-classifier forwarding-class be-class loss-priority
  high code-points 000001
set class-of-service classifiers dscp ba-classifier forwarding-class ef-class loss-priority
  high code-points 101111
set class-of-service classifiers dscp ba-classifier forwarding-class af-class loss-priority
  high code-points 001100
set class-of-service classifiers dscp ba-classifier forwarding-class nc-class loss-priority
  high code-points 110001
set class-of-service interfaces ge-0/0/0 unit 0 classifiers dscp ba-classifier
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the Junos OS CLI User Guide.

To configure Behavior Aggregate Classifiers for a device in PMI:

1. Configure the class of service.

```
[edit]
user@host# edit class-of-service
```

2. Configure behavior aggregate classifiers for Differentiated Services (DiffServ) CoS.

```
[edit class-of-service]
user@host# edit classifiers dscp ba-classifier
user@host# set import default
```

3. Configure a best-effort forwarding class classifier.

```
[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class be-class loss-priority high code-points 000001
```

4. Configure an expedited forwarding class classifier.

```
[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class ef-class loss-priority high code-points 101111
```

5. Configure an assured forwarding class classifier.

```
[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class af-class loss-priority high code-points 001100
```

6. Configure a network control forwarding class classifier.

```
[edit class-of-service classifiers dscp ba-classifier]
user@host# set forwarding-class nc-class loss-priority high code-points 110001
```

7. Apply the behavior aggregate classifier to an interface.

```
[edit]
user@host# set class-of-service interfaces ge-0/0/0 unit 0 classifiers dscp
ba-classifier
```

Results

From configuration mode, confirm your configuration by entering the **show class-of-service** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show class-of-service
classifiers {
  dscp ba-classifier {
    import default;
    forwarding-class be-class {
      loss-priority high code-points 000001;
    }
    forwarding-class ef-class {
```

```

        loss-priority high code-points 101111;
    }
    forwarding-class af-class {
        loss-priority high code-points 001100;
    }
    forwarding-class nc-class {
        loss-priority high code-points 110001;
    }
}
}
interfaces {
    ge-0/0/0 {
        unit 0 {
            classifiers {
                dscp ba-classifier;
            }
        }
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying the Classifier is applied to the Interfaces on page 961](#)

Verifying the Classifier is applied to the Interfaces

Purpose Make sure that the classifier is applied to the correct interfaces.

Action From the operational mode, enter the **show class-of-service interface ge-0/0/0** command.

```
user@host> show class-of-service interface ge-0/0/0
```

```
Physical interface: ge-0/0/0, Index: 144
  Queues supported: 8, Queues in use: 4
  Scheduled map: <default>, Index:2
  Congestion-notification: Disabled
```

```
Logical interface: ge-1/0/3, Index: 333
Object      Name              Type      Index
Classifier   v4-ba-classifier  dscp      10755
```

Meaning The interfaces are configured as expected.

Example: Configuring and Applying a Firewall Filter for a Multifield Classifier in PMI

This example shows how to configure a firewall filter to classify traffic to different forwarding class by using DSCP value and multifield (MF) classifier in PowerMode IPsec (PMI).

The classifier detects packets of interest to class of service (CoS) as they arrive on an interface. MF classifiers are used when a simple behavior aggregate (BA) classifier is insufficient to classify a packet, when peering routers do not have CoS bits marked, or the peering router's marking is untrusted.

- [Requirements on page 962](#)
- [Overview on page 962](#)
- [Configuration on page 963](#)
- [Verification on page 966](#)

Requirements

This example uses the following hardware and software components:

- SRX Series device.
- Junos OS Release 19.1R1 and later releases.

Before you begin:

- Determine the forwarding class that are assigned by default to each well-known DSCP that you want to configure for the MF classifier. See "[Improving IPsec Performance with PowerMode IPsec](#)" on page 956.

Overview

This example explain how to configure the firewall filter **mf-classifier**. To configure the MF classifier, create and name the assured forwarding traffic class, set the match condition, and then specify the destination address as 192.168.44.55. Create the forwarding class for assured forwarding DiffServ traffic as **af-class** and set the loss priority to low.

In this example, create and name the expedited forwarding traffic class and set the match condition for the expedited forwarding traffic class. Specify the destination address as 192.168.66.77. Create the forwarding class for expedited forwarding DiffServ traffic as **ef-class** and set the policer to **ef-policer**. Create and name the network-control traffic class and set the match condition.

In this example, create and name the forwarding class for the network control traffic class as **nc-class** and name the forwarding class for the best-effort traffic class as **be-class**. Finally, apply the multifield classifier firewall filter as an input and output filter on each customer-facing or host-facing that needs the filter. In this example, the interface for input filter is ge-0/0/2 and interface for output filter is ge-0/0/4.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set firewall filter mf-classifier interface-specific
set firewall filter mf-classifier term assured-forwarding from destination-address
  192.168.44.55
set firewall filter mf-classifier term assured-forwarding then forwarding-class af-class
set firewall filter mf-classifier term assured-forwarding then loss-priority low
set firewall filter mf-classifier term expedited-forwarding from destination-address
  192.168.66.77
set firewall filter mf-classifier term expedited-forwarding then forwarding-class ef-class
set firewall filter mf-classifier term expedited-forwarding then policer ef-policer
set firewall filter mf-classifier term network-control from precedence net-control
set firewall filter mf-classifier term network-control then forwarding-class nc-class
set firewall filter mf-classifier term best-effort then forwarding-class be-class
set interfaces ge-0/0/2 unit 0 family inet filter input mf-classifier
set interfaces ge-0/0/4 unit 0 family inet filter output mf-classifier
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the Junos OS CLI User Guide.

To configure a Firewall Filter for a Multifield Classifier for a device in PMI:

1. Create and name the multifield classifier filter.

```
[edit]
user@host# edit firewall filter mf-classifier
user@host# set interface-specific
```

2. Create and name the term for the assured forwarding traffic class.

```
[edit firewall filter mf-classifier]
user@host# edit term assured-forwarding
```

3. Specify the destination address for assured forwarding traffic.

```
[edit firewall filter mf-classifier term assured-forwarding]
user@host# set from destination-address 192.168.44.55
```

4. Create the forwarding class and set the loss priority for the assured forwarding traffic class.

```
[edit firewall filter mf-classifier term assured-forwarding]
```

```
user@host# set then forwarding-class af-class
user@host# set then loss-priority low
```

5. Create and name the term for the expedited forwarding traffic class.

```
[edit]
user@host# edit firewall filter mf-classifier
user@host# edit term expedited-forwarding
```

6. Specify the destination address for the expedited forwarding traffic.

```
[edit firewall filter mf-classifier term expedited-forwarding]
user@host# set from destination-address 192.168.66.77
```

7. Create the forwarding class and apply the policer for the expedited forwarding traffic class.

```
[edit firewall filter mf-classifier term expedited-forwarding]
user@host# set then forwarding-class ef-class
user@host# set then policer ef-policer
```

8. Create and name the term for the network control traffic class.

```
[edit]
user@host# edit firewall filter mf-classifier
user@host# edit term network-control
```

9. Create the match condition for the network control traffic class.

```
[edit firewall filter mf-classifier term network-control]
user@host# set from precedence net-control
```

10. Create and name the forwarding class for the network control traffic class.

```
[edit firewall filter mf-classifier term network-control]
user@host# set then forwarding-class nc-class
```

11. Create and name the term for the best-effort traffic class.

```
[edit]
user@host# edit firewall filter mf-classifier
user@host# edit term best-effort
```

12. Create and name the forwarding class for the best-effort traffic class.


```
[edit firewall filter mf-classifier term best-effort]
user@host# set then forwarding-class be-class
```

13. Apply the multifield classifier firewall filter as an input filter.

```
[edit]
user@host# set interfaces ge-0/0/2 unit 0 family inet filter input mf-classifier
```

14. Apply the multifield classifier firewall filter as an output filter.

```
[edit]
user@host# set interfaces ge-0/0/4 unit 0 family inet filter output mf-classifier
```

Results

From configuration mode, confirm your configuration by entering the **show firewall filter mf-classifier** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show firewall filter mf-classifier
interface-specific;
  term assured-forwarding {
    from {
      destination-address {
        192.168.44.55/32;
      }
    }
    then {
      loss-priority low;
      forwarding-class af-class;
    }
  }
  term expedited-forwarding {
    from {
      destination-address {
        192.168.66.77/32;
      }
    }
    then {
      policer ef-policer;
      forwarding-class ef-class;
    }
  }
  term network-control {
    from {
      precedence net-control;
    }
    then forwarding-class nc-class;
  }
}
```

```
term best-effort {  
    then forwarding-class be-class;  
}
```

From configuration mode, confirm your configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]  
user@host# show show interfaces  
ge-0/0/2 {  
    unit 0 {  
        family inet {  
            filter {  
                input mf-classifier;  
            }  
        }  
    }  
}  
ge-0/0/4 {  
    unit 0 {  
        family inet {  
            filter {  
                output mf-classifier;  
            }  
        }  
    }  
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying a Firewall Filter for a Multifield Classifier Configuration on page 966](#)

Verifying a Firewall Filter for a Multifield Classifier Configuration

Purpose Verify that a firewall filter for a multifield classifier is configured properly on a device and confirm that the forwarding classes are configured correctly.

Action From configuration mode, enter the **show class-of-service forwarding-class** command.

```
user@host> show class-of-service forwarding-class
```

Forwarding class	ID	Queue	Restricted queue	Fabric
priority Policing priority SPU priority				
BE-data	0	0	0	low
normal				
Premium-data	1	1	1	low
normal				
Voice	2	2	2	low
normal				
NC	3	3	3	low
normal				

Meaning The output shows the configured custom classifier settings.

Example: Configuring and Applying Rewrite Rules on a Security Device in PMI

This example shows how to configure and apply rewrite rules for a device in PowerMode IPsec (PMI).

- [Requirements on page 967](#)
- [Overview on page 967](#)
- [Configuration on page 968](#)
- [Verification on page 970](#)

Requirements

This example uses the following hardware and software components:

- SRX Series device.
- Junos OS Release 19.1R1 and later releases.

Before you begin:

- Create and configure the forwarding classes. See [“Improving IPsec Performance with PowerMode IPsec” on page 956](#).

Overview

This example explains how to configure rewrite rules to replace CoS values on packets received from the customer or host with the values expected by other SRX devices. You do not have to configure rewrite rules if the received packets already contain valid CoS values. Rewrite rules apply the forwarding class information and packet loss priority used internally by the device to establish the CoS value on outbound packets. After you configure the rewrite rules, apply them to the correct interfaces.

In this example, configure the rewrite rule for DiffServ CoS as **rewrite-dscps**. Specify the best-effort forwarding class as **be-class**, expedited forwarding class as **ef-class**, an

assured forwarding class as **af-class**, and a network control class as **nc-class**. Finally, apply the rewrite rule to the ge-0/0/0 interface.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class be-class
  loss-priority low code-point 000000
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class be-class
  loss-priority high code-point 000001
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class ef-class loss-priority
  low code-point 101110
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class ef-class loss-priority
  high code-point 101111
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class af-class loss-priority
  low code-point 001010
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class af-class loss-priority
  high code-point 001100
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class nc-class loss-priority
  low code-point 110000
set class-of-service rewrite-rules dscp rewrite-dscps forwarding-class nc-class loss-priority
  high code-point 110001
set class-of-service interfaces ge-0/0/0 unit 0 rewrite-rules dscp rewrite-dscps
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the Junos OS CLI User Guide.

To configure and apply Rewrite Rules for a device in PMI:

1. Configure rewrite rules for DiffServ CoS.

```
[edit]
user@host# edit class-of-service
user@host# edit rewrite-rules dscp rewrite-dscps
```

2. Configure best-effort forwarding class rewrite rules.

```
[edit class-of-service rewrite-rules dscp rewrite-dscps]
user@host# set forwarding-class be-class loss-priority low code-point 000000
user@host# set forwarding-class be-class loss-priority high code-point 000001
```

3. Configure expedited forwarding class rewrite rules.

```
[edit class-of-service rewrite-rules dscp rewrite-dscps]
user@host# set forwarding-class ef-class loss-priority low code-point 101110
```

```
user@host# set forwarding-class ef-class loss-priority high code-point 101111
```

4. Configure an assured forwarding class rewrite rules.

```
[edit class-of-service rewrite-rules dscp rewrite-dscps]
user@host# set forwarding-class af-class loss-priority low code-point 001010
user@host# set forwarding-class af-class loss-priority high code-point 001100
```

5. Configure a network control class rewrite rules.

```
[edit class-of-service rewrite-rules dscp rewrite-dscps]
user@host# set forwarding-class nc-class loss-priority low code-point 110000
user@host# set forwarding-class nc-class loss-priority high code-point 110001
```

6. Apply rewrite rules to an interface.

```
[edit class-of-service]
user@host# set interfaces ge-0/0/0 unit 0 rewrite-rules dscp rewrite-dscps
```

Results

From configuration mode, confirm your configuration by entering the **show class-of-service** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show class-of-service
interfaces {
  ge-0/0/0 {
    unit 0 {
      rewrite-rules {
        dscp rewrite-dscps;
      }
    }
  }
}
rewrite-rules {
  dscp rewrite-dscps {
    forwarding-class be-class {
      loss-priority low code-point 000000;
      loss-priority high code-point 000001;
    }
    forwarding-class ef-class {
      loss-priority low code-point 101110;
      loss-priority high code-point 101111;
    }
    forwarding-class af-class {
      loss-priority low code-point 001010;
      loss-priority high code-point 001100;
    }
  }
}
```

```

    }
    forwarding-class nc-class {
        loss-priority low code-point 110000;
        loss-priority high code-point 110001;
    }
}
}

```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying Rewrite Rules Configuration on page 970](#)

Verifying Rewrite Rules Configuration

Purpose Verify that rewrite rules are configured properly.

Action From the operational mode, enter the **show class-of-service** command.

```

user@host> show class-of-service

Physical interface: ge-0/0/0, Index: 130
  Maximum usable queues: 8, Queues in use: 4
  Scheduled map: <default>, Index:2
  Congestion-notification: Disabled

Logical interface: ge0/0/0, Index: 71
Object      Name                      Type      Index
Classifier  ipprec-compatibility ip        13

```

Meaning Rewrite rules are configured on ge-0/0/0 interface as expected.

Configuring Security Flow PMI

The Class of Service (CoS) supports configuration of behavior aggregate (BA) classifier, multifield (MF) classifier and rewrite-rule functions in PowerMode IPsec (PMI) on SPC3 cards.

The PMI is a new mode of operation that provides IPsec performance improvements.

Before you begin:

- Understand how to configure and apply rewrite rules for a device in PMI. See “[Example: Configuring and Applying Rewrite Rules on a Security Device in PMI](#)” on page 967.
- Understand how to configure and apply a firewall filter for a multifield (MF) classifier in PMI. See “[Example: Configuring and Applying a Firewall Filter for a Multifield Classifier in PMI](#)” on page 962.

- Understanding how to configure behavior aggregate (BA) classifiers for a device to determine forwarding treatment of packets in PMI. See [“Example: Configuring Behavior Aggregate Classifier in PMI”](#) on page 958.

To configure security flow PowerMode IPsec:

1. Create security flow in PMI.

```
user@host#set security flow power-mode-ipsec
```

2. Confirm your configuration by entering the **show security** command.

```
user@host# show security
flow {
  power-mode-ipsec;
}
```

Understanding the Loopback Interface for a High Availability VPN

In an IPsec VPN tunnel configuration, an external interface must be specified to communicate with the peer IKE gateway. Specifying a loopback interface for the external interface of a VPN is a good practice when there are multiple physical interfaces that can be used to reach a peer gateway. Anchoring a VPN tunnel on the loopback interface removes the dependency on a physical interface for successful routing.

Using a loopback interface for VPN tunnels is supported on standalone SRX Series devices as well as on SRX Series devices in chassis clusters. In a chassis cluster active-passive deployment, you can create a logical loopback interface and make it a member of a redundancy group so that it can be used to anchor VPN tunnels. The loopback interface can be configured in any redundancy group and is assigned as the external interface for the IKE gateway. VPN packets are processed on the node where the redundancy group is active.



NOTE: On SRX5400, SRX5600, and SRX5800 devices, if the loopback interface is used as the IKE gateway external interface, it must be configured in a redundancy group other than RG0.

In a chassis cluster setup, the node on which the external interface is active selects an SPU to anchor the VPN tunnel. IKE and IPsec packets are processed on that SPU. Thus an active external interface determines the anchor SPU.

You can use the **show chassis cluster interfaces** command to view information on the redundant pseudointerface.

See Also • *show chassis cluster interfaces*

Release History Table

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, IPsec VPN performance is optimized when the VPN session affinity and performance acceleration features are enabled.
12.3X48-D50	Starting with Junos OS Release 12.3X48-D50, Junos OS Release 15.1X49-D90, and Junos OS Release 17.3R1, if VPN session affinity is enabled on SRX5400, SRX5600, and SRX5800 devices, the tunnel overhead is calculated according to the negotiated encryption and authentication algorithms on the anchor Services Processing Unit (SPU).

**Related
Documentation**

- [Understanding VPN Support for Inserting Services Processing Cards on page 52](#)
- [IPsec VPN Configuration Overview on page 54](#)

CHAPTER 11

Configuring Public Key Infrastructure

- [Digital Certificates with PKI Overview on page 973](#)
- [Configuring Certificate Authority Profiles on page 992](#)
- [Configuring CA and Local Certificates on page 996](#)
- [Generating Self-Signed Digital Certificates on page 1008](#)
- [Revoking Digital Certificates on page 1011](#)
- [Example: Configuring PKI on page 1035](#)

Digital Certificates with PKI Overview

A public key infrastructure (PKI) supports the distribution and identification of public encryption keys, enabling users to both securely exchange data over networks such as the Internet and verify the identity of the other party.

- [Understanding Certificates and PKI on page 973](#)
- [Configuring a Trusted CA Group on page 978](#)
- [Digital Certificates Configuration Overview on page 981](#)
- [Example: Generating a Public-Private Key Pair on page 983](#)
- [Understanding Digital Certificate Validation on page 984](#)
- [Example: Validating Digital Certificate by Configuring Policy OIDs on an SRX Series Device on page 988](#)

Understanding Certificates and PKI

A digital certificate is an electronic means for verifying your identity through a trusted third party, known as a certificate authority (CA). Alternatively, you can use a self-signed certificate to attest to your identity.

The CA server you use can be owned and operated by an independent CA or by your own organization, in which case you become your own CA. If you use an independent CA, you must contact them for the addresses of their CA and certificate revocation list (CRL) servers (for obtaining certificates and CRLs) and for the information they require when submitting personal certificate requests. When you are your own CA, you determine this information yourself.

The Public Key Infrastructure (PKI) provides an infrastructure for digital certificate management.

This topic includes the following sections:

- [Certificate Signatures and Verification on page 974](#)
- [Public Key Infrastructure on page 975](#)
- [PKI Management and Implementation on page 976](#)
- [Internet Key Exchange on page 977](#)
- [Trusted CA Group on page 977](#)
- [Cryptographic Key Handling Overview on page 977](#)

Certificate Signatures and Verification

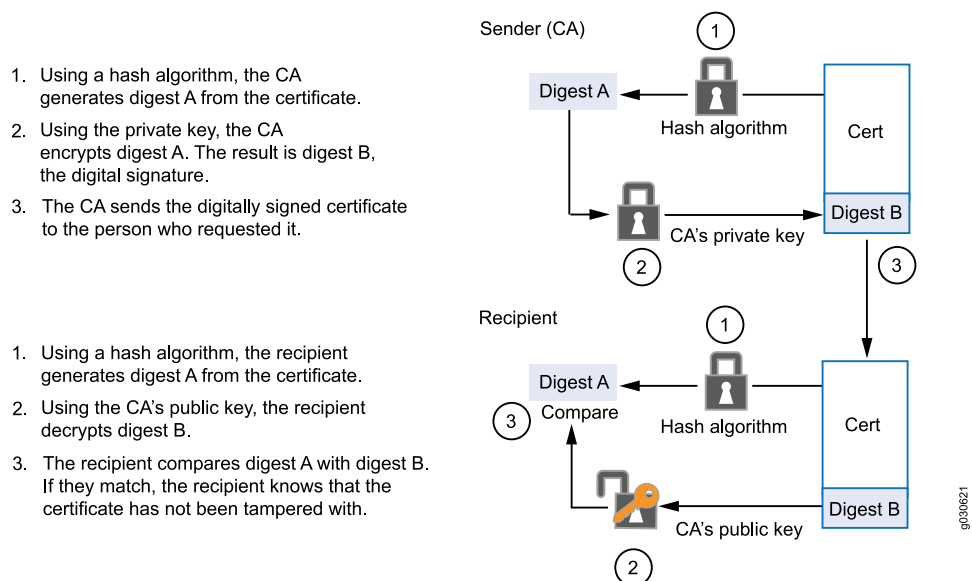
The CA that issues a certificate uses a hash algorithm to generate a digest, and then “signs” the certificate by encrypting the digest with its private key. The result is a digital signature. The CA then makes the digitally signed certificate available for download to the person who requested it. [Figure 63 on page 974](#) illustrates this process.

The recipient of the certificate generates another digest by applying the same hash algorithm to the certificate file, then uses the CA's public key to decrypt the digital signature. By comparing the decrypted digest with the digest just generated, the recipient can confirm the integrity of the CA's signature and, by extension, the integrity of the accompanying certificate. [Figure 63 on page 974](#) illustrates this process.



NOTE: A certificate is considered valid if the digital signature can be verified and the serial number of the certificate is not listed in a certificate revocation list.

Figure 63: Digital Signature Verification



When Digital Signature Algorithm (DSA) signatures are used, the SHA-1 hash algorithm is used to generate the digest. When Rivest-Shamir-Adleman (RSA) signatures are used, SHA-1 is the default hash algorithm used to generate the digest; you can specify the SHA-256 hash algorithm with the **digest** option of the **request security pki generate-certificate-request** or **request security pki local-certificate generate-self-signed** commands. When Elliptic Curve Digital Signature Algorithm (ECDSA) signatures are used, the SHA-256 hash algorithm is used for ECDSA-256 signatures and the SHA-384 hash algorithm is used for ECDSA-384 signatures.

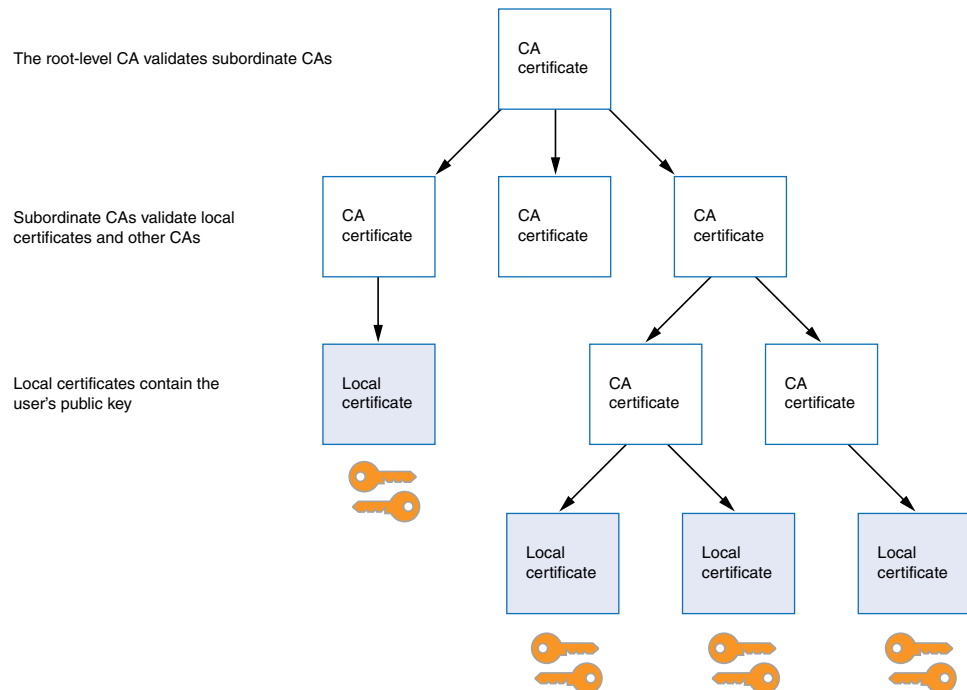
Starting in Junos OS Release 18.1R3, the default encryption algorithm that is used for validating automatically and manually generated self-signed PKI certificates is Secure Hash Algorithm 256 (SHA-256). Prior to Junos OS Release 18.1R3, SHA-1 is used as default encryption algorithm.

Public Key Infrastructure

To verify the trustworthiness of a certificate, you must be able to track a path of certified certificate authorities (CAs) from the one issuing your local certificate to the root authority of a CA domain. Public key infrastructure (PKI) refers to the hierarchical structure of trust required for the successful implementation of public key cryptography.

Figure 64 on page 975 shows the structure of a single-domain certificate authority with multiple hierarchy levels.

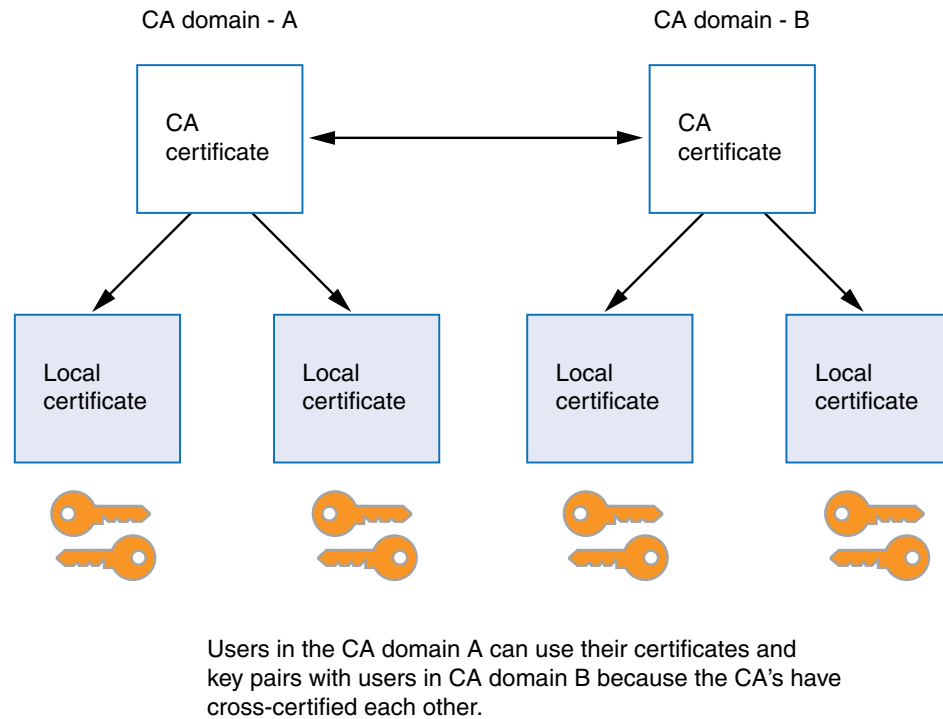
Figure 64: PKI Hierarchy of Trust—CA Domain



If certificates are used solely within an organization, that organization can have its own CA domain within which a company CA issues and validates certificates for its employees. If that organization later wants its employees to exchange their certificates with certificates from another CA domain (for example, with employees at another organization

that has its own CA domain), the two CAs can develop cross-certification by agreeing to trust the authority of each other. In this case, the PKI structure does not extend vertically but does extend horizontally. See [Figure 65 on page 976](#).

Figure 65: Cross-Certification



PKI Management and Implementation

The minimum PKI elements required for certificate-based authentication in Junos OS are:

- CA certificates and authority configuration.
- Local certificates including the device's identity (example: IKE ID type and value) and private and public keys
- Certificate validation through a CRL.

Junos OS supports three different types of PKI objects:

- Private/public key pair
- Certificates
 - Local certificate—The local certificate contains the public key and identity information for the Juniper Networks device. The Juniper Networks device owns the associated private key. This certificate is generated based on a certificate request from the Juniper Networks device.
 - Pending certificate — A pending certificate contains a key pair and identity information that is generated into a PKCS10 certificate request and manually sent to a certificate

authority (CA). While the Juniper Networks device waits for the certificate from the CA, the existing object (key pair and the certificate request) is tagged as a certificate request or pending certificate.

Internet Key Exchange

The procedure for digitally signing messages sent between two participants in an Internet Key Exchange (IKE) session is similar to digital certificate verification, with the following differences:

- Instead of making a digest from the CA certificate, the sender makes it from the data in the IP packet payload.
- Instead of using the CA's public-private key pair, the participants use the sender's public-private key pair.

Trusted CA Group

A Certificate Authority (CA) is a trusted third party responsible for issuing and revoking certificates. You can group multiple CAs (CA profiles) in one trusted CA group for a given topology. These certificates are used to establish connection between two endpoints. To establish IKE or IPsec, both the endpoints must trust the same CA. If either of the endpoints are unable to validate the certificate using their respective trusted CA (ca-profile) or trusted CA group, the connection is not established.

For example, there are two endpoints, endpoint A and endpoint B are trying to establish a secure connection. When endpoint B presents its certificate to endpoint A, the endpoint A will check if the certificate is valid. The CA of the endpoint A verifies the signed certificate that the endpoint B is using to get authorized. When **trusted-ca** or **trusted-ca-group** is configured, the device will only use the CA profiles added in this **trusted-ca-group** or the CA profile configured under **trusted-ca** to validate the certificate coming from endpoint B. If the certificate is verified as valid, the connection is allowed, else the connection is rejected.

Benefits:

- For any incoming connection request, only the certificate issued by that particular trusted CA of that endpoint gets validated. If not, the authorization will reject establishing the connection.

Cryptographic Key Handling Overview

With cryptographic key handling, persistent keys are stored in the memory of the device without any attempt to alter them. While the internal memory device is not directly accessible to a potential adversary, those who require a second layer of defense can enable special handling for cryptographic keys. When enabled, the cryptographic key handling encrypts keys when not immediately in use, performs error detection when copying a key from one memory location to another, and overwrites the memory location of a key with a random bit pattern when the key is no longer in use. Keys are also protected when they are stored in the flash memory of the device. Enabling cryptographic key

handling feature does not cause any externally observable change in the behavior of the device, and the device continues to interoperate with the other devices.



NOTE: A cryptographic administrator can enable and disable the cryptographic self-test functions; however, the security administrator can modify the behavior of the cryptographic self-test functions such as configuring periodic self-tests or selecting a subset of cryptographic self-tests.

The following persistent keys are currently under the management of IKE and PKI:

- IKE preshared keys (IKE PSKs)
- PKI private keys
- Manual VPN keys

- See Also**
- [Digital Certificates Configuration Overview on page 981](#)
 - [Understanding Certificate Chains on page 139](#)
 - [IPsec VPN Overview on page 31](#)
 - [trusted-ca-group on page 1259](#)

Configuring a Trusted CA Group

This section describes the procedure to create a trusted CA group for a list of CA profiles and delete a trusted CA group.

- [Creating a Trusted CA Group for a List of CA Profiles on page 979](#)
- [Deleting a CA Profile from a Trusted CA Group on page 980](#)
- [Deleting a Trusted CA Group on page 981](#)

Creating a Trusted CA Group for a List of CA Profiles

You can configure and assign a trusted CA group to authorize an entity. When a peer tries to establish a connection with a client, only the certificate issued by that particular trusted CA of that entity gets validated. The device validates if the issuer of the certificate and the one presenting the certificate belongs to the same client network. If the issuer and the presenter belong to the same client network then the connection is established. If not, the connection will not be established.

Before you begin, you must have a list of all the CA profiles you want to add to the trusted group.

In this example, we are creating three CA profiles named **orgA-ca-profile**, **orgB-ca-profile**, and **orgC-ca-profile** and associating the following CA identifiers **ca-profile1**, **ca-profile2**, and **ca-profile3** for the respective profiles. You can group all the three CA profiles to belong to a trusted CA group **orgABC-trusted-ca-group**.



NOTE: You can configure a maximum of 20 CA profiles for a trusted CA group.

1. Create CA profiles and associate CA identifiers to the profile.

```
[edit]
user@host# set security pki ca-profile orgA-ca-profile ca-identity ca-profile1
user@host# set security pki ca-profile orgB-ca-profile ca-identity ca-profile2
user@host# set security pki ca-profile orgC-ca-profile ca-identity ca-profile3
```

2. Group the CA profiles under a trusted CA group.

```
[edit]
set security pki trusted-ca-group orgABC-trusted-ca-group ca-profiles [orgA-ca-profile
orgB-ca-profile orgC-ca-profile]
```

3. Commit the configuration when you are done configuring the CA profiles and the trusted CA groups.

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

To view the CA profiles and the trusted CA groups configured on your device, run **show security pki** command.

```
user@host# show security pki
ca-profile orgA-ca-profile {
  ca-identity ca-profile1;
}
ca-profile orgB-ca-profile {
  ca-identity ca-profile2;
}
```

```
ca-profile orgC-ca-profile {
    ca-identity ca-profile3;
}
trusted-ca-group orgABC-trusted-ca-group {
    ca-profiles [ orgA-ca-profile orgB-ca-profile orgC-ca-profile ];
}
```

The **show security pki** command displays all the CA profiles that are grouped under the **orgABC-trusted-ca-group**.

Deleting a CA Profile from a Trusted CA Group

You can delete a specific CA profile in a trusted CA group or you can delete the trusted CA group itself.

For example, if you want to delete a CA profile named **orgC-ca-profile** from a trusted CA group **orgABC-trusted-ca-group**, configured on your device as shown in [“Creating a Trusted CA Group for a List of CA Profiles” on page 979](#) topic perform the following steps:

1. Delete a CA profile from the trusted CA group.

```
[edit]
user@host# delete security pki trusted-ca-group orgABC-trusted-ca-group ca-profiles
orgC-ca-profile
```

2. If you are done deleting the CA profile from the trusted CA group, commit the configuration.

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

To view the **orgC-ca-profile** being deleted from the **orgABC-trusted-ca-group**, run the **show security pki** command.

```
user@host# show security pki
ca-profile orgA-ca-profile {
    ca-identity ca-profile1;
}
ca-profile orgB-ca-profile {
    ca-identity ca-profile2;
}
trusted-ca-group orgABC-trusted-ca-group {
    ca-profiles [ orgA-ca-profile orgB-ca-profile ];
}
```

The output does not display the **orgC-ca-profile** profile as it is deleted from the trusted CA group.

Deleting a Trusted CA Group

An entity can support many trusted CA groups and you can delete any trusted CA group for an entity.

For example, if you want to delete a trusted CA group named **orgABC-trusted-ca-group**, configured on your device as shown in [“Creating a Trusted CA Group for a List of CA Profiles” on page 979](#) topic perform the following steps:

1. Delete a trusted CA group.

```
[edit]
user@host# delete security pki trusted-ca-group orgABC-trusted-ca-group
```

2. If you are done deleting the CA profile from the trusted CA group, commit the configuration.

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

To view the **orgABC-trusted-ca-group** being deleted from the entity, run the **show security pki** command.

```
user@host# show security pki
ca-profile orgA-ca-profile {
    ca-identity ca-profile1;
}
ca-profile orgB-ca-profile {
    ca-identity ca-profile2;
}
```

The output does not display the **orgABC-trusted-ca-group** as it is deleted from the entity.

See Also • [Understanding Certificate Authority Profiles on page 992](#)

Digital Certificates Configuration Overview

You can obtain CA and local certificates manually, or online using Simple Certificate Enrollment Protocol (SCEP) or CMPv2. Certificates are verifiable and renewable, and you can delete them when they are no longer needed.

Manual certificate processing includes generation of a PKCS10 request, submission to the CA, retrieval of the signed certificate, and manually loading the certificate into the Juniper Networks device. Based on your deployment environment, you can use either SCEP or CMPv2 for online certificate enrollment.

To use a digital certificate to authenticate your identity when establishing a secure VPN connection, you must first do the following:

- Obtain a CA certificate from which you intend to obtain a local certificate, and then load the CA certificate onto the device. The CA certificate can contain a CRL to identify invalid certificates.
- Obtain a local certificate from the CA whose CA certificate you have previously loaded, and then load the local certificate in the device. The local certificate establishes the identity of the Juniper Networks device with each tunnel connection.

This topic includes the following sections:

- [Enrolling Digital Certificates Online: Configuration Overview on page 982](#)
- [Manually Generating Digital Certificates: Configuration Overview on page 982](#)

Enrolling Digital Certificates Online: Configuration Overview

You can use either Certificate Management Protocol version 2 (CMPv2) or Simple Certificate Enrollment Protocol (SCEP) to enroll digital certificates. To enroll a certificate online:

1. Generate a key pair on the device. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
2. Create a CA profile or profiles containing information specific to a CA. See [“Example: Configuring a CA Profile” on page 993](#).
3. For SCEP only, enroll the CA certificate. See [“Enrolling a CA Certificate Online Using SCEP” on page 998](#).
4. Enroll the local certificate from the CA whose CA certificate you have previously loaded. See [“Example: Enrolling a Local Certificate Online Using SCEP” on page 998](#).
5. Configure automatic reenrollment. See [“Example: Using SCEP to Automatically Renew a Local Certificate” on page 1000](#).

- See Also**
- [Understanding CMPv2 and SCEP Certificate Enrollment on page 1002](#)
 - *Example: Configuring SecurID User Authentication*

Manually Generating Digital Certificates: Configuration Overview

To obtain digital certificates manually:

1. Generate a key pair on the device. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
2. Create a CA profile or profiles containing information specific to a CA. See [“Example: Configuring a CA Profile” on page 993](#).
3. Generate the CSR for the local certificate and send it to the CA server. See [“Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server” on page 1004](#).

4. Load the certificate onto the device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).
5. Configure automatic reenrollment. See [“Example: Using SCEP to Automatically Renew a Local Certificate” on page 1000](#).
6. If necessary, load the certificate's CRL on the device. See [“Example: Manually Loading a CRL onto the Device” on page 1029](#).
7. If necessary, configure the CA profile with CRL locations. See [“Example: Configuring a Certificate Authority Profile with CRL Locations” on page 1032](#)

- See Also**
- [Example: Configuring a CA Profile on page 993](#)
 - [Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server on page 1004](#)
 - [Example: Loading CA and Local Certificates Manually on page 1006](#)
 - [Example: Manually Loading a CRL onto the Device on page 1029](#)
- See Also**
- [Example: Verifying Certificate Validity on page 1033](#)
 - [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)
 - [Deleting Certificates \(CLI Procedure\) on page 1007](#)

Example: Generating a Public-Private Key Pair

This example shows how to generate a public-private key pair.

- [Requirements on page 983](#)
- [Overview on page 983](#)
- [Configuration on page 983](#)
- [Verification on page 984](#)

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

In this example, you generate a public-private key pair named `ca-ipsec`.

Configuration

Step-by-Step Procedure To generate a public-private key pair:

- Create a certificate key pair.

```
user@host> request security pki generate-key-pair certificate-id ca-ipsec
```

Verification

After the public-private key pair is generated, the Juniper Networks device displays the following:

```
generated key pair ca-ipsec, key size 1024 bits
```

See Also • [Example: Verifying Certificate Validity on page 1033](#)

Understanding Digital Certificate Validation

During IKE negotiation, the PKI daemon on an SRX Series device validates X509 certificates received from VPN peers. The certificate validation performed is specified in RFC 5280, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*. Basic certificate and certificate chain validations include signature and date validation as well as revocation checks. This topic describes additional digital certificate validations performed by the PKI daemon.

- [Policy Validation on page 984](#)
- [Path Length Validation on page 986](#)
- [Key Usage on page 987](#)
- [Issuer and Subject Distinguished Name Validation on page 987](#)

Policy Validation

X509 certificates can include optional policy validation fields. If a policy validation field is present, policy validation is performed for the entire certificate chain including the end entity (EE) certificate and intermediate certificate authority (CA) certificates. Policy validation is not applicable to the root certificate. Policy validation ensures that the EE and intermediate CA certificates have a common policy. If no common policy exists for the certificate chain being validated, certificate validation fails.

Prior to policy validation, a certificate chain containing the self-signed root certificate, intermediate CA certificates, and EE certificate must be built. The policy validation starts with the intermediate CA certificate issued by the self-signed root certificate and continues through the EE certificate.

The following optional certificate fields are used for policy validation:

- `policy-oids`
- `requireExplicitPolicy`
- `skipCerts`

These fields are described in the following sections.

Policy OIDs Configured on SRX Series Devices

In some situations, it might be desirable to only accept certificates with known policy object identifiers (OIDs) from peers. This optional configuration allows certificate

validation to succeed only if the certificate chain received from the peer contains at least one policy OID that is configured on the SRX Series device.

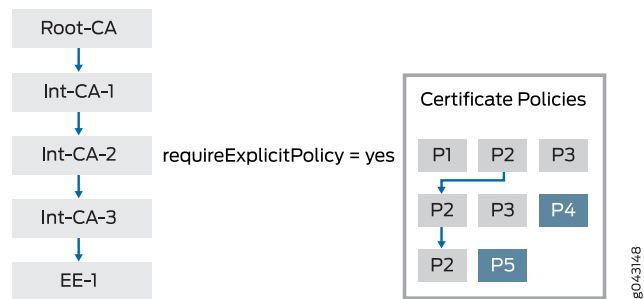
On the SRX Series device, policy OIDs are configured in an IKE policy with the **policy-oids** configuration statement at the [edit security ike policy *policy-name* certificate] hierarchy level. You can configure up to five policy OIDs. For a peer's certificate to be validated successfully, the peer's certificate chain must contain at least one of the policy OIDs configured on the SRX Series device. Note that the **policy-oids** field in a certificate is optional. If you configure policy OIDs on the SRX Series device but the peer's certificate chain does not contain any policy OIDs, certificate validation fails.

No Policy OIDs Configured on SRX Series Devices

If no policy OID is configured on the SRX Series device, policy validation starts whenever the **requireExplicitPolicy** field is encountered in the certificate chain. A certificate can contain one or more certificate policy OIDs. For policy validation to succeed, there must be a common policy OID in the certificate chain.

Figure 66 on page 985 shows a certificate chain that consists of certificates for a root CA, three intermediate CAs, and an EE. The CA certificate for Int-CA-2 contains the **requireExplicitPolicy** field; therefore, policy validation starts with Int-CA-2 and continues through EE-1. The certificate for Int-CA-2 contains policy OIDs P1, P2, and P3. The certificate for Int-CA-3 contains policy OIDs P2, P3, and P4. The certificate for EE-1 contains policy OIDs P2 and P5. Because the policy OID P2 is common to the certificates being validated, policy validation succeeds.

Figure 66: Policy Validation with requireExplicitPolicy Field

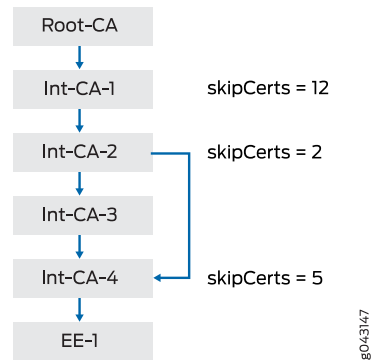


The optional **skipCerts** field in an intermediate CA certificate indicates the number of certificates, including the current CA certificate, that are to be excluded from policy validation. If **skipCerts** is 0, policy validation starts from the current certificate. If **skipCerts** is 1, the current certificate is excluded from policy validation. The value of the **skipCerts** field is checked in every intermediate CA certificate. If a **skipCerts** value is encountered that is lower than the current number of certificates being excluded, the lower **skipCerts** value is used.

Figure 67 on page 986 shows a certificate chain consisting of a root CA, four intermediate CAs, and an EE. The **skipCerts** value in Int-CA-1 is 12, which skips 12 certificates including the certificate for Int-CA-1. However, the **skipCerts** value is checked in every intermediate CA certificate in the chain. The **skipCerts** value in Int-CA-2 is 2, which is lower than 12, so

now 2 certificates are skipped. The **skipCerts** value in Int-CA-4 is 5, which is greater than 2, so the Int-CA-4 **skipCerts** value is ignored.

Figure 67: Policy Validation with skipCerts Field



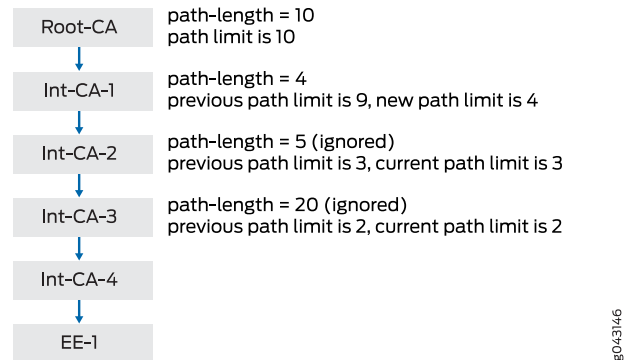
When policy OIDs are configured on the SRX Series device, the certificate fields **requireExplicitPolicy** and **skipCerts** are ignored.

Path Length Validation

Certificate validation can involve a certificate chain that includes a root CA, one or more optional intermediate CAs, and an EE certificate. The number of intermediate CAs can grow depending upon the deployment scenario. Path length validation provides a mechanism to limit the number of intermediate certificates involved in certificate validation. **path-length** is an optional field in an X509 certificate. The value of **path-length** indicates the number of non-self-signed intermediate CA certificates allowed for certificate validation. The last certificate, which is generally the EE certificate, is not included in the path limit. If the root certificate contains a **path-length** value of 0, no intermediate CA certificates are allowed. If the **path-length** value is 1, there can be 0 or 1 intermediate CA certificates.

path-length can be present in multiple CA certificates in the certificate chain. The path length validation always begins with the self-signed root certificate. The path limit is decremented by 1 at each intermediate certificate in the chain. If an intermediate certificate contains a **path-length** value less than the current path limit, the new limit is enforced. On the other hand, if the **path-length** value is larger than the current path limit, it is ignored.

Figure 68 on page 987 shows a certificate chain that consists of a root CA, four intermediate CAs, and an EE. The **path-length** value in Root-CA is 10, therefore the initial path limit of non-self-signed intermediate CA certificates allowed for certificate validation is 10. At Int-CA-1, the path limit is 10-1 or 9. The **path-length** value in Int-CA-1 is 4, which is less than the path limit of 9, so the new path limit becomes 4. At Int-CA-2, the path limit is 4-1 or 3. The **path-length** value in Int-CA-2 is 5, which is larger than the path limit of 3, so it is ignored. At Int-CA-3, the path limit is 3-1 or 2. The **path-length** value in Int-CA-3 is 20, which is larger than the path limit of 2, so it is also ignored.

Figure 68: Path Length Validation

Key Usage

The key usage field in an EE or CA certificate defines the purpose of the key contained in the certificate.

EE Certificates

For EE certificates, if the key usage field is present but the certificate does not contain **digitalSignature** or **nonrepudiation** flags, the certificate is rejected. If the key usage field is not present, then key usage is not checked.

CA Certificates

The key can be used for certificate or CRL signature validation. Because the PKI daemon is responsible for both X509 certificate validation and CRL downloads, key usage must be checked before validating the certificate or CRL.

Certificate Signature Validation

The **keyCertSign** flag indicates that a CA certificate can be used for certificate signature validation. If this flag is not set, certificate validation is aborted.

CRL Signature Validation

In Phase 1 negotiations, participants check the certificate revocation list (CRL) to see if certificates received during an IKE exchange are still valid. The CRL is periodically downloaded for CA profiles configured with CRL as the certificate revocation check. Downloaded CRL files must be verified before they are downloaded into the device. One of the verification steps is to validate the CRL signature using a CA certificate. The downloaded CRL is signed with the CA certificate's private key and it must be verified with the CA certificate's public key stored in the device. The key usage field in the CA certificate must contain the **CRLSign** flag to verify the downloaded CRL. If this flag is not present, the CRL is discarded.

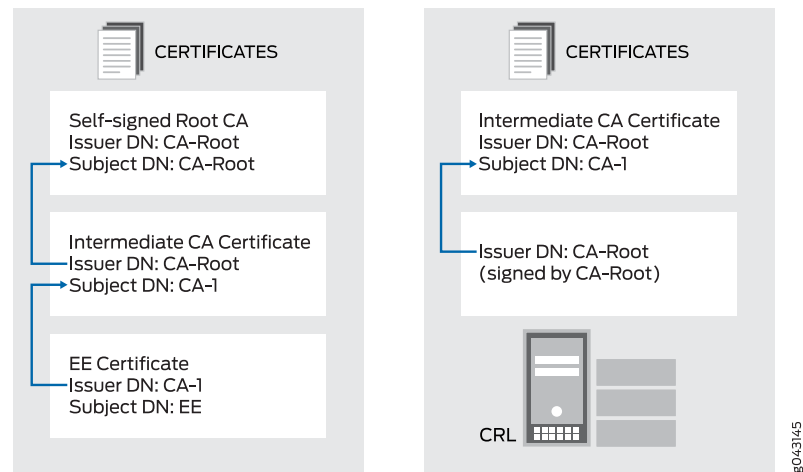
Issuer and Subject Distinguished Name Validation

Signature validation is performed for certificates received from a peer as well as for the CRL file downloaded from a CA server. Signature validation involves looking up the CA

certificate in a CA database based on the issuer's distinguished name (DN) in the certificate or the CRL being verified.

Figure 69 on page 988 shows the lookup for CA certificates based on the issuer DN. In the EE certificate, the issuer DN is CA-1, which is the subject DN of the intermediate CA certificate in the chain. In the intermediate CA certificate, the issuer DN is CA-Root, which is the subject DN of the self-signed Root-CA certificate in the chain. In the CRL, the issuer DN is CA-Root, which is the subject DN of the self-signed Root-CA certificate.

Figure 69: Issuer and Subject DN Validation



The lookup for the issuer or subject DN must follow these rules for attribute values:

- Attribute values encoded in different ASN.1 types (for example, PrintableString and BMPString) are assumed to represent different strings.
- Attribute values encoded in PrintableString types are not case-sensitive. These attribute values are compared after removing leading and trailing white spaces and converting internal substrings of one or more consecutive white spaces to a single space.
- Attribute values encoded in types other than PrintableString are case-sensitive.

See Also

- [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)
- [Deleting Certificates \(CLI Procedure\) on page 1007](#)

Example: Validating Digital Certificate by Configuring Policy OIDs on an SRX Series Device

In some situations, it might be desirable to only accept certificates with known policy object identifiers (OIDs) from peers. This optional configuration allows certificate validation to succeed only if the certificate chain received from the peer contains at least one policy OID that is configured on the SRX Series device. This example shows how to configure policy OIDs in the IKE policy on an SRX Series device.



NOTE: You must ensure that at least one of the policy OIDs configured on the SRX Series device is included in a peer's certificate or certificate chain. Note that the `policy-oids` field in a peer's certificate is optional. If you configure policy OIDs in an IKE policy and the peer's certificate chain does not contain any policy OIDs, certificate validation for the peer fails.

- [Requirements on page 989](#)
- [Overview on page 989](#)
- [Configuration on page 989](#)
- [Verification on page 990](#)

Requirements

Before you begin:

- Ensure that you are using Junos OS Release 12.3X48-D10 or later for SRX Series devices.
- Configure an IPsec VPN tunnel. See [“IPsec VPN with Autokey IKE Configuration Overview” on page 55](#). The complete IKE phase 1 and phase 2 VPN tunnel configuration is not shown in this example.

Overview

This example shows an IKE policy configuration where policy OIDs 2.16.840.1.101.3.1.48.2 and 5.16.40.1.101.3.1.55.2 are specified. The IKE policy `ike_cert_pol` references the IKE proposal `ike_cert_prop`, which is not shown. The local certificate on the SRX Series device is `lc-igloo-root`.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security ike policy ike_cert_pol mode main
set security ike policy ike_cert_pol proposals ike_cert_prop
set security ike policy ike_cert_pol certificate local-certificate lc-igloo-root
set security ike policy ike_cert_pol certificate policy-oids 2.16.840.1.101.3.1.48.2
set security ike policy ike_cert_pol certificate policy-oids 5.16.40.1.101.3.1.55.2
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure policy OIDs for certificate validation:

- Configure the IKE policy:

```
[edit security ike policy ike_cert_pol]
user@host# set mode main
user@host# set proposals ike_cert_prop
user@host# set certificate local-certificate lc-igloo-root
user@host# set certificate policy-oids 2.16.840.1.101.3.1.48.2
user@host# set certificate policy-oids 5.16.40.1.101.3.1.55.2
```

Results From configuration mode, confirm your configuration by entering the **show security ike policy ike_cert_pol** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show security ike policy ike_cert_pol
mode main;
proposals ike_cert_prop;
certificate {
  local-certificate lc-igloo-root;
  policy-oids [ 2.16.840.1.101.3.1.48.2 5.16.40.1.101.3.1.55.2 ];
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Verifying the CA Certificate

Purpose Display the CA certificate configured on the device.

Action From operational mode, enter the **show security pki ca-certificate ca-profile ca-tmp** command.

```
user@host> show security pki ca-certificate ca-profile ca-tmp detail
```

```

Certificate identifier: ca-tmp
Certificate version: 3
Serial number: 00000047
Issuer:
  Organization: U.S. Government,
  Organizational unit: DoD, Organizational unit: Testing,
Country: US,
  Common name: Trust Anchor
Subject:
  Organization: U.S. Government,
  Organizational unit: Dod, Organizational unit: Testing,
```

```

Country: US,
Common name: CA1-PP.01.03
Subject string:
  C=US, O=U.S. Government, OU=Dod, OU=Testing,
CN=CA1-PP.01.03
Validity:
  Not before: 01- 1-1998 12:01 UTC
  Not after: 01- 1-2048 12:01 UTC
?Public key algorithm: rsaEncryption(1024 bits)
  30:81:89:02:81:81:00:cb:fd:78:0c:be:87:ac:cd:c0:33:66:a3:18
  9e:fd:40:b7:9b:bc:dc:66:ff:08:45:f7:7e:fe:8e:d6:32:f8:5b:75
  db:76:f0:4d:21:9a:6e:4f:04:21:4c:7e:08:a1:f9:3d:ac:8b:90:76
  44:7b:c4:e9:9b:93:80:2a:64:83:6e:6a:cd:d8:d4:23:dd:ce:cb:3b
  b5:ea:da:2b:40:8d:ad:a9:4d:97:58:cf:60:af:82:94:30:47:b7:7d
  88:c3:76:c0:97:b4:6a:59:7e:f7:86:5d:d8:1f:af:fb:72:f1:b8:5c
  2a:35:1e:a7:9e:14:51:d4:19:ae:c7:5c:65:ea:f5:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Certificate Policy:
  Policy Identifier = 2.16.840.1.101.3.1.48.2
Use for key: CRL signing, Certificate signing
Fingerprint:
  e0:b3:2f:2e:a1:c5:ee:ad:af:dd:96:85:f6:78:24:c5:89:ed:39:40 (sha1)
  f3:47:6e:55:bc:9d:80:39:5a:40:70:8b:10:0e:93:c5 (md5)

```

Verifying Policy OID Validation

Purpose If the peer's certificate is successfully validated, IKE and IPsec security associations are established. If the validation of the peer's certificate fails, no IKE security association is established.

Action From operational mode, enter the **show security ike security-associations** and **show security ipsec security-associations** commands.

```
user@host> show security ike security-associations
```

```
node0:
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
821765168	UP	88875c981252c1d8	b744ac9c21bde57e	IKEv2	192.0.2.2
1106977837	UP	1a09e32d1e6f20f1	e008278091060acb	IKEv2	198.51.100.202

```
user@host> show security ipsec security-associations
```

```
node0:
```

```

-----
Total active tunnels: 2
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<213909506 ESP:aes-cbc-192/sha256 8cb9e40a 1295/ unlim - root 500 192.0.2.2
>213909506 ESP:aes-cbc-192/sha256 8271d2b2 1295/ unlim - root 500 192.0.2.2

```

```
<218365954 ESP:aes-cbc-192/sha256 d0153bc0 1726/ unlim - root 1495 198.51.100.202
>218365954 ESP:aes-cbc-192/sha256 97611813 1726/ unlim - root 1495 198.51.100.202
```

Meaning The `show security ike security-associations` command lists all active IKE Phase 1 SAs. If no SAs are listed, there was a problem with Phase 1 establishment. In this case, check for the `PKID_CERT_POLICY_CHECK_FAIL` message in the system logs. This message indicates that the peer's certificate chain does not contain a policy OID that is configured on the SRX Series device. Check the **policy-oids** values in the peer's certificate chain with the values configured on the SRX Series device.

It might also be that the peer's certificate chain does not contain any **policy-oids** fields, which are optional fields. If this is the case, certificate validation fails if there are any policy OIDs configured on the SRX Series device.

See Also

- [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)
- [Deleting Certificates \(CLI Procedure\) on page 1007](#)

Release History Table

Release	Description
18.1R3	Starting in Junos OS Release 18.1R3, the default encryption algorithm that is used for validating automatically and manually generated self-signed PKI certificates is Secure Hash Algorithm 256 (SHA-256). Prior to Junos OS Release 18.1R3, SHA-1 is used as default encryption algorithm.

Related Documentation

- [Configuring CA and Local Certificates on page 996](#)

Configuring Certificate Authority Profiles

A certificate authority (CA) profile define every parameter associated with a specific certificate to establish secure connection between two endpoints. The profiles specify which certificates to use, how to verify certificate revocation status, and how that status constrains access.

- [Understanding Certificate Authority Profiles on page 992](#)
- [Example: Configuring a CA Profile on page 993](#)
- [Example: Configuring an IPv6 address as the Source Address for a CA Profile on page 995](#)

Understanding Certificate Authority Profiles

A certificate authority (CA) profile configuration contains information specific to a CA. You can have multiple CA profiles on an SRX Series device. For example, you might have one profile for orgA and one for orgB. Each profile is associated with a CA certificate. If

you want to load a new CA certificate without removing the older one then create a new CA profile (for example, Microsoft-2008).

Starting with Junos OS Release 18.1R1, the CA server can be an IPv6 CA server.



NOTE: The PKI module supports IPv6 address format to enable the use of SRX Series devices in networks where IPv6 is the only protocol used.

A CA issues digital certificates, which helps to establish secure connection between two endpoints through certificate validation. You can group multiple CA profiles in one trusted CA group for a given topology. These certificates are used to establish a connection between two endpoints. To establish IKE or IPsec, both the endpoints must trust the same CA. If either of the endpoints are unable to validate the certificate using their respective trusted CA (ca-profile) or trusted CA group, the connection is not established. A minimum of one CA profile is mandatory to create a trusted CA group and maximum of 20 CAs are allowed in one trusted CA group. Any CA from a particular group can validate the certificate for that particular endpoint.

Starting with Junos OS Release 18.1R1, validation of a configured IKE peer can be done with a specified CA server or group of CA servers. A group of trusted CA servers can be created with the **trusted-ca-group** configuration statement at the **[edit security pki]** hierarchy level; one or multiple CA profiles can be specified. The trusted CA server is bound to the IKE policy configuration for the peer at **[edit security ike policy policy certificate]** hierarchy level.

If proxy profile is configured in CA profile, the device connects to the proxy host instead of the CA server while certificate enrollment, verification or revocation. The proxy host communicates with the CA server with the requests from the device, and then relay the response to the device.

CA proxy profile supports SCEP, CMPv2, and OCSP protocols.

CA proxy profile is supported only on HTTP and is not supported on HTTPS protocol.

- See Also**
- [Understanding Certificates and PKI on page 973](#)
 - [trusted-ca \(Security IKE Policy\) on page 1258](#)
 - [trusted-ca-group on page 1259](#)

Example: Configuring a CA Profile

This example shows how to configure a CA profile.

- [Requirements on page 994](#)
- [Overview on page 994](#)
- [Configuration on page 994](#)
- [Verification on page 995](#)

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

In this example, you create a CA profile called **ca-profile-ipsec** with CA identity **microsoft-2008**. You then create proxy profile to the CA profile. The configuration specifies that the CRL be refreshed every 48 hours, and the location to retrieve the CRL is **http://www.my-ca.com**. Within the example, you set the enrollment retry value to 20. (The default retry value is 10.)

Automatic certificate polling is set to every 30 minutes. If you configure retry only without configuring a retry interval, then the default retry interval is 900 seconds (or 15 minutes). If you do not configure retry or a retry interval, then there is no polling.

Configuration

Step-by-Step Procedure

To configure a CA profile:

1. Create a CA profile.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec ca-identity microsoft-2008
user@host#
```

2. Optionally, configure the proxy profile to the CA profile.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec proxy-profile px-profile
```

Public key infrastructure (PKI) uses proxy profile configured at the system-level. The proxy profile being used in the CA profile must be configured at the **[edit services proxy]** hierarchy. There can be more than one proxy profile configured under **[edit services proxy]** hierarchy. Each CA profile is referred to the most one such proxy profile. You can configure host and port of the proxy profile at the **[edit system services proxy]** hierarchy.

3. Create a revocation check to specify a method for checking certificate revocation.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec ca-identity microsoft-2008
revocation-check crl
```

4. Set the refresh interval, in hours, to specify the frequency in which to update the CRL. The default values are next-update time in CRL, or 1 week, if no next-update time is specified.

```
[edit]
```

```
user@host# set security pki ca-profile ca-profile-ipsec ca-identity microsoft-2008
revocation-check crl refresh-interval 48 url http://www.my-ca.com/my-crl.crl
```

5. Specify the enrollment retry value.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec enrollment retry 20
```

6. Specify the time interval in seconds between attempts to automatically enroll the CA certificate online.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec enrollment retry-interval
1800
```

7. If you are done configuring the device, commit the configuration.

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

Verification

To verify the configuration is working properly, enter the **show security pki** command.

See Also • [Digital Certificates Configuration Overview on page 981](#)

Example: Configuring an IPv6 address as the Source Address for a CA Profile

This example shows how to configure an IPv6 address as the source address for a CA profile.

No special configuration beyond device initialization is required before configuring this feature.

In this example, create a CA profile called **orgA-ca-profile** with CA identity **v6-ca** and set the source address of the CA profile to be an IPv6 address, such as **2001:db8:0:f101::1**. You can configure the enrollment URL to accept an IPv6 address **http://[2002:db8:0:f101::1]:/.../**.

1. Create a CA profile.

```
[edit]
user@host# set security pki ca-profile orgA-ca-profile ca-identity v6_ca
```

2. Configure the source address of the CA profile to be an IPv6 address.

```
[edit]
user@host# set security pki ca-profile v6_ca source-address 2001:db8:0:f101::1
```

3. Specify the enrollment parameters for the CA.

```
[edit]
user@host# set security pki ca-profile v6_ca enrollment url
http://[2002:db8:0:f101::1]:/.../
```

4. If you are done configuring the device, commit the configuration.

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

See Also • [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)

Release History Table

Release	Description
18.1R1	Starting with Junos OS Release 18.1R1, the CA server can be an IPv6 CA server.
18.1R1	Starting with Junos OS Release 18.1R1, validation of a configured IKE peer can be done with a specified CA server or group of CA servers.

Related Documentation • [Generating Self-Signed Digital Certificates on page 1008](#)

Configuring CA and Local Certificates

A certificate authority (CA) issues digital certificates, which helps to establish a secure connection between two endpoints through certificate validation. The following topics describe how to configure CA certificates online or local using Simple Certificate Enrollment Protocol (SCEP):

- [Understanding Online CA Certificate Enrollment on page 997](#)
- [Understanding Local Certificate Requests on page 997](#)
- [Enrolling a CA Certificate Online Using SCEP on page 998](#)
- [Example: Enrolling a Local Certificate Online Using SCEP on page 998](#)
- [Example: Using SCEP to Automatically Renew a Local Certificate on page 1000](#)
- [Understanding CMPv2 and SCEP Certificate Enrollment on page 1002](#)
- [Understanding Certificate Enrollment with CMPv2 on page 1002](#)
- [Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server on page 1004](#)

- [Example: Loading CA and Local Certificates Manually on page 1006](#)
- [Deleting Certificates \(CLI Procedure\) on page 1007](#)

Understanding Online CA Certificate Enrollment

With Simple Certificate Enrollment Protocol (SCEP), you can configure your Juniper Networks device to obtain a certificate authority (CA) certificate online and start the online enrollment for the specified certificate ID. The CA public key verifies certificates from remote peers.

See Also • [Understanding Certificates and PKI on page 973](#)

Understanding Local Certificate Requests

When you create a local certificate request, the device generates a CA certificate in PKCS #10 format from a key pair you previously generated using the same certificate ID.

A subject name is associated with the local certificate request in the form of a common name (CN), organizational unit (OU), organization (O), locality (L), state (ST), country (C), and domain component (DC). Additionally, a subject alternative name is associated in the following form:

- IP address
- E-mail address
- Fully qualified domain name (FQDN)



NOTE: Specify the subject name in the distinguished name format in quotation marks, including the domain component (DC), common name (CN), serial number (SN), organizational unit name (OU), organization name (O), locality (L), state (ST), and country (C).



NOTE: Some CAs do not support an e-mail address as the domain name in a certificate. If you do not include an e-mail address in the local certificate request, you cannot use an e-mail address as the local IKE ID when configuring the device as a dynamic peer. Instead, you can use a fully qualified domain name (if it is in the local certificate), or you can leave the local ID field empty. If you do not specify a local ID for a dynamic peer, enter the *hostname.domain-name* of that peer on the device at the other end of the IPsec tunnel in the peer ID field.

See Also • [Understanding Certificates and PKI on page 973](#)

Enrolling a CA Certificate Online Using SCEP

Before you begin:

1. Generate a public and private key pair. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
2. Create a CA profile. See [“Example: Configuring a CA Profile” on page 993](#).

To enroll a CA certificate online:

1. Retrieve the CA certificate online using SCEP. (The attributes required to reach the CA server are obtained from the defined CA profile.)

```
user@host> request security pki ca-certificate enroll ca-profile ca-profile-ipsec
```

The command is processed synchronously to provide the fingerprint of the received CA certificate.

```
Fingerprint:
e6:fa:d6:da:e8:8d:d3:00:e8:59:12:e1:2c:b9:3c:c0:9d:6c:8f:8d (sha1)
82:e2:dc:ea:48:4c:08:9a:fd:b5:24:b0:db:c3:ba:59 (md5)
Do you want to load the above CA certificate ? [yes,no]
```

2. Confirm that the correct certificate is loaded. The CA certificate is loaded only when you type **yes** at the CLI prompt.

For more information on the certificate, such as the bit length of the key pair, use the command **show security pki ca-certificate**.

See Also • [Digital Certificates Configuration Overview on page 981](#)

Example: Enrolling a Local Certificate Online Using SCEP

This example shows how to enroll a local certificate online using Simple Certificate Enrollment Protocol (SCEP).

- [Requirements on page 998](#)
- [Overview on page 999](#)
- [Configuration on page 999](#)
- [Verification on page 1000](#)

Requirements

Before you begin:

- Generate a public and private key pair. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
- Configure a certificate authority profile. See [“Example: Configuring a CA Profile” on page 993](#).

- For SCEP, enroll the CA certificate. See [“Enrolling a CA Certificate Online Using SCEP” on page 998](#).

Overview

In this example, you configure your Juniper Networks device to obtain a local certificate online and start the online enrollment for the specified certificate ID with SCEP. You specify the URL path to the CA server in the CA profile name **ca-profile-ipsec**.

You use the **request security pki local-certificate enroll scep** command to start the online enrollment for the specified certificate ID. (Starting in Junos OS Release 15.1X49-D40 and Junos OS Release 17.3R1, the **scep** keyword is supported and required.) You must specify the CA profile name (for example, **ca-profile-ipsec**), the certificate ID corresponding to a previously generated key-pair (for example, **qqq**), and the following information:

- The challenge password provided by the CA administrator for certificate enrollment and reenrollment.
- At least one of the following values:
 - The domain name to identify the certificate owner in IKE negotiations—for example, **qqq.example.net**.
 - The identity of the certificate owner for IKE negotiation with the e-mail statement—for example, **qqq@example.net**.
 - The IP address if the device is configured for a static IP address—for example, **10.10.10.10**.



NOTE: Specify the subject name in the distinguished name format in quotation marks, including the domain component (DC), common name (CN), serial number (SN), organizational unit name (OU), organization name (O), locality (L), state (ST), and country (C).

Once the device certificate is obtained and the online enrollment begins for the certificate ID. The command is processed asynchronously.

Configuration

Step-by-Step Procedure

To enroll a local certificate online:

1. Specify the CA profile.

```
[edit]
user@host# set security pki ca-profile ca-profile-ipsec enrollment url
path-to-ca-server
```

2. If you are done configuring the device, commit the configuration.

```
[edit]
```

```
user@host# commit
```

3. Initiate the enrollment process by running the operational mode command.

```
user@host> request security pki local-certificate enroll scep ca-profile  
ca-profile-ipsec certificate-id qqq challenge-password ca-provided-password  
domain-name qqq.example.net email qqq@example.net ip-address 10.10.10.10  
subject DC=example, CN=router3, SN, OU=marketing, O=example, L=sunnyvale,  
ST=california, C=us
```



NOTE: If you define SN in the subject field without the serial number, then the serial number is read directly from the device and added to the certificate signing request (CSR).

Verification

To verify the configuration is working properly, enter the **show security pki** command.

- See Also**
- [Digital Certificates Configuration Overview on page 981](#)
 - [Enrolling Digital Certificates Online: Configuration Overview on page 982](#)

Example: Using SCEP to Automatically Renew a Local Certificate

You can use either Certificate Management Protocol version 2 (CMPv2) or Simple Certificate Enrollment Protocol (SCEP) to enroll digital certificates. This example shows how to renew the local certificates automatically using SCEP.

- [Requirements on page 1000](#)
- [Overview on page 1001](#)
- [Configuration on page 1001](#)
- [Verification on page 1002](#)

Requirements

Before you begin:

- Obtain a certificate either on line or manually. See “[Enrolling Digital Certificates Online: Configuration Overview](#)” on page 982.
- Obtain a local certificate. See “[Example: Enrolling a Local Certificate Online Using SCEP](#)” on page 998.

Overview

You can enable the device to automatically renew certificates that were acquired by online enrollment or loaded manually. Automatic certificate renewal saves you from having to remember to renew certificates on the device before they expire, and helps to maintain valid certificates at all times.

Automatic certificate renewal is disabled by default. You can enable automatic certificate renewal and configure the device to automatically send out a request to reenroll a certificate before it expires. You can specify when the certificate reenrollment request is to be sent; the trigger for reenrollment is the percentage of the certificate's lifetime that remains before expiration. For example, if the renewal request is to be sent when the certificate's remaining lifetime is 10 percent, then configure 10 for the reenrollment trigger.

For this feature to work, the device must be able to reach the CA server, and the certificate must be present on the device during the renewal process. Furthermore, you must also ensure that the CA issuing the certificate can return the same DN. The CA must not modify the subject name or alternate subject name extension in the new certificate.

You can enable and disable automatic SCEP certificate renewal either for all SCEP certificates or on a per-certificate basis. You use the **set security pki auto-re-enrollment scep** command to enable and configure certificate reenrollment. In this example, you specify the certificate ID of the CA certificate as **ca-ipsec** and set the CA profile name associated with the certificate to **ca-profile-ipsec**. You set the challenge password for the CA certificate to the challenge password provided by the CA administrator; this password must be the same one configured previously for the CA. You also set the percentage for the reenrollment trigger to **10**. During automatic reenrollment, the Juniper Networks device by default uses the existing key pair. A good security practice is to regenerate a new key pair for reenrollment. To generate a new key pair, use the **re-generate-keypair** command.

Configuration

Step-by-Step Procedure

To enable and configure local certificate reenrollment:

1. To enable and configure certificate reenrollment.

```
[edit]
user@host# set security pki auto-re-enrollment scep certificate-id ca-ipsec
ca-profile-name ca-profile-ipsec challenge-password ca-provided-password
re-enroll-trigger-time-percentage 10 re-generate-keypair
```

Starting in Junos OS Release 15.1X49-D40 and Junos OS Release 17.3R1, the **scep** keyword is supported and required.

2. If you are done configuring the device, commit the configuration.

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

Verification

To verify the configuration is working properly, enter the **show security pki local-certificate detail** operational mode command.

See Also • [Enrolling Digital Certificates Online: Configuration Overview on page 982](#)

Understanding CMPv2 and SCEP Certificate Enrollment

Based on your deployment environment, you can use either Certificate Management Protocol version 2 (CMPv2) or Simple Certificate Enrollment Protocol (SCEP) for online certificate enrollment. This topic describes some of the basic differences between the two protocols.

[Table 101 on page 1002](#) describes the differences between the CMPv2 and SCEP certificate enrollment protocols.

Table 101: Comparison of CMPv2 and SCEP Certificate Enrollment

Attribute	CMPv2	SCEP
Supported certificate types:	DSA, ECDSA, and RSA	RSA only
Supported standards	RFCs 4210 and 4211	Internet Engineering Task Force draft

Certificate enrollment and reenrollment requests and responses differ between CMPv2 and SCEP. With CMPv2, there is no separate command to enroll CA certificates. With SCEP, you enroll CA certificates with the **request security pki ca-certificate enroll** command and specify the CA profile. A CA profile must be configured with either CMPv2 or SCEP.

See Also • [Understanding Certificates and PKI on page 973](#)

Understanding Certificate Enrollment with CMPv2

The **request security pki local-certificate enroll cmpv2** command uses CMPv2 to enroll a local digital certificate online. This command loads both end-entity and CA certificates based on the CA server configuration. The CA profile must be created prior to CA certificate enrollment because the enrollment URL is extracted from the CA profile.

This topic describes certificate enrollment with the CMPv2 protocol.

- [Certificate Enrollment and Reenrollment Messages on page 1002](#)
- [End-Entity Certificate with Issuer CA Certificate on page 1003](#)
- [End-Entity Certificate with CA Certificate Chain on page 1003](#)

Certificate Enrollment and Reenrollment Messages

The CMPv2 protocol mainly involves certificate enrollment and reenrollment operations. The certificate enrollment process includes Initialization Request and Initialization

Response messages, while certificate reenrollment includes Key Update Request and Key Update Response messages.



NOTE: If the Initialization Response message needs to be authenticated by a CA certificate, the CA certificate must be enrolled prior to any end-entity certificate enrollment.

The Initialization Response or Key Update Response message can contain an issuer CA certificate or a chain of CA certificates. The CA certificates received in the responses are treated as trusted CA certificates and stored in the receiving device if they are not already present in the trusted CA store. These CA certificates are later used for end-entity certificate validation.



NOTE: CA certificate reenrollment is not supported.

A CA might issue a new CA certificate prior to the expiration of the current CA certificate. If a new CA certificate arrives during certificate reenrollment with a new public key, the new CA certificate is not saved in the device.

End-Entity Certificate with Issuer CA Certificate

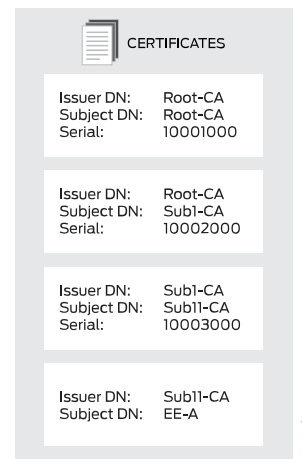
In a simple scenario, the Initialization Response message might contain only an end-entity certificate, in which case the CA information is provided separately. The certificate is stored in the end-entity certificate store.

The Initialization Response message can contain an end-entity certificate as well as a self-signed issuer CA certificate. The end-entity certificate is first stored in the certificate store, and then the CA certificate is checked. If the CA certificate is found and the subject distinguished name (DN) of the CA certificate in the Initialization Response message matches the issuer DN of the end-entity certificate, the CA certificate is stored in the CA certificate store for the CA profile name specified in the CMPv2 certificate enrollment command. If the CA certificate already exists in the CA certificate store, no action is taken.

End-Entity Certificate with CA Certificate Chain

In many deployments, the end-entity certificate is issued by an intermediate CA in a certificate chain. In this case, the Initialization Response message can contain the end-entity certificate along with a list of CA certificates in the chain. The intermediate CA certificates and the self-signed root CA certificates are all required to validate the end-entity certificate. The CA chain might also be needed to validate certificates received from peer devices with similar hierarchies. The following section describes how certificates in the CA chain are stored.

In [Figure 70 on page 1004](#), the Initialization Response message includes the end-entity certificate and three CA certificates in a certificate chain.

Figure 70: End-Entity Certificate with CA Certificate Chain

The end-entity certificate is stored in the end-entity certificate store. Each CA certificate needs a CA profile. The CA certificate with the subject DN Sub11-CA is the first CA in the chain and is the issuer of the end-entity certificate. It is stored in the CA profile that is specified with the CMPv2 certificate enrollment command.

Each of the remaining CA certificates in the chain is checked for its presence in the CA store. If a CA certificate is not present in the CA store, it is saved and a CA profile is created for it. The new CA profile name is created using the least significant 16 digits of the CA certificate serial number. If the serial number is longer than 16 digits, the most significant digits beyond 16 digits are truncated. If the serial number is shorter than 16 digits, the remaining most significant digits are filled with 0s. For example, if the serial number is 11111000100010001000, then the CA profile name is 1000100010001000. If the serial number is 10001000, then the CA profile name is 0000000010001000.

It is possible that multiple certificate serial numbers can have the same least significant 16 digits. In that case, -00 is appended to the profile name to create a unique CA profile name; additional CA profile names are created by incrementing the appended number, from -01 up to -99. For example, CA profile names can be 1000100010001000, 1000100010001000-00, and 1000100010001000-01.

- See Also**
- [Understanding Certificate Authority Profiles on page 992](#)
 - [Understanding Certificate Chains on page 139](#)

Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server

This example shows how to generate a certificate signing request manually.

- [Requirements on page 1005](#)
- [Overview on page 1005](#)
- [Configuration on page 1005](#)
- [Verification on page 1005](#)

Requirements

Generate a public and private key. See [“Example: Generating a Public-Private Key Pair” on page 983](#).

Overview

In this example, you generate a certificate request using the certificate ID of a public-private key pair you previously generated (ca-ipsec). Then you specify the domain name (example.net) and the associated common name (abc). The certificate request is displayed in PEM format.

You copy the generated certificate request and paste it into the appropriate field at the CA website to obtain a local certificate. (Refer to the CA server documentation to determine where to paste the certificate request.) When the PKCS #10 content is displayed, the MD5 hash and SHA-1 hash of the PKCS #10 file is also displayed.

Configuration

Step-by-Step Procedure

To generate a local certificate manually:

- Specify certificate ID, domain name, and common name.

```
user@host> request security pki generate-certificate-request certificate-id ca-ipsec
domain-name example.net subject CN=abc
```

Verification

To view the certificate signing request, enter the **show security pki certificate-request detail** command.

```
Certificate identifier: ca-ipsec
Certificate version: 1
Issued to: CN = abc
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:da:ea:cd:3a:49:1f:b7:33:3c:c5:50:fb:57
de:17:34:1c:51:9b:7b:1c:e9:1c:74:86:69:a4:36:77:13:a7:10:0e
52:f4:2b:52:39:07:15:3f:39:f5:49:d6:86:70:4b:a6:2d:73:b6:68
39:d3:6b:f3:11:67:ee:b4:40:5b:f4:de:a9:a4:0e:11:14:3f:96:84
03:3c:73:c7:75:f5:c4:c2:3f:5b:94:e6:24:aa:e8:2c:54:e6:b5:42
c7:72:1b:25:ca:f3:b9:fa:7f:41:82:6e:76:8b:e6:d7:d2:93:9b:38
fe:fd:71:01:2c:9b:5e:98:3f:0c:ed:a9:2b:a7:fb:02:03:01:00:01
Fingerprint:
0f:e6:2e:fc:6d:52:5d:47:6e:10:1c:ad:a0:8a:4c:b7:cc:97:c6:01 (sha1)
f8:e6:88:53:52:c2:09:43:b7:43:9c:7a:a2:70:98:56 (md5)
```

See Also • [Digital Certificates Configuration Overview on page 981](#)

Example: Loading CA and Local Certificates Manually

This example shows how to load CA and local certificates manually.

- [Requirements on page 1006](#)
- [Overview on page 1006](#)
- [Configuration on page 1006](#)
- [Verification on page 1007](#)

Requirements

Before you begin:

- Generate a public-private key pair. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
- Create a CA profile. See [“Understanding Certificate Authority Profiles” on page 992](#).



NOTE: CA Profile is only required for the CA certificate and not for the local certificate

- Generate a certificate request. See [“Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server” on page 1004](#).

Overview

In this example, you download the local.cert and ca.cert certificates and save them to the /var/tmp/ directory on the device.

After you download certificates from a CA, you transfer them to the device (for example, using FTP), and then load them.

You can load the following certificate files onto a device running Junos OS:

- A local or end-entity (EE) certificate that identifies your local device. This certificate is your public key.
- A CA certificate that contains the CA's public key.
- A CRL that lists any certificates revoked by the CA.



NOTE: You can load multiple EE certificates onto the device.

Configuration

Step-by-Step Procedure

To load the certificate files onto a device:

1. Load the local certificate.

```
[edit]
user@host> request security pki local-certificate load certificate-id local.cert
filename /var/tmp/local.cert
```

2. Load the CA certificate.

```
[edit]
user@host> request security pki ca-certificate load ca-profile ca-profile-ipsec
filename /var/tmp/ca.cert
```

3. Examine the fingerprint of the CA certificate, if it is correct for this CA certificate select yes to accept.

Verification

To verify the certificates loaded properly, enter the **show security pki local-certificate** and **show security pki ca-certificate** commands in operational mode.

```
Fingerprint:
e8:bf:81:6a:cd:26:ad:41:b3:84:55:d9:10:c4:a3:cc:c5:70:f0:7f (sha1)
19:b0:f8:36:e1:80:2c:30:a7:31:79:69:99:b7:56:9c (md5)
Do you want to load this CA certificate ? [yes,no] (no) yes
```

- See Also**
- [Digital Certificates Configuration Overview on page 981](#)
 - [Example: Using SCEP to Automatically Renew a Local Certificate on page 1000](#)
 - [Example: Verifying Certificate Validity on page 1033](#)
 - [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)

Deleting Certificates (CLI Procedure)

You can delete a local or trusted CA certificate that is automatically or manually generated.

Use the following command to delete a local certificate:

```
user@host> clear security pki local certificate certificate-id (certificate-id| all |
system-generated )
```

Specify a certificate ID to delete a local certificate with a specific ID, use **all** to delete all local certificates, or specify **system-generated** to delete the automatically generated self-signed certificate.

When you delete an automatically generated self-signed certificate, the device generates a new one.

To delete a CA certificate:

```
user@host> clear security pki ca-certificate ca-profile (ca-profile-name | all)
```

Specify a CA profile to delete a specific CA certificate, or use **all** to delete all CA certificates present in the persistent store.



NOTE: You are asked for confirmation before a CA certificate can be deleted.

See Also • [Digital Certificates Configuration Overview on page 981](#)

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40 and Junos OS Release 17.3R1, the scep keyword is supported and required.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40 and Junos OS Release 17.3R1, the scep keyword is supported and required.

Related Documentation • [Digital Certificates with PKI Overview on page 973](#)

Generating Self-Signed Digital Certificates

A self-signed certificate is a certificate that is signed by the same entity who created it rather than by a Certificate Authority (CA). Junos OS provides two methods for generating a self-signed certificate- automatic generation and manual generation.

- [Understanding Self-Signed Certificates on page 1008](#)
- [Example: Manually Generating Self-Signed Certificates on page 1009](#)
- [Using Automatically Generated Self-Signed Certificates \(CLI Procedure\) on page 1010](#)

Understanding Self-Signed Certificates

A self-signed certificate is a certificate that is signed by its creator rather than by a Certificate Authority (CA).

Self-signed certificates allow for use of SSL-based (Secure Sockets Layer) services without requiring that the user or administrator to undertake the considerable task of obtaining an identity certificate signed by a CA.



NOTE: Self-signed certificates do not provide additional security as do those generated by CAs. This is because a client cannot verify that the server he or she has connected to is the one advertised in the certificate.

Junos OS provides two methods for generating a self-signed certificate:

- Automatic generation

In this case, the creator of the certificate is the Juniper Networks device. An automatically generated self-signed certificate is configured on the device by default.

After the device is initialized, it checks for the presence of an automatically generated self-signed certificate. If it does not find one, the device generates one and saves it in the file system.

- Manual generation

In this case, you create the self-signed certificate for the device.

At any time, you can use the CLI to generate a self-signed certificate. These certificates are also used to gain access to SSL services.

Self-signed certificates are valid for five years from the time they were generated.

An automatically generated self-signed certificate allows for use of SSL-based services without requiring that the administrator obtain an identity certificate signed by a CA.

A self-signed certificate that is automatically generated by the device is similar to a Secure Shell (SSH) host key. It is stored in the file system, not as part of the configuration. It persists when the device is rebooted, and it is preserved when a **request system snapshot** command is issued.

A self-signed certificate that you manually generate allows for use of SSL-based services without requiring that you obtain an identity certificate signed by a CA. A manually generated self-signed certificate is one example of a public key infrastructure (PKI) local certificate. As is true of all PKI local certificates, manually generated self-signed certificates are stored in the file system.

See Also • [Understanding Certificates and PKI on page 973](#)

Example: Manually Generating Self-Signed Certificates

This example shows how to generate self-signed certificates manually.

- [Requirements on page 1009](#)
- [Overview on page 1009](#)
- [Configuration on page 1010](#)
- [Verification on page 1010](#)

Requirements

Before you begin, generate a public private key pair. See [“Example: Generating a Public-Private Key Pair” on page 983](#).

Overview

For a manually generated self-signed certificate, you specify the DN when you create it. For an automatically generated self-signed certificate, the system supplies the DN, identifying itself as the creator.

In this example, you generate a self-signed certificate with the e-mail address as **mholmes@example.net**. You specify a certificate-id of **self-cert** to be referenced by web management, which refers a key-pair of the same certificate-id.

Configuration

Step-by-Step Procedure To generate the self-signed certificate manually:

- Create the self-signed certificate.

```
user@host> request security pki local-certificate generate-self-signed certificate-id
self-cert subject CN=abc domain-name example.net ip-address 1.2.3.4 email
mholmes@example.net
```

Verification

To verify the certificate was properly generated and loaded, enter the **show security pki local-certificate** operational mode command.

See Also • [Digital Certificates Configuration Overview on page 981](#)

Using Automatically Generated Self-Signed Certificates (CLI Procedure)

After the device is initialized, it checks for the presence of a self-signed certificate. If a self-signed certificate is not present, the device automatically generates one.

You can add the following statement to your configuration if you want to use the automatically generated self-signed certificate to provide access to HTTPS services:

```
system {
  services {
    web-management {
      http {
        interface [ ... ];
      } https {
        system-generated-certificate;
        interface [ ... ];
      }
    }
  }
}
```

The device uses the following distinguished name for the automatically generated certificate:

```
"CN=<device serial number>, CN=system generated, CN=self-signed"
```

Use the following command to specify that the automatically generated self-signed certificate is to be used for Web management HTTPS services:

```
user@host# set system services web-management https system-generated-certificate
```

Use the following operational command to delete the automatically generated self-signed certificate:

```
user@host# clear security pki local-certificate system-generated
```

After you delete the system-generated self-signed certificate, the device automatically generates a new one and saves it in the file system.

See Also • [Digital Certificates Configuration Overview on page 981](#)

Related Documentation • [Digital Certificates with PKI Overview on page 973](#)

Revoking Digital Certificates

Digital certificates have an expiration date, however, prior to expiration, a certificate may no longer be valid due to many reasons. You can manage certificate revocations and validations locally and by referencing a Certificate Authority (CA) certificate revocation list (CRL).

- [Understanding Online Certificate Status Protocol and Certificate Revocation Lists on page 1011](#)
- [Improving Security by Configuring OCSP for Certificate Revocation Status on page 1014](#)
- [Example: Manually Loading a CRL onto the Device on page 1029](#)
- [Understanding Dynamic CRL Download and Checking on page 1030](#)
- [Example: Configuring a Certificate Authority Profile with CRL Locations on page 1032](#)
- [Example: Verifying Certificate Validity on page 1033](#)
- [Deleting a Loaded CRL \(CLI Procedure\) on page 1035](#)

Understanding Online Certificate Status Protocol and Certificate Revocation Lists

OCSP is used to check the revocation status of X509 certificates. OCSP provides revocation status on certificates in real time and is useful in time-sensitive situations such as bank transactions and stock trades.

The revocation status of a certificate is checked by sending a request to an OCSP server that resides outside of an SRX Series device. Based on the response from the server, the VPN connection is allowed or denied. OCSP responses are not cached on SRX Series devices.

The OCSP server can be the certificate authority (CA) that issues a certificate or a designated authorized responder. The location of the OCSP server can be configured manually or extracted from the certificate that is being verified. Requests are sent first to OCSP server locations that are manually configured in CA profiles with the **ocsp url** statement at the **[edit security pki ca-profile *profile-name* revocation-check]** hierarchy

level; up to two locations can be configured for each CA profile. If the first configured OCSP server is not reachable, the request is sent to the second OCSP server. If the second OCSP server is not reachable, the request is then sent to the location in the certificate's AuthorityInfoAccess extension field. The **use-ocsp** option must also be configured, as certificate revocation list (CRL) is the default checking method.

SRX Series devices accept only signed OCSP responses from the CA or authorized responder. The response received is validated using trusted certificates. The response is validated as follows:

1. The CA certificate enrolled for the configured CA profile is used to validate the response.
2. The OCSP response might contain a certificate to validate the OCSP response. The received certificate must be signed by a CA certificate enrolled in the SRX Series device. After the received certificate is validated by the CA certificate, it is used to validate the OCSP response.

The response from the OCSP server can be signed by different CAs. The following scenarios are supported:

- The CA server that issues the end entity certificate for a device also signs the OCSP revocation status response. The SRX Series device verifies the OCSP response signature using the CA certificate enrolled in the SRX Series device. After the OCSP response is validated, the certificate revocation status is checked.
- An authorized responder signs the OCSP revocation status response. The certificate for the authorized responder and the end entity certificate being verified must be issued by the same CA. The authorized responder is first verified using the CA certificate enrolled in the SRX Series device. The OCSP response is validated using the responder's CA certificate. The SRX Series device then uses the OCSP response to check the revocation status of the end entity certificate.
- There are different CA signers for the end entity certificate being verified and the OCSP response. The OCSP response is signed by a CA in the certificate chain for the end entity certificate being verified. (All peers participating in an IKE negotiation need to have at least one common trusted CA in their respective certificate chains.) The OCSP responder's CA is verified using a CA in the certificate chain. After validating the responder CA certificate, the OCSP response is validated using the responder's CA certificate.

To prevent replay attacks, a nonce payload can be sent in an OCSP request. Nonce payloads are sent by default unless it is explicitly disabled. If enabled, the SRX Series device expects the OCSP response to contain a nonce payload, otherwise the revocation check fails. If OCSP responders are not capable of responding with a nonce payload, then the nonce payload must be disabled on the SRX Series device.

In the normal course of business, certificates are revoked for various reasons. You might wish to revoke a certificate if you suspect that it has been compromised, for example, or when a certificate holder leaves the company.

You can manage certificate revocations and validations in two ways:

- Locally— This is a limited solution.
- By referencing a Certificate Authority (CA) certificate revocation list (CRL)— You can automatically access the CRL online at intervals you specify or at the default interval set by the CA.

In Phase 1 negotiations, participants check the CRL list to see if certificates received during an IKE exchange are still valid. If a CRL did not accompany a CA certificate and is not loaded on the device, the device tries to download it automatically from the CRL distribution point of the local certificate. If the device fails to connect to the URL in the certificate distribution point (CDP), it tries to retrieve the CRL from the URL configured in the CA profile.

If the certificate does not contain a certificate distribution point extension, and you cannot automatically retrieve the CRL through Lightweight Directory Access Protocol (LDAP) or Hypertext Transfer Protocol (HTTP), you can retrieve a CRL manually and load that in the device.

Local certificates are being validated against certificate revocation list (CRL) even when CRL check is disabled. This can be stopped by disabling the CRL check through the Public Key Infrastructure (PKI) configuration. When CRL check is disabled, PKI will not validate local certificate against CRL.

Comparison of Online Certificate Status Protocol and Certificate Revocation List

Online Certificate Status Protocol (OCSP) and certificate revocation list (CRL) can both be used to check the revocation status of a certificate. There are advantages and disadvantages to each method.

- OCSP provides certificate status in real time, while CRL uses cached data. For time-sensitive applications, OCSP is the preferred approach.
- CRL checking is faster because lookup for certificate status is done on information cached on the VPN device. OCSP requires time to obtain the revocation status from an external server.
- CRL requires additional memory to store the revocation list received from a CRL server. OCSP does not require additional memory to save the revocation status of certificates.
- OCSP requires that the OCSP server be available at all times. CRL can use cached data to check the revocation status of certificates when the server is unreachable.



NOTE: On MX Series and SRX Series devices, CRL is the default method used to check the revocation status of a certificate.

See Also • [Understanding Digital Certificate Validation on page 984](#)

Improving Security by Configuring OCSP for Certificate Revocation Status

This example shows how to improve security by configuring two peers using the Online Certificate Status Protocol (OCSP) to check the revocation status of the certificates used in Phase 1 negotiations for the IPsec VPN tunnel.

- [Requirements on page 1014](#)
- [Overview on page 1014](#)
- [Configuration on page 1016](#)
- [Verification on page 1025](#)

Requirements

On each device:

- Obtain and enroll a local certificate. This can be done either manually or by using the Simple Certificate Enrollment Protocol (SCEP).
- Optionally, enable automatic renewal of the local certificate.
- Configure security policies to permit traffic to and from the peer device.

Overview

On both peers, a certificate authority (CA) profile OCSP-ROOT is configured with the following options:

- CA name is OCSP-ROOT.
- Enrollment URL is `http://10.1.1.1:8080/scep/OCSP-ROOT/`. This is the URL where SCEP requests to the CA are sent.
- The URL for the OCSP server is `http://10.157.88.56:8210/OCSP-ROOT/`.
- OCSP is used first to check the certificate revocation status. If there is no response from the OCSP server, then the certificate revocation list (CRL) is used to check the status. The CRL URL is `http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45`.
- The CA certificate received in an OCSP response is not checked for certificate revocation. Certificates received in an OCSP response generally have shorter lifetimes and a revocation check is not required.

[Table 102 on page 1014](#) shows the Phase 1 options used in this example.

Table 102: Phase 1 Options for OCSP Configuration Example

Option	Peer A	Peer B
IKE proposal	ike_prop	ike_prop
Authentication method	RSA signatures	RSA signatures
DH group	group2	group2

Table 102: Phase 1 Options for OCSP Configuration Example (continued)

Option	Peer A	Peer B
Authentication algorithm	SHA 1	SHA 1
Encryption algorithm	3DES CBC	3DES CBC
IKE policy	ike_policy	ike_policy
Mode	aggressive	aggressive
Proposal	ike_prop	ike_prop
Certificate	local-certificate localcert1	local-certificate localcert1
IKE gateway	jsr_gateway	jsr_gateway
Policy	ike_policy	ike_policy
Gateway address	198.51.100.50	192.0.2.50
Remote identity	localcert11.example.net	-
Local identity	-	localcert11.example.net
External interface	reth1	ge-0/0/2.0
Version	v2	v2

[Table 103 on page 1015](#) shows the Phase 2 options used in this example.

Table 103: Phase 2 Options for OCSP Configuration Example

Option	Peer A	Peer B
IPsec proposal	ipsec_prop	ipsec_prop
Protocol	ESP	ESP
Authentication algorithm	HMAC SHA1-96	HMAC SHA1-96
Encryption algorithm	3DES CBC	3DES CBC
Lifetime seconds	1200	1200
Lifetime kilobytes	150,000	150,000
IPsec policy	ipsec_policy	ipsec_policy
PFC keys	group2	group2

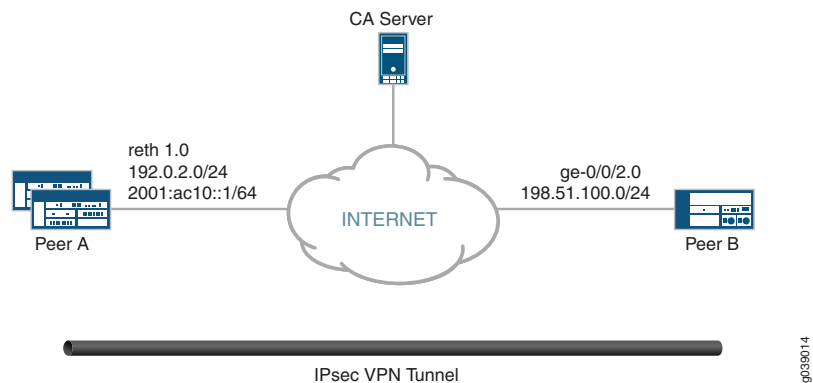
Table 103: Phase 2 Options for OCSP Configuration Example (continued)

Option	Peer A	Peer B
Proposal	ipsec_prop	ipsec_prop
VPN	test_vpn	test_vpn
Bind interface	st0.1	st0.1
IKE gateway	jsr_gateway	jsr_gateway
Policy	ipsec_policy	ipsec_policy
Establish tunnels	-	immediately

Topology

Figure 71 on page 1016 shows the peer devices that are configured in this example.

Figure 71: OCSP Configuration Example

**Configuration**

- [Configuring Peer A on page 1016](#)
- [Configuring Peer B on page 1021](#)

Configuring Peer A**CLI Quick Configuration**

To quickly configure VPN peer A to use OCSP, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/3 gigether-options redundant-parent reth1
set interfaces ge-9/0/3 gigether-options redundant-parent reth1
set interfaces lo0 unit 0 family inet address 172.16.1.100/24
```

```

set interfaces lo0 redundant-pseudo-interface-options redundancy-group 1
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 family inet address 192.0.2.50/24
set interfaces st0 unit 1 family inet address 172.18.1.100/24
set security pki ca-profile OCSP-ROOT ca-identity OCSP-ROOT
set security pki ca-profile OCSP-ROOT enrollment url
    http://10.1.1.1:8080/scep/OCSP-ROOT/
set security pki ca-profile OCSP-ROOT revocation-check ocsp url
    http://10.157.88.56:8210/OCSP-ROOT/
set security pki ca-profile OCSP-ROOT revocation-check use-ocsp
set security pki ca-profile OCSP-ROOT revocation-check ocsp
    disable-responder-revocation-check
set security pki ca-profile OCSP-ROOT revocation-check ocsp connection-failure
    fallback-crl
set security pki ca-profile OCSP-ROOT revocation-check crl url
    http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45
set security ike proposal ike_prop authentication-method rsa-signatures
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm sha1
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_policy mode aggressive
set security ike policy ike_policy proposals ike_prop
set security ike policy ike_policy certificate local-certificate localcert1
set security ike gateway jsr_gateway ike-policy ike_policy
set security ike gateway jsr_gateway address 198.51.100.50
set security ike gateway jsr_gateway remote-identity hostname localcert11.example.net
set security ike gateway jsr_gateway external-interface reth1
set security ike gateway jsr_gateway version v2-only
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec proposal ipsec_prop lifetime-seconds 1200
set security ipsec proposal ipsec_prop lifetime-kilobytes 150000
set security ipsec policy ipsec_policy perfect-forward-secrecy keys group2
set security ipsec policy ipsec_policy proposals ipsec_prop
set security ipsec vpn test_vpn bind-interface st0.1
set security ipsec vpn test_vpn ike gateway jsr_gateway
set security ipsec vpn test_vpn ike ipsec-policy ipsec_policy

```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure VPN peer A to use OCSP:

1. Configure interfaces.

```

[edit interfaces]
set ge-0/0/3 gigether-options redundant-parent reth1
set ge-9/0/3 gigether-options redundant-parent reth1
set lo0 unit 0 family inet address 172.16.1.100/24
set lo0 redundant-pseudo-interface-options redundancy-group 1
set reth1 redundant-ether-options redundancy-group 1

```

```
set reth1 unit 0 family inet address 192.0.2.0/24
set st0 unit 1 family inet address 172.18.1.100/24
```

2. Configure the CA profile.

```
[edit security pki ca-profile OCSP-ROOT]
set ca-identity OCSP-ROOT
set enrollment url http://10.1.1.1:8080/scep/OCSP-ROOT/
set revocation-check ocs url http://10.157.88.56:8210/OCSP-ROOT/
set revocation-check use-ocsp
set revocation-check ocs disable-responder-revocation-check
set revocation-check ocs connection-failure fallback-crl
set revocation-check crl url http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike_prop]
set authentication-method rsa-signatures
set dh-group group2
set authentication-algorithm sha1
set encryption-algorithm 3des-cbc

[edit security ike policy ike_policy]
set mode aggressive
set proposals ike_prop
set certificate local-certificate localcert1

[edit security ike gateway jsr_gateway]
set ike-policy ike_policy
set address 198.51.100.50
set remote-identity hostname localcert11.example.net
set external-interface reth1
set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec_prop]
set protocol esp
set authentication-algorithm hmac-sha1-96
set encryption-algorithm 3des-cbc
set lifetime-seconds 1200
set lifetime-kilobytes 150000

[edit security ipsec policy ipsec_policy]
set perfect-forward-secrecy keys group2
set proposals ipsec_prop

[edit security ipsec vpn test_vpn]
set bind-interface st0.1
set ike gateway jsr_gateway
```

```
set ike ipsec-policy ipsec_policy
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security pki ca-profile OSCP-ROOT**, **show security ike**, and **show security ipsec** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/3 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-9/0/3 {
  gigether-options {
    redundant-parent reth1;
  }
}
lo0 {
  unit 0 {
    family inet {
      address 172.16.1.100/24;
    }
  }
  redundant-pseudo-interface-options {
    redundancy-group 1;
  }
}
reth1 {
  redundant-ether-options {
    redundancy-group 1;
  }
  unit 0 {
    family inet {
      address 192.0.2.0/24;
    }
  }
}
st0 {
  unit 1 {
    family inet {
      address 172.18.1.100/24;
    }
  }
}
[edit]
user@host# show security pki ca-profile OSCP-ROOT
ca-identity OSCP-ROOT;
enrollment {
  url http://10.1.1.1:8080/scep/OCSP-ROOT/;
}
```

```
revocation-check {
  crl {
    url http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45;
  }
  ocsf {
    disable-responder-revocation-check;
    url http://10.157.88.56:8210/OCSP-ROOT/;
  }
  use-ocsp;
}
[edit]
user@host# show security ike
proposal ike_prop {
  authentication-method rsa-signatures;
  dh-group group2;
  authentication-algorithm sha1;
  encryption-algorithm 3des-cbc;
}
policy ike_policy {
  mode aggressive;
  proposals ike_prop;
  certificate {
    local-certificate localcert1;
  }
}
gateway jsr_gateway {
  ike-policy ike_policy;
  address 10.10.2.50;
  remote-identity hostname localcert1.example.net;
  external-interface reth1;
  version v2-only;
}
[edit]
user@host# show security ipsec
proposal ipsec_prop {
  protocol esp;
  authentication-algorithm hmac-sha1-96;
  encryption-algorithm 3des-cbc;
  lifetime-seconds 1200;
  lifetime-kilobytes 150000;
}
policy ipsec_policy {
  perfect-forward-secrecy {
    keys group2;
  }
  proposals ipsec_prop;
}
vpn test_vpn {
  bind-interface st0.1;
  ike {
    gateway jsr_gateway;
    ipsec-policy ipsec_policy;
  }
}
```


If you are done configuring the device, enter **commit** from configuration mode.

Configuring Peer B

CLI Quick Configuration To quickly configure VPN peer B to use OSCP, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/2 unit 0 family inet address 198.51.100.0/24
set interfaces lo0 unit 0 family inet address 172.17.1.100/24
set interfaces st0 unit 1 family inet address 172.18.1.1/24
set security pki ca-profile OSCP-ROOT ca-identity OSCP-ROOT
set security pki ca-profile OSCP-ROOT enrollment url
    http://10.1.1.1:8080/scep/OCSP-ROOT/
set security pki ca-profile OSCP-ROOT revocation-check ocs url
    http://10.157.88.56:8210/OCSP-ROOT/
set security pki ca-profile OSCP-ROOT revocation-check use-ocsp
set security pki ca-profile OSCP-ROOT revocation-check ocs
    disable-responder-revocation-check
set security pki ca-profile OSCP-ROOT revocation-check ocs connection-failure
    fallback-crl
set security pki ca-profile OSCP-ROOT revocation-check crl url
    http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45
set security ike proposal ike_prop authentication-method rsa-signatures
set security ike proposal ike_prop dh-group group2
set security ike proposal ike_prop authentication-algorithm sha1
set security ike proposal ike_prop encryption-algorithm 3des-cbc
set security ike policy ike_policy mode aggressive
set security ike policy ike_policy proposals ike_prop
set security ike policy ike_policy certificate local-certificate localcert11
set security ike gateway jsr_gateway ike-policy ike_policy
set security ike gateway jsr_gateway address 192.0.2.50
set security ike gateway jsr_gateway local-identity hostname localcert11.example.net
set security ike gateway jsr_gateway external-interface ge-0/0/2.0
set security ike gateway jsr_gateway version v2-only
set security ipsec proposal ipsec_prop protocol esp
set security ipsec proposal ipsec_prop authentication-algorithm hmac-sha1-96
set security ipsec proposal ipsec_prop encryption-algorithm 3des-cbc
set security ipsec proposal ipsec_prop lifetime-seconds 1200
set security ipsec proposal ipsec_prop lifetime-kilobytes 150000
set security ipsec policy ipsec_policy perfect-forward-secrecy keys group2
set security ipsec policy ipsec_policy proposals ipsec_prop
set security ipsec vpn test_vpn bind-interface st0.1
set security ipsec vpn test_vpn ike gateway jsr_gateway
set security ipsec vpn test_vpn ike ipsec-policy ipsec_policy
set security ipsec vpn test_vpn establish-tunnels immediately
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure VPN peer B to use OCSP:

1. Configure interfaces.

```
[edit interfaces]
set ge-0/0/2 unit 0 family inet address 198.51.100.0/24
set lo0 unit 0 family inet address 172.17.1.100/24
set st0 unit 1 family inet address 172.18.1.1/24
```

2. Configure the CA profile.

```
[edit security pki ca-profile OCSP-ROOT]
set ca-identity OCSP-ROOT
set enrollment url http://10.1.1.1:8080/scep/OCSP-ROOT/
set revocation-check ocs url http://10.157.88.56:8210/OCSP-ROOT/
set revocation-check use-ocsp
set revocation-check ocs disable-responder-revocation-check
set revocation-check ocs connection-failure fallback-crl
set revocation-check crl url http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45
```

3. Configure Phase 1 options.

```
[edit security ike proposal ike_prop]
set authentication-method rsa-signatures
set dh-group group2
set authentication-algorithm sha1
set encryption-algorithm 3des-cbc

[edit security ike policy ike_policy]
set mode aggressive
set proposals ike_prop
set certificate local-certificate localcert1

[edit security ike gateway jsr_gateway]
set ike-policy ike_policy
set address 192.0.2.50
set local-identity hostname localcert11.example.net
set external-interface ge-0/0/2.0
set version v2-only
```

4. Configure Phase 2 options.

```
[edit security ipsec proposal ipsec_prop]
set protocol esp
set authentication-algorithm hmac-sha1-96
set encryption-algorithm 3des-cbc
set lifetime-seconds 1200
```

```

set lifetime-kilobytes 150000

[edit security ipsec policy ipsec_policy]
set perfect-forward-secrecy keys group2
set proposals ipsec_prop

[edit security ipsec vpn test_vpn]
set bind-interface st0.1
set ike gateway jsr_gateway
set ike ipsec-policy ipsec_policy
set establish-tunnels immediately

```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security pki ca-profile OCSP-ROOT**, **show security ike**, and **show security ipsec** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show interfaces
ge-0/0/2 {
  unit 0 {
    family inet {
      address 198.51.100.0/24;
    }
  }
}
lo0 {
  unit 0 {
    family inet {
      address 172.17.1.100/24;
    }
  }
}
st0 {
  unit 1 {
    family inet {
      address 172.18.1.1/24;
    }
  }
}
[edit]
user@host# show security pki ca-profile OCSP-ROOT
ca-identity OCSP-ROOT;
enrollment {
  url http://10.1.1.1:8080/scep/OCSP-ROOT/;
}
revocation-check {
  crl {
    url http://10.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45;
  }
}
ocsp {

```

```
        disable-responder-revocation-check;
        url http://10.157.88.56:8210/OCSP-ROOT/;
    }
    use-ocsp;
}
[edit]
user@host# show security ike
proposal ike_prop {
    authentication-method rsa-signatures;
    dh-group group2;
    authentication-algorithm sha1;
    encryption-algorithm 3des-cbc;
}
policy ike_policy {
    mode aggressive;
    proposals ike_prop;
    certificate {
        local-certificate localcert11;
    }
}
gateway jsr_gateway {
    ike-policy ike_policy;
    address 192.0.2.50;
    local-identity hostname localcert11.example.net;
    external-interface ge-0/0/2.0;
    version v2-only;
}
[edit]
user@host# show security ipsec
proposal ipsec_prop {
    protocol esp;
    authentication-algorithm hmac-sha1-96;
    encryption-algorithm 3des-cbc;
    lifetime-seconds 1200;
    lifetime-kilobytes 150000;
}
policy ipsec_policy {
    perfect-forward-secrecy {
        keys group2;
    }
    proposals ipsec_prop;
}
vpn test_vpn {
    bind-interface st0.1;
    ike {
        gateway jsr_gateway;
        ipsec-policy ipsec_policy;
    }
    establish-tunnels immediately;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- [Verifying CA Certificates on page 1025](#)
- [Verifying Local Certificates on page 1026](#)
- [Verifying IKE Phase 1 Status on page 1027](#)
- [Verifying IPsec Phase 2 Status on page 1028](#)

Verifying CA Certificates

Purpose Verify the validity of a CA certificate on each peer device.

Action From operational mode, enter the **show security pki ca-certificate ca-profile OCSP-ROOT** or **show security pki ca-certificate ca-profile OCSP-ROOT detail** command.

```

user@host> show security pki ca-certificate ca-profile OCSP-ROOT
Certificate identifier: OCSP-ROOT
  Issued to: OCSP-ROOT, Issued by: C = US, O = example, CN = OCSP-ROOT
  Validity:
    Not before: 11-15-2013 22:26 UTC
    Not after: 11-14-2016 22:26 UTC
  Public key algorithm: rsaEncryption(2048 bits)

user@host> show security pki ca-certificate ca-profile OCSP-ROOT detail
Certificate identifier: OCSP-ROOT
Certificate version: 3
Serial number: 0000a17f
Issuer:
  Organization: example, Country: US, Common name: OCSP-ROOT
Subject:
  Organization: example, Country: US, Common name: OCSP-ROOT
Subject string:
  C=US, O=example, CN=OCSP-ROOT
Validity:
  Not before: 11-15-2013 22:26 UTC
  Not after: 11-14-2016 22:26 UTC
Public key algorithm: rsaEncryption(2048 bits)
30:82:01:0a:02:82:01:01:00:c6:38:e9:03:69:5e:45:d8:a3:ea:3d
2e:e3:b8:3f:f0:5b:39:f0:b7:35:64:ed:60:a0:ba:89:28:63:29:e7
27:82:47:c4:f6:41:53:c8:97:d7:1e:3c:ca:f0:a0:b9:09:0e:3d:f8
76:5b:10:6f:b5:f8:ef:c5:e8:48:b9:fe:46:a3:c6:ba:b5:05:de:2d
91:ce:20:12:8f:55:3c:a6:a4:99:bb:91:cf:05:5c:89:d3:a7:dc:a4
d1:46:f2:dc:36:f3:f0:b5:fd:1d:18:f2:e6:33:d3:38:bb:44:8a:19
ad:e0:b1:1a:15:c3:56:07:f9:2d:f6:19:f7:cd:80:cf:61:de:58:b8
a3:f5:e0:d1:a3:3a:19:99:80:b0:63:03:1f:25:05:cc:b2:0c:cd:18
ef:37:37:46:91:20:04:bc:a3:4a:44:a9:85:3b:50:33:76:45:d9:ba
26:3a:3b:0d:ff:82:40:36:64:4e:ea:6a:d8:9b:06:ff:3f:e2:c4:a6
76:ee:8b:58:56:a6:09:d3:4e:08:b0:64:60:75:f3:e2:06:91:64:73
d2:78:e9:7a:cb:8c:57:0e:d1:9a:6d:3a:4a:9e:5b:d9:e4:a2:ef:31
5d:2b:2b:53:ab:a1:ad:45:49:fd:a5:e0:8b:4e:0b:71:52:ca:6b:fa
8b:0e:2c:7c:7b:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://10.1.1.1:8080/crl-as-der/currentcrl-45.crl?id=45

```

```

Authority Information Access OCSP:
  http://10.1.1.1:8090/OCSP-ROOT/
Use for key: CRL signing, Certificate signing, Key encipherment, Digital
signature
Fingerprint:
  ed:ce:ec:13:1a:d2:ab:0a:76:e5:26:6d:2c:29:5d:49:90:57:f9:41 (sha1)
  af:87:07:69:f0:3e:f7:c6:b8:2c:f8:df:0b:ae:b0:28 (md5)

```



NOTE: In this example, IP addresses are used in the URLs in the CA profile configuration. If IP addresses are not used with CA-issued certificates or CA certificates, DNS must be configured in the device's configuration. DNS must be able to resolve the host in the distribution CRL and in the CA URL in the CA profile configuration. Additionally, you must have network reachability to the same host to receive revocation checks.

Meaning The output shows the details and validity of CA certificate on each peer as follows:

- **C**—Country.
- **O**—Organization.
- **CN**—Common name.
- **Not before**—Begin date of validity.
- **Not after**—End date of validity.

Verifying Local Certificates

Purpose Verify the validity of a local certificate on each peer device.

Action From operational mode, enter the **show security pki local-certificate certificate-id localcert1 detail** command.

```

user@host> show security pki local-certificate certificate-id localcert1 detail
Certificate identifier: localcert1
Certificate version: 3
Serial number: 013e3f1d
Issuer:
  Organization: example, Country: US, Common name: OCSP-ROOT
Subject:
  Organization: example, Organizational unit: example, State: california1,
  Locality: sunnyvale1, Common name: localcert1, Domain component:
  domain_component1
Subject string:
  DC=domain_component1, CN=localcert1, OU=example, O=example, L=sunnyvale1,
  ST=california1, C=us1
Alternate subject: "localcert1@example.net", localcert1.example.net,
10.10.1.50
Validity:
  Not before: 01-28-2014 22:23 UTC

```

```

Not after: 03-29-2014 22:53 UTC
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:a6:df:c1:57:59:f8:4d:0f:c4:a8:96:25:97
03:c4:a0:fb:df:d5:f3:d5:56:b6:5a:26:65:b8:1a:ec:be:f6:c6:5f
b3:d7:d3:59:39:48:52:4a:e3:1b:e4:e0:6d:24:c3:c1:50:8c:55:3b
c0:c1:29:a0:45:29:8e:ec:3e:52:2f:84:b3:e8:89:9a:0f:8b:7d:e8
90:4b:c1:28:48:95:b3:aa:11:ab:b4:8c:a8:80:ce:90:07:2a:13:a2
2f:84:44:92:3b:be:7d:39:5b:2f:9a:4c:7a:2f:2d:31:8b:12:6d:52
34:7d:6b:e4:69:7e:f3:86:55:e2:89:31:98:c9:15:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  http://10.1.1.1:8080/crl-as-der/currentcrl-45.crl?id=45
Authority Information Access OCSP:
  http://10.1.1.1:8090/OCSP-ROOT/
Fingerprint:
  00:c6:56:64:ad:e3:ce:8e:26:6b:df:17:1e:de:fc:14:a4:bb:8c:e4 (sha1)
  7f:43:c6:ed:e4:b3:7a:4f:9a:8c:0b:61:95:01:c9:52 (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started

```

Meaning The output shows the details and validity of a local certificate on each peer as follows:

- **DC**—Domain component.
- **CN**—Common name.
- **OU**—Organizational unit.
- **O**—Organization.
- **L**—Locality
- **ST**—State.
- **C**—Country.
- **Not before**—Begin date of validity.
- **Not after**—End date of validity.

Verifying IKE Phase 1 Status

Purpose Verify the IKE Phase 1 status on each peer device.

Action From operational mode, enter the **show security ike security-associations** command.

```

user@host> show security ike security-associations
Index   State Initiator cookie Responder cookie Mode Remote
Address
6534660 UP      3e62e05abd6a703f c552b238e8a26668 IKEv2 198.51.100.50

```

From operational mode, enter the **show security ike security-associations detail** command.

```

user@host> show security ike security-associations detail

```

```

IKE peer 198.51.100.50, Index 6534660, Gateway Name: jsr_gateway
Role: Responder, State: UP
Initiator cookie: 3e62e05abd6a703f, Responder cookie: c552b238e8a26668
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.0.2.50:500, Remote: 198.51.100.50:500
Lifetime: Expires in 26906 seconds
Peer ike-id: localcert11.example.net
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication      : hmac-sha1-96
  Encryption          : 3des-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group : DH-group-2
Traffic statistics:
  Input bytes  :      2152
  Output bytes :      2097
  Input packets:         4
  Output packets:        4
Flags: IKE SA is created
IPsec security associations: 4 created, 0 deleted
Phase 2 negotiations in progress: 0

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 192.0.2.50:500, Remote: 198.51.100.50:500
Local identity: 192.0.2.50
Remote identity: localcert11.example.net
Flags: IKE SA is created

```

Meaning The **flags** field in the output shows that, IKE security association is created.

Verifying IPsec Phase 2 Status

Purpose Verify the IPsec Phase 2 status on each peer device.

Action From operational mode, enter the **show security ipsec security-associations** command.

```

user@host> show security ipsec security-associations
Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<131073 ESP:3des/sha1  9d1066e2 252/    150000 -   root 500   198.51.100.50
>131073 ESP:3des/sha1  82079c2c 252/    150000 -   root 500   198.51.100.50

```

From operational mode, enter the **show security ipsec security-associations detail** command.

```

user@host> show security ipsec security-associations detail
ID: 131073 Virtual-system: root, VPN Name: test_vpn
Local Gateway: 192.0.2.50, Remote Gateway: 198.51.100.50
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear
Bind-interface: st0.1

```



```

Port: 500, Nego#: 2, Fail#: 0, Def-Del#: 0 Flag: 0x600a29
Last Tunnel Down Reason: Delete payload received
Direction: inbound, SPI: 9d1066e2, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 249 seconds
Lifesize Remaining: 150000 kilobytes
Soft lifetime: Expires in 10 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: 82079c2c, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 249 seconds
Lifesize Remaining: 150000 kilobytes
Soft lifetime: Expires in 10 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

Meaning The output shows the ipsec security associations details.

See Also • [Understanding Certificates and PKI on page 973](#)

Example: Manually Loading a CRL onto the Device

This example shows how to load a CRL manually onto the device.

- [Requirements on page 1029](#)
- [Overview on page 1030](#)
- [Configuration on page 1030](#)
- [Verification on page 1030](#)

Requirements

Before you begin:

1. Generate a public and private key pair. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
2. Generate a certificate request. See [“Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server” on page 1004](#).
3. Configure a certificate authority (CA) profile. See [“Example: Configuring a CA Profile” on page 993](#).
4. Load your certificate onto the device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).

Overview

You can load a CRL manually, or you can have the device load it automatically, when you verify certificate validity. To load a CRL manually, you obtain the CRL from a CA and transfer it to the device (for example, using FTP).

In this example, you load a CRL certificate called **revoke.crl** from the `/var/tmp` directory on the device. The CA profile is called **ca-profile-ipsec**. (Maximum file size is 5 MB.)



NOTE: If a CRL is already loaded into the `ca-profile` the command `clear security pki crl ca-profile ca-profile-ipsec` must be run first to clear the old CRL.

Configuration

Step-by-Step Procedure

To load a CRL certificate manually:

1. Load a CRL certificate.

```
[edit]
user@host> request security pki crl load ca-profile ca-profile-ipsec filename
/var/tmp/revoke.crl
```



NOTE: Junos OS supports loading of CA certificates in X509, PKCS #7, DER, or PEM formats.

Verification

To verify the configuration is working properly, enter the **show security pki crl** operational mode command.

See Also • [Digital Certificates Configuration Overview on page 981](#)

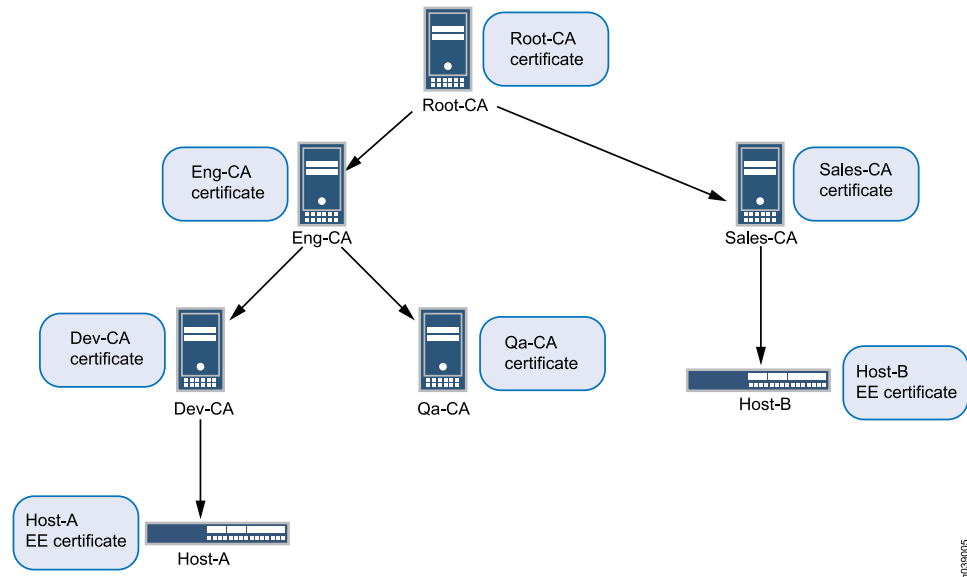
Understanding Dynamic CRL Download and Checking

Digital certificates are issued for a set period of time and are invalid after the specified expiration date. A CA can revoke an issued certificate by listing it in a certificate revocation list (CRL). During peer certificate validation, the revocation status of a peer certificate is checked by downloading the CRL from a CA server to the local device.

A VPN device must be able to check a peer's certificate for its revocation status. A device can use the CA certificate received from its peer to extract the URL to dynamically download the CA's CRL and check the revocation status of the peer's certificate. A dynamic CA profile is automatically created on the local device with the format **dynamic-*nnn***. A dynamic CA profile allows the local device to download the CRL from

the peer's CA and check the revocation status of the peer's certificate. In [Figure 14 on page 140](#), Host-A can use the Sales-CA and EE certificates received from Host-B to dynamically download the CRL for Sales-CA and check the revocation status of Host-B's certificate.

Figure 72: Multilevel Hierarchy for Certificate-Based Authentication



To enable dynamic CA profiles, the **revocation-check crl** option must be configured on a parent CA profile at the `[edit security pki ca-profile profile-name]` hierarchy level.

The properties of a parent CA profile are inherited for dynamic CA profiles. In [Figure 14 on page 140](#), the CA profile configuration on Host-A for Root-CA enables dynamic CA profiles as shown in the following output:

```
admin@host-A# show security
pki {
  ca-profile Root-CA {
    ca-identity Root-CA;
    enrollment {
      url "www.example.net/scep/Root/";
    }
    revocation-check {
      crl;
    }
  }
}
```

A dynamic CA profile is created on Host-A for Sales-CA. Revocation checking is inherited for the Sales-CA dynamic CA profile from Root-CA.

If the **revocation-check disable** statement is configured in a parent CA profile, dynamic CA profiles are not created and dynamic CRL download and checking is not performed.

The data for CRLs downloaded from dynamic CA profiles are displayed with the **show security pki crl** command in the same way as CRLs downloaded by configured CA profiles. The CRL from a dynamic CA profile is updated periodically as are those for CA profiles that are configured in the device.



NOTE: The CA certificate is required to validate the CRL received from a CA server; therefore, the CA certificate received from a peer is stored on the local device. Because the CA certificate is not enrolled by an administrator, it is used only for validating the CRL received from the CA server and not for validating the peer certificate.

- See Also**
- [Example: Configuring a Device for Peer Certificate Chain Validation on page 141](#)
 - [Understanding Certificates and PKI on page 973](#)
 - [Understanding Certificate Authority Profiles on page 992](#)

Example: Configuring a Certificate Authority Profile with CRL Locations

This example shows how to configure a certificate authority profile with CRL locations.

- [Requirements on page 1032](#)
- [Overview on page 1033](#)
- [Configuration on page 1033](#)
- [Verification on page 1033](#)

Requirements

Before you begin:

1. Generate a key pair in the device. See [“Example: Generating a Public-Private Key Pair” on page 983](#).
2. Create a CA profile or profiles containing information specific to a CA. See [“Example: Configuring a CA Profile” on page 993](#).
3. Obtain a personal certificate from the CA. See [“Example: Manually Generating a CSR for the Local Certificate and Sending It to the CA Server” on page 1004](#).
4. Load the certificate onto the device. See [“Example: Loading CA and Local Certificates Manually” on page 1006](#).
5. Configure automatic reenrollment. See *Example: Configuring SecurID User Authentication*.
6. If necessary, load the certificate's CRL on the device. See [“Example: Manually Loading a CRL onto the Device” on page 1029](#).

Overview

In Phase 1 negotiations, you check the CRL list to see if the certificate that you received during an IKE exchange is still valid. If a CRL did not accompany a CA certificate and is not loaded on the device, Junos OS tries to retrieve the CRL through the LDAP or HTTP CRL location defined within the CA certificate itself. If no URL address is defined in the CA certificate, the device uses the URL of the server that you define for that CA certificate. If you do not define a CRL URL for a particular CA certificate, the device gets the CRL from the URL in the CA profile configuration.



NOTE: The CRL distribution point extension (.cdp) in an X509 certificate can be added to either an HTTP URL or an LDAP URL.

In this example, you direct the device to check the validity of the CA profile called **my_profile** and, if a CRL did not accompany a CA certificate and is not loaded on the device, to retrieve the CRL from the URL **http://abc/abc-crl.crl**.

Configuration

Step-by-Step Procedure

To configure certificate using CRL:

1. Specify the CA profile and URL.

```
[edit]
user@host# set security pki ca-profile my_profile revocation-check crl url
http://abc/abc-crl.crl
```

2. If you are done configuring the device, commit the configuration.

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

Verification

To verify the configuration is working properly, enter the **show security pki operational** mode command.

See Also • [Deleting Certificates \(CLI Procedure\) on page 1007](#)

Example: Verifying Certificate Validity

This example shows how to verify the validity of a certificate.

- [Requirements on page 1034](#)
- [Overview on page 1034](#)

- [Configuration on page 1034](#)
- [Verification on page 1034](#)

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

In this example, you verify certificates manually to find out whether a certificate has been revoked or whether the CA certificate used to create a local certificate is no longer present on the device.

When you verify certificates manually, the device uses the CA certificate (**ca-cert**) to verify the local certificate (**local.cert**). If the local certificate is valid, and if **revocation-check** is enabled in the CA profile, the device verifies that the CRL is loaded and valid. If the CRL is not loaded and valid, the device downloads the new CRL.

For CA-issued certificates or CA certificates, a DNS must be configured in the device's configuration. The DNS must be able to resolve the host in the distribution CRL and in the CA cert/revocation list url in the ca-profile configuration. Additionally, you must have network reachability to the same host in order for the checks to receive.

Configuration

Step-by-Step Procedure

To manually verify the validity of a certificate:

1. Verify the validity of a local certificate.

```
[edit]  
user@host> request security pki local-certificate verify certificate-id local.cert
```

2. Verify the validity of a CA certificate.

```
[edit]  
user@host> request security pki ca-certificate verify ca-profile ca-profile-ipsec
```



NOTE: The associated private key and the signature are also verified.

Verification

To verify the configuration is working properly, enter the **show security pki ca-profile** command.



NOTE: If an error is returned instead of a positive verification the failure is logged in pkid.

- See Also**
- [Deleting Certificates \(CLI Procedure\) on page 1007](#)
 - [Understanding Certificates and PKI on page 973](#)

Deleting a Loaded CRL (CLI Procedure)

You can choose to delete a loaded CRL if you no longer need to use it to manage certificate revocations and validation.

Use the following command to delete a loaded certificate revocation list:

```
user@host> clear security pki crl ca-profile (ca-profile all)
```

Specify a CA profile to delete a CRL associated with the CA identified by the profile, or use **all** to delete all CRLs.

- See Also**
- [Deleting Certificates \(CLI Procedure\) on page 1007](#)

- Related Documentation**
- [Configuring Certificate Authority Profiles on page 992](#)
 - [Digital Certificates with PKI Overview on page 973](#)

Example: Configuring PKI

This example shows how to configure, verify, and troubleshoot PKI. This topic includes the following sections:

- [Requirements on page 1035](#)
- [Overview on page 1036](#)
- [Configuration on page 1039](#)
- [Verification on page 1049](#)
- [Troubleshooting IKE, PKI, and IPsec Issues on page 1055](#)

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.4 or later
- Juniper Networks security devices

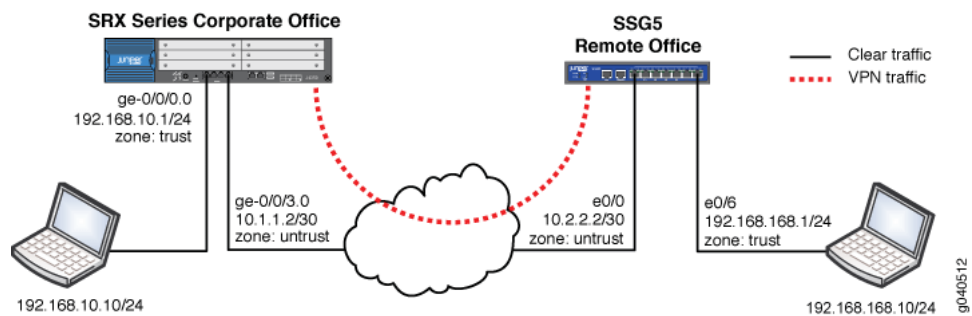
Before you begin:

- Ensure that the internal LAN interface of the SRX Series device is ge-0/0/0 in zone trust and has a private IP subnet.
- Ensure that the Internet interface of the device is ge-0/0/3 in zone untrust and has a public IP.
- Ensure that all traffic between the local and remote LANs is permitted, and traffic can be initiated from either side.
- Ensure that the SSG5 has been preconfigured correctly and loaded with a ready-to-use local certificate, CA certificate, and CRL.
- Ensure that the SSG5 device is configured to use the FQDN of ssg5.example.net (IKE ID).
- Ensure that PKI certificates with 1024-bit keys are used for the IKE negotiations on both sides.
- Ensure that the CA is a standalone CA at the domain example.com for both VPN peers.

Overview

Figure 73 on page 1036 shows the network topology used for this example to configure a policy-based IPsec VPN to allow data to be securely transferred between a corporate office and a remote office.

Figure 73: Network Topology Diagram



NOTE: The PKI administration is the same for both policy-based VPNs and route-based VPNs.

In this example, the VPN traffic is incoming on interface ge-0/0/0.0 with the next hop of 10.1.1.1. Thus the traffic is outgoing on interface ge-0/0/3.0. Any tunnel policy must consider incoming and outgoing interfaces.



NOTE: Optionally, you can use a dynamic routing protocol such as OSPF (not described in this document). When processing the first packet of a new session, the device running Junos OS first performs a route lookup. The static route, which is also the default route, dictates the zone for the outgoing VPN traffic.

Many CAs use hostnames (for example, FQDN) to specify various elements of the PKI. Because the CDP is usually specified using a URL containing an FQDN, you must configure a DNS resolver on the device running Junos OS.

The certificate request can be generated by the following methods:

- Creating a CA profile to specify the CA settings
- Generating the PKCS10 certificate request

The PKCS10 certificate request process involves generating a public or private key pair and then generating the certificate request itself, using the key pair.



NOTE: Take note of the following information about the CA profile:

- The CA profile defines the attributes of a certificate authority.
- Each CA profile is associated with a CA certificate. If a new or renewed CA certificate needs to be loaded without removing the older CA certificate, a new profile must be created. This profile can also be used for online fetching of the CRL.
- There can be multiple such profiles present in the system created for different users.



NOTE: If you specify a CA administrator e-mail address to send the certificate request to, then the system composes an e-mail from the certificate request file and forwards it to the specified e-mail address. The e-mail status notification is sent to the administrator.



NOTE: The certificate request can be sent to the CA through an out-of-band method.

The following options are available to generate the PKCS10 certificate request:

- **certificate-id** — Name of the local digital certificate and the public/private key pair. This ensures that the proper key pair is used for the certificate request and ultimately for the local certificate.



NOTE: Starting in Junos OS Release 19.1R1, a commit check is added to prevent user from adding ., /, %, and space in a certificate identifier while generating a local or remote certificates or a key pair.

- **subject** — Distinguished name format that contains the common name, department, company name, state, and country:
 - CN — Common name
 - OU — Department
 - O — Company name
 - L — Locality
 - ST — State
 - C — Country
 - CN — Phone
 - DC — Domain component



NOTE: You are not required to enter all subject name components. Note also that you can enter multiple values of each type.

- **domain-name** — FQDN. The FQDN provides the identity of the certificate owner for IKE negotiations and provides an alternative to the subject name.
- **filename (path | terminal)** — (Optional) Location where the certificate request should be placed, or the login terminal.
- **ip-address** — (Optional) IP address of the device.
- **email** — (Optional) E-mail address of the CA administrator.



NOTE: You must use a domain-name, an ip-address, or an e-mail address.

The generated certificate request is stored in a specified file location. A local copy of the certificate request is saved in the local certificate storage. If the administrator reissues this command, the certificate request is generated again.

The PKCS10 certificate request is stored in a specified file and location, from which you can download it and send it to the CA for enrollment. If you have not specified the filename or location, you can get PKCS10 certificate request details by using the **show security pki certificate-request certificate-id <id-name>** command in the CLI. You can copy the command output and paste it into a Web front end for the CA server or into an e-mail.

The PKCS10 certificate request is generated and stored on the system as a pending certificate or certificate request. An e-mail notification is sent to the administrator of the CA (in this example, certadmin@example.com).



NOTE: A unique identity called certificate-ID is used to name the generated key pair. This ID is also used in certificate enrollment and request commands to get the right key pair. The generated key pair is saved in the certificate store in a file with the same name as the certificate-ID. The file size can be 1024 or 2048 bits.



NOTE:

A default (fallback) profile can be created if intermediate CAs are not preinstalled in the device. The default profile values are used in the absence of a specifically configured CA profile.

In the case of a CDP, the following order is followed:

- Per CA profile
- CDP embedded in CA certificate
- Default CA profile

We recommend using a specific CA profile instead of a default profile.

The administrator submits the certificate request to the CA. The CA administrator verifies the certificate request and generates a new certificate for the device. The administrator for the Juniper Networks device retrieves it, along with the CA certificate and CRL.

The process of retrieving the CA certificate, the device's new local certificate, and the CRL from the CA depends on the CA configuration and software vendor in use.



NOTE:

Junos OS supports the following CA vendors:

- Entrust
- Verisign
- Microsoft

Although other CA software services such as OpenSSL can be used to generate certificates, these certificates are not verified by Junos OS.

Configuration

- [PKI Basic Configuration on page 1040](#)
- [Configuring a CA Profile on page 1041](#)

- [Generating a Public-Private Key Pair on page 1042](#)
- [Enrolling a Local Certificate on page 1042](#)
- [Loading CA and Local Certificates on page 1043](#)
- [Configuring the IPsec VPN with the Certificates on page 1046](#)

PKI Basic Configuration

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure PKI:

1. Configure an IP address and protocol family on the Gigabit Ethernet interfaces.

```
[edit interfaces]
user@host# set ge-0/0/0 unit 0 family inet address 192.168.10.1/24
user@host# set ge-0/0/3 unit 0 family inet address 10.1.1.2/30
```

2. Configure a default route to the Internet next hop.

```
[edit]
user@host# set routing-options static route 0.0.0.0/0 next-hop 10.1.1.1
```

3. Set the system time and date.

```
[edit]
user@host# set system time-zone PST8PDT
```

After the configuration is committed, verify the clock settings using the **show system uptime** command.

```
user@host> show system uptime
Current time: 2007-11-01 17:57:09 PDT
System booted: 2007-11-01 14:36:38 PDT (03:20:31 ago)
Protocols started: 2007-11-01 14:37:30 PDT (03:19:39 ago)
Last configured: 2007-11-01 17:52:32 PDT (00:04:37 ago) by root
5:57PM up 3:21, 4 users, load averages: 0.00, 0.00, 0.00
```

4. Set the NTP server address.

```
user@host> set date ntp 130.126.24.24
1 Nov 17:52:52 ntpdate[5204]: step time server 172.16.24.24 offset -0.220645
sec
```

5. Set the DNS configuration.

```
[edit]
user@host# set system name-server 172.31.2.1
```

```
user@host# set system name-server 172.31.2.2
```

Configuring a CA Profile

Step-by-Step Procedure

1. Create a trusted CA profile.

```
[edit]
user@host# set security pki ca-profile ms-ca ca-identity example.com
```

2. Create a revocation check to specify a method for checking certificate revocation.

```
[edit]
user@host# set security pki ca-profile ms-ca revocation-check crl
```



NOTE: You can use the `disable` option to disable the revocation check or select the `crl` option to configure the CRL attributes. You can select the `disable on-download-failure` option to allow the sessions matching the CA profile, when CRL download failed for a CA profile. The sessions will be allowed only if no old CRL is present in the same CA profile.

3. Set the refresh interval, in hours, to specify the frequency in which to update the CRL. The default values are next-update time in CRL, or 1 week, if no next-update time is specified.

```
[edit]
user@host# set security pki ca-profile ms-ca revocation-check crl refresh-interval 48
```

4. Specify the location (URL) to retrieve the CRL (HTTP or LDAP). By default, the URL is empty and uses CDP information embedded in the CA certificate.

```
[edit]
user@host# set security pki ca-profile ms-ca revocation-check crl url
http://srv1.example.com/CertEnroll/EXAMPLE.crl
```



NOTE: Currently you can configure only one URL. Support for backup URL configuration is not available.

5. Specify an e-mail address to send the certificate request directly to a CA administrator.

```
user@host# set security pki ca-profile ms-ca administrator email-address
certadmin@example.com
```

- Commit the configuration:

```
user@host# commit and-quit
commit complete
Exiting configuration mode
```

Generating a Public-Private Key Pair

Step-by-Step Procedure When the CA profile is configured, the next step is to generate a key pair on the Juniper Networks device. To generate the private and public key pair:

- Create a certificate key pair.

```
user@host> request security pki generate-key-pair certificate-id ms-cert size 1024
```

Results After the public-private key pair is generated, the Juniper Networks device displays the following:

```
Generated key pair ms-cert, key size 1024 bits
```

Enrolling a Local Certificate

Step-by-Step Procedure 1. Generate a local digital certificate request in the PKCS-10 format.

```
user@host> request security pki generate-certificate-request certificate-id ms-cert subject
"CN=john doe,CN=10.1.1.2,OU=sales,O=example,L=Sunnyvale,ST=CA,C=US" email
user@example.net filename ms-cert-req
```

```
Generated certificate request
-----BEGIN CERTIFICATE REQUEST-----
MIIB3DCCAUAQAwbDERMA8GA1UEAxMIam9obiBkb2UxDjAMBgNVBAStBXNhbGVz
MRkwFwYDVQQKEwBKdW5pcGVyIE51dHdvcmVzMRkwEwYDVQQHEw1TdW5ueXZhbnVz
CzAJBgNVBAGTAkNBMDswCQYDVQQGEwJVUzCBnzANBgkqhkiG9w0BAQEFAAOBjQAw
gYkCgYEA5EG6sgG/CTFzX6KC/hz6Cza10BxakUxfGx7UWYWHaWFFYLqo6vXN08r
OS5Yak7rWANAsMob3E2X/1ad1QIRi4QFTjkBqGI+MTEDGnqFsJBqrB6oyqGtdcSU
u0qUivMvgKQVCx8hpx99J3EBTurfWL1pCN7BmZggNogb6MbWES0CAwEAAAwMC4G
CSqGSIb3DQEJJDjEhMB8wHQYDVR0RBBywFIESInVzZXJAanVuaXB1ci5uZXQiMAOG
CSqGSIb3DQEBBQUAA4GBAI6GhBaCsXk6/11E2e5AakFFDhY7oqzHhgdlYmjiSUMV
djmrf9JbDz2gM2UKPi+yKgtUjyCK/1V2ui57hpZMvnhAW4AmgwK0Jg6mpR5rsxdLr
4/HHSHuEGOF17RH06x0YwJ+KE1rYDRWj3Dt447ynaLxcDF7buwd4IrMcRJJi9ws
-----END CERTIFICATE REQUEST-----
Fingerprint:
47:b0:e1:4c:be:52:f7:90:c1:56:13:4e:35:52:d8:8a:50:06:e6:c8 (sha1)
a9:a1:cd:f3:0d:06:21:f5:31:b0:6b:a8:65:1b:a9:87 (md5)
```



NOTE: In the sample of the PKCS10 certificate, the request starts with and includes the BEGIN CERTIFICATE REQUEST line and ends with and includes the END CERTIFICATE REQUEST line. This portion can be copied and pasted to your CA for enrollment. Optionally, you can also offload the ms-cert-req file and send that to your CA.

2. Generate the PKCS10 certificate request to be sent to the CA.

```
user@host> request security pki generate-certificate-request certificate-id id-name
subject subject-name (domain-name domain-name | ip-address device-ip | email
email-id) filename filename
```

3. Submit the certificate request to the CA, and retrieve the certificate.

Loading CA and Local Certificates

Step-by-Step Procedure

1. Load the local certificate, CA certificate, and CRL.

```
user@host> file copy ftp://192.168.10.10/certnew.cer certnew.cer
/var/tmp/...transferring.file.....crYdEC/100% of 1459 B 5864 kBps
user@host> file copy ftp:// 192.168.10.10/CA-certnew.cer CA-certnew.cer
/var/tmp/...transferring.file.....UKXUWu/100% of 1049 B 3607 kBps
user@host> file copy ftp:// 192.168.10.10/certcrl.crl certcrl.crl
/var/tmp/...transferring.file.....wpqnpA/100% of 401 B 1611 kBps
```



NOTE: You can verify that all files have been uploaded by using the command file list.

2. Load the certificate into local storage from the specified external file.

You must also specify the certificate ID to keep the proper linkage with the private or public key pair. This step loads the certificate into the RAM cache storage of the PKI module, checks the associated private key, and verifies the signing operation.

```
user@host> request security pki local-certificate load certificate-id ms-cert filename
certnew.cer
```

```
Local certificate loaded successfully
```

3. Load the CA certificate from the specified external file.

You must specify the CA profile to associate the CA certificate to the configured profile.

```

user@host> request security pki ca-certificate load ca-profile ms-ca filename
CA-certnew.cer
Fingerprint:
1b:02:cc:cb:0f:d3:14:39:51:aa:0f:ff:52:d3:38:94:b7:11:86:30 (sha1)
90:60:53:c0:74:99:f5:da:53:d0:a0:f3:b0:23:ca:a3 (md5)
Do you want to load this CA certificate ? [yes,no] (no) yes
CA certificate for profile ms-ca loaded successfully

```

4. Load the CRL into the local storage.

The maximum size of the CRL is 5 MB. You must specify the associated CA profile in the command.

```

user@host> request security pki crl load ca-profile ms-ca filename certcrl.crl
CRL for CA profile ms-ca loaded successfully

```

Results Verify that all local certificates are loaded.

```

user@host> show security pki local-certificate certificate-id ms-cert detail Certificate
identifier: ms-cert
Certificate version: 3
Serial number: 3a01c5a0000000000011
Issuer:
Organization: Example, Organizational unit: example, Country: US, State:
CA, Locality: Sunnyvale,
Common name: LAB
Subject:
Organization: Example, Organizational unit: example, Country: US,
State: CA, Locality: Sunnyvale,
Common name: john doe
Alternate subject: "user@example.net", fqdn empty, ip empty
Validity:
Not before: 11- 2-2007 22:54
Not after: 11- 2-2008 23:04
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:e4:41:ba:b2:01:bf:09:31:73:5f:a2:82:fe
1c:fa:0b:36:a5:d0:1c:5a:91:4c:5f:1b:11:7b:51:66:16:1d:a5:85
15:82:ea:a3:ab:d7:34:ef:2b:39:2e:58:6a:4e:eb:58:03:40:b0:ca
1b:dc:4d:97:ff:56:9d:95:02:11:8b:84:05:4e:39:01:a8:62:3e:31
31:03:1a:7a:85:b0:90:6a:ac:1e:a8:ca:a1:ad:75:c4:94:bb:4a:94
8a:f3:2f:80:a4:15:0b:1f:21:a7:1f:7d:27:71:01:4e:ea:df:58:bd
69:08:d9:41:99:98:20:36:88:1b:e8:c6:f0:11:2d:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
ldap:///CN=LAB,CN=LABSRV1,CN=CDP,CN=Public%20Key%20Services,CN=Services,
CN=Configuration,DC=domain,DC=com?certificateRevocationList?base?
objectclass=cRLDistributionPoint
http://labsrv1.domain.com/CertEnroll/LAB.crl
Fingerprint:
c9:6d:3d:3e:c9:3f:57:3c:92:e0:c4:31:fc:1c:93:61:b4:b1:2d:58 (sha1)
50:5d:16:89:c9:d3:ab:5a:f2:04:8b:94:5d:5f:65:bd (md5)

```




NOTE: You can display the individual certificate details by specifying certificate-ID in the command line.

Verify all CA certificates or the CA certificates of an individual CA profile (specified).

```
user@host> show security pki ca-certificate ca-profile ms-ca detail
```

```
Certificate identifier: ms-ca
Certificate version: 3
Serial number: 44b033d1e5e158b44597d143bbfa8a13
Issuer:
Organization: Example, Organizational unit: example, Country: US, State:
CA, Locality: Sunnyvale,
Common name: example
Subject:
Organization: Example, Organizational unit: example, Country: US, State:
CA, Locality: Sunnyvale,
Common name: example
Validity:
Not before: 09-25-2007 20:32
Not after: 09-25-2012 20:41
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:d1:9e:6f:f4:49:c8:13:74:c3:0b:49:a0:56
11:90:df:3c:af:56:29:58:94:40:74:2b:f8:3c:61:09:4e:1a:33:d0
8d:53:34:a4:ec:5b:e6:81:f5:a5:1d:69:cd:ea:32:1e:b3:f7:41:8e
7b:ab:9c:ee:19:9f:d2:46:42:b4:87:27:49:85:45:d9:72:f4:ae:72
27:b7:b3:be:f2:a7:4c:af:7a:8d:3e:f7:5b:35:cf:72:a5:e7:96:8e
30:e1:ba:03:4e:a2:1a:f2:1f:8c:ec:e0:14:77:4e:6a:e1:3b:d9:03
ad:de:db:55:6f:b8:6a:0e:36:81:e3:e9:3b:e5:c9:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
ldap:///CN=LAB,CN=LABSRV1,CN=CDP,CN=Public%20Key%20Services,CN=Services,
CN=Configuration,DC=domain,DC=com?certificateRevocationList?base?
objectclass=cRLDistributionPoint
http://srv1.domain.com/CertEnroll/LAB.crl
Use for key: CRL signing, Certificate signing, Non repudiation
Fingerprint:
1b:02:cc:cb:0f:d3:14:39:51:aa:0f:ff:52:d3:38:94:b7:11:86:30 (sha1)
90:60:53:c0:74:99:f5:da:53:d0:a0:f3:b0:23:ca:a3 (md5)
```

Verify all loaded CRLs or the CRLs of the specified individual CA profile.

```
user@host> show security pki crl ca-profile ms-ca detail
```

```
CA profile: ms-ca
CRL version: V00000001
CRL issuer: emailAddress = certadmin@example.net, C = US, ST = CA,
L = Sunnyvale, O = Example, OU = example, CN = example
Effective date: 10-30-2007 20:32
Next update: 11- 7-2007 08:52
```

Verify the certificate path for the local certificate and the CA certificate.

```
user@host> request security pki local-certificate verify certificate-id ms-cert
```

```
Local certificate ms-cert verification success
```

```
user@host> request security pki ca-certificate verify ca-profile ms-ca
```

```
CA certificate ms-ca verified successfully
```

Configuring the IPsec VPN with the Certificates

Step-by-Step Procedure To configure the IPsec VPN with the certificate, refer to the network diagram shown in [Figure 73 on page 1036](#)

1. Configure security zones and assign interfaces to the zones.

In this example packets are incoming on **ge-0/0/0**, and the ingress zone is the trust zone.

```
[edit security zones security-zone]
user@host# set trust interfaces ge-0/0/0.0
user@host# set untrust interfaces ge-0/0/3.0
```

2. Configure host-inbound services for each zone.

Host-inbound services are for traffic destined for the Juniper Networks device. These settings include but are not limited to the FTP, HTTP, HTTPS, IKE, ping, rlogin, RSH, SNMP, SSH, Telnet, TFTP, and traceroute.

```
[edit security zones security-zone]
user@host# set trust host-inbound-traffic system-services all
user@host# set untrust host-inbound-traffic system-services ike
```

3. Configure the address book entries for each zone.

```
[edit security zones security-zone]
user@host# set trust address-book address local-net 192.168.10.0/24
user@host# set untrust address-book address remote-net 192.168.168.0/24
```

4. Configure the IKE (Phase 1) proposal to use RSA encryption.

```
[edit security ike proposal rsa-prop1]
user@host# set authentication-method rsa-signatures
user@host# set encryption-algorithm 3des-cbc
user@host# set authentication-algorithm sha1
user@host# set dh-group group2
```

5. Configure an IKE policy.

The phase 1 exchange can take place in either main mode or aggressive mode.

```
[edit security ike policy ike-policy1]
```

```

user@host# set mode main
user@host# set proposals rsa-prop1
user@host# set certificate local-certificate ms-cert
user@host# set certificate peer-certificate-type x509- signature
user@host# set certificate trusted-ca use-all

```

6. Configure an IKE gateway.

In this example, the peer is identified by an FQDN (hostname). Therefore the gateway IKE ID should be the remote peer domain name. You must specify the correct external interface or peer ID to properly identify the IKE gateway during Phase 1 setup.

```

[edit security ike gateway ike-gate]
user@host# set external-interface ge-0/0/3.0
user@host# set ike-policy ike-policy1
user@host# set dynamic hostname ssg5.example.net

```

7. Configure the IPsec policy.

This example uses the Standard proposal set, which includes **esp-group2-3des-sha1** and **esp-group2- aes128-sha1** proposals. However, a unique proposal can be created and then specified in the IPsec policy if needed.

```

[edit security ipsec policy vpn-policy1]
user@host# set proposal-set standard
user@host# set perfect-forward-secrecy keys group2

```

8. Configure the IPsec VPN with an IKE gateway and IPsec policy.

In this example, the ike-vpn VPN name must be referenced in the tunnel policy to create a security association. Additionally, if required, an idle time and a proxy ID can be specified if they are different from the tunnel policy addresses.

```

[edit security ipsec vpn ike-vpn ike]
user@host# set gateway ike-gate
user@host# set ipsec-policy vpn-policy1

```

9. Configure bidirectional tunnel policies for VPN traffic.

In this example, traffic from the host LAN to the remote office LAN requires a from-zone trust to-zone untrust tunnel policy. However, if a session needs to originate from the remote LAN to the host LAN, then a tunnel policy in the opposite direction from from-zone untrust to-zone trust is also required. When you specify the policy in the opposite direction as the pair-policy, the VPN becomes bidirectional. Note that in addition to the permit action, you also need to specify the IPsec profile to be used. Note that for tunnel policies, the action is always permit. In fact, if you are configuring a policy with the deny action, you will not see an option for specifying the tunnel.

```
[edit security policies from-zone trust to-zone untrust]
user@host# set policy tunnel-policy-out match source-address local-net
user@host# set policy tunnel-policy-out match destination-address remote-net
user@host# set policy tunnel-policy-out match application any
user@host# set policy tunnel-policy-out then permit tunnel ipsec-vpn ike-vpn
pair-policy tunnel-policy-in
user@host# top edit security policies from-zone untrust to-zone trust
user@host# set policy tunnel-policy-in match source-address remote-net
user@host# set policy tunnel-policy-in match destination-address local-net
user@host# set policy tunnel-policy-in match application any
user@host# set policy tunnel-policy-in then permit tunnel ipsec-vpn ike-vpn
pair-policy tunnel-policy-out
```

10. Configure a source NAT rule and a security policy for Internet traffic.

The device uses the specified source-nat interface, and translates the source IP address and port for outgoing traffic, using the IP address of the egress interface as the source IP address and a random higher port for the source port. If required, more granular policies can be created to permit or deny certain traffic.

```
[edit security nat source rule-set nat-out]
user@host# set from zone trust
user@host# set to zone untrust
user@host# set rule interface-nat match source-address 192.168.10.0/24
user@host# set rule interface-nat match destination-address 0.0.0.0/0
user@host# set rule interface-nat then source-nat interface
```

```
[edit security policies from-zone trust to-zone untrust]
user@host# set policy any-permit match source-address any
user@host# set policy any-permit match destination-address any
user@host# set policy any-permit match application any
user@host# set policy any-permit then permit
```

11. Move the tunnel policy above the any-permit policy.

```
[edit security policies from-zone trust to-zone untrust]
user@host# insert policy tunnel-policy-out before policy any-permit
```



NOTE: The security policy should be below the tunnel policy in the hierarchy because the policy list is read from top to bottom. If this policy were above the tunnel policy, then the traffic would always match this policy and would not continue to the next policy. Thus no user traffic would be encrypted.

12. Configure the tcp-mss setting for TCP traffic across the tunnel.

TCP-MSS is negotiated as part of the TCP 3-way handshake. It limits the maximum size of a TCP segment to accommodate the MTU limits on a network. This is very

important for VPN traffic because the IPsec encapsulation overhead along with the IP and frame overhead can cause the resulting ESP packet to exceed the MTU of the physical interface, causing fragmentation. Because fragmentation increases the bandwidth and device resources usage, and in general it should be avoided.

The recommended value to use for tcp-mss is 1350 for most Ethernet-based networks with an MTU of 1500 or higher. This value might need to be altered if any device in the path has a lower value of MTU or if there is any added overhead such as PPP, Frame Relay, and so on. As a general rule, you might need to experiment with different tcp-mss values to obtain optimal performance.

```
user@host# set security flow tcp-mss ipsec-vpn mss mss-value
```

Example:

```
[edit]
```

```
user@host# set security flow tcp-mss ipsec-vpn mss 1350
```

```
user@host# commit and-quit
```

```
commit complete
```

```
Exiting configuration mode
```

Verification

Confirm that the configuration is working properly.

- [Confirming IKE Phase 1 Status on page 1049](#)
- [Getting Details on Individual Security Associations on page 1050](#)
- [Confirming IPsec Phase 2 Status on page 1051](#)
- [Displaying IPsec Security Association Details on page 1052](#)
- [Checking IPsec SA Statistics on page 1053](#)
- [Testing Traffic Flow Across the VPN on page 1054](#)
- [Confirming the Connectivity on page 1055](#)

Confirming IKE Phase 1 Status

Purpose Confirm the VPN status by checking any IKE Phase 1 security associations status.

PKI related to IPsec tunnels is formed during Phase 1 setup. Completion of Phase 1 indicates that PKI was successful.

Action From operational mode, enter the **show security ike security-associations** command.

```
user@host> show security ike security-associations
```

```
Index Remote Address State Initiator cookie Responder cookie Mode
2010.2.2.2 UP af4f78bc135e4365 48a35f853ee95d21 Main
```

Meaning The output indicates that:

- The remote peer is 10.2.2.2 and the status is UP, which means the successful association of Phase 1 establishment.
- The remote peer IKE ID, IKE policy, and external interfaces are all correct.
- Index 20 is a unique value for each IKE security association. You can use this output details to get further details on each security association. See [“Getting Details on Individual Security Associations” on page 1050](#).

Incorrect output would indicate that:

- The remote peer status is Down.
- There are no IKE security associations .
- There are IKE policy parameters, such as the wrong mode type (Aggr or Main), PKI issues, or Phase 1 proposals (all must match on both peers). For more information, see [“Troubleshooting IKE, PKI, and IPsec Issues” on page 1055](#).
- External interface is invalid for receiving the IKE packets. Check the configurations for PKI-related issues, check the key management daemon (kmd) log for any other errors, or run trace options to find the mismatch. For more information, see [“Troubleshooting IKE, PKI, and IPsec Issues” on page 1055](#).

Getting Details on Individual Security Associations

Purpose Get details on individual IKE.

Action From operational mode, enter the **show security ike security-associations index 20 detail** command.

```
user@host> show security ike security-associations index 20 detail
IKE peer 10.2.2.2, Index 20,
Role: Responder, State: UP
Initiator cookie: af4f78bc135e4365, Responder cookie: 48a35f853ee95d21
Exchange type: Main, Authentication method: RSA-signatures
Local: 10.1.1.2:500, Remote: 10.2.2.2:500
Lifetime: Expires in 23282 seconds
Algorithms:
Authentication : sha1
Encryption : 3des-cbc
Pseudo random function: hmac-sha1
Traffic statistics:
Input bytes : 10249
Output bytes : 4249
Input packets: 10
Output packets: 9
Flags: Caller notification sent
IPsec security associations: 2 created, 1 deleted
Phase 2 negotiations in progress: 0
```

Meaning The output displays the details of the individual IKE SAs such as role (initiator or responder), status, exchange type, authentication method, encryption algorithms, traffic statistics, Phase 2 negotiation status, and so on.

You can use the output data to:

- Know the role of the IKE SA. Troubleshooting is easier when the peer has the responder role.
- Get the traffic statistics to verify the traffic flow in both directions.
- Get the number of IPsec security associations created or in progress.
- Get the status of any completed Phase 2 negotiations.

Confirming IPsec Phase 2 Status

Purpose View IPsec (Phase 2) security associations.

When IKE Phase 1 is confirmed, view the IPsec (Phase 2) security associations.

Action From operational mode, enter the **show security ipsec security-associations** command.

```
user@host> show security ipsec security-associations
```

```
total configured sa: 2
ID Gateway Port Algorithm SPI Life:sec/kb Mon vsys
<2 10.2.2.2 500 ESP:3des/sha1 bce1c6e0 1676/ unlim - 0
>2 10.2.2.2 500 ESP:3des/sha1 1a24eab9 1676/ unlim - 0
```

Meaning The output indicates that:

- There is a configured IPsec SA pair available. The port number 500 indicates that a standard IKE port is used. Otherwise, it is Network Address Translation-Traversal (NAT-T), 4500, or random high port.
- The security parameter index (SPI) is used for both directions. The lifetime or usage limits of the SA is expressed either in seconds or in kilobytes. In the output, 1676/ unlim indicates Phase 2 lifetime is set to expire in 1676 seconds and there is no specified lifetime size.
- The ID number shows the unique index value for each IPsec SA.
- A hyphen (-) in the Mon column indicates that VPN monitoring is not enabled for this SA.
- The virtual system (vsys) is zero, which is the default value.



NOTE: Phase 2 lifetime can be different from the Phase 1 lifetime because Phase 2 is not dependent on Phase 1 after the VPN is up.

Displaying IPsec Security Association Details

Purpose Display the individual IPsec SA details identified by the index number.

Action From operational mode, enter the **show security ipsec security-associations index 2 detail** command.

```
user@host> show security ipsec security-associations index 2 detail
```

```
Virtual-system: Root
Local Gateway: 10.1.1.2, Remote Gateway: 10.2.2.2
Local Identity: ipv4_subnet(any:0,[0..7]=192.168.10.0/24)
Remote Identity: ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
DF-bit: clear
Policy-name: tunnel-policy-out
Direction: inbound, SPI: bce1c6e0, AUX-SPI: 0
Hard lifetime: Expires in 1667 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1093 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: enabled, Replay window size: 32
Direction: outbound, SPI: 1a24eab9, AUX-SPI: 0
Hard lifetime: Expires in 1667 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1093 seconds
Mode: tunnel, Type: dynamic, State: installed, VPN Monitoring: -
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: enabled, Replay window size: 32
```


Meaning The output displays the local Identity and the remote Identity.

Note that a proxy ID mismatch can cause Phase 2 completion to fail. The proxy ID is derived from the tunnel policy (for policy-based VPNs). The local address and remote address are derived from the address book entries, and the service is derived from the application configured for the policy.

If Phase 2 fails due to a proxy ID mismatch, verify which address book entries are configured in the policy and ensure that the correct addresses are sent. Also ensure that the ports are matching. Double-check the service to ensure that the ports match for the remote and local servers.



NOTE: If multiple objects are configured in a tunnel policy for source address, destination address, or application, then the resulting proxy ID for that parameter is changed to zeroes.

For example, assume the following scenario for a tunnel policy:

- Local addresses of 192.168.10.0/24 and 10.10.20.0/24
- Remote address of 192.168.168.0/24
- Application as junos-http

The resulting proxy ID is local 0.0.0.0/0, remote 192.168.168.0/24, service 80.

The resulting proxy IDs can affect the interoperability if the remote peer is not configured for the second subnet. Also, if you are employing a third-party vendor's application, you might have to manually enter the proxy ID to match.

If IPsec fails to complete, then check the kmd log or use the `set traceoptions` command. For more information, see [“Troubleshooting IKE, PKI, and IPsec Issues” on page 1055](#).

Checking IPsec SA Statistics

Purpose Check statistics and errors for an IPsec SA.

For troubleshooting purpose, check the Encapsulating Security Payload/Authentication Header (ESP/AH) counters for any errors with a particular IPsec SA.

Action From operational mode, enter the `show security ipsec statistics index 2` command.

```
user@host> show security ipsec statistics index 2
```

```
ESP Statistics:
Encrypted bytes: 674784
Decrypted bytes: 309276
Encrypted packets: 7029
```

```
Decrypted packets: 7029
AH Statistics:
Input bytes: 0
Output bytes: 0
Input packets: 0
Output packets: 0
Errors:
AH authentication failures: 0, Replay errors: 0
ESP authentication failures: 0, ESP decryption failures: 0
Bad headers: 0, Bad trailers: 0
```

Meaning An error value of zero in the output indicates a normal condition.

We recommend running this command multiple times to observe any packet loss issues across a VPN. Output from this command also displays the statistics for encrypted and decrypted packet counters, error counters, and so on.

You must enable security flow trace options to investigate which ESP packets are experiencing errors and why. For more information, see [“Troubleshooting IKE, PKI, and IPsec Issues” on page 1055](#).

Testing Traffic Flow Across the VPN

Purpose Test traffic flow across the VPN after Phase 1 and Phase 2 have completed successfully. You can test traffic flow by using the **ping** command. You can ping from local host to remote host. You can also initiate pings from the Juniper Networks device itself.

This example shows how to initiate a ping request from the Juniper Networks device to the remote host. Note that when pings are initiated from the Juniper Networks device, the source interface must be specified to ensure that the correct route lookup takes place and the appropriate zones are referenced in the policy lookup.

In this example, the ge-0/0/0.0 interface resides in the same security zone as the local host and must be specified in the ping request so that the policy lookup can be from zone trust to zone untrust.

Action From operational mode, enter the **ping 192.168.168.10 interface ge-0/0/0 count 5** command.

```
user@host> ping 192.168.168.10 interface ge-0/0/0 count 5

PING 192.168.168.10 (192.168.168.10): 56 data bytes
64 bytes from 192.168.168.10: icmp_seq=0 ttl=127 time=8.287 ms
64 bytes from 192.168.168.10: icmp_seq=1 ttl=127 time=4.119 ms
64 bytes from 192.168.168.10: icmp_seq=2 ttl=127 time=5.399 ms
64 bytes from 192.168.168.10: icmp_seq=3 ttl=127 time=4.361 ms
64 bytes from 192.168.168.10: icmp_seq=4 ttl=127 time=5.137 ms
--- 192.168.168.10 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 4.119/5.461/8.287/1.490 ms
```

Confirming the Connectivity

Purpose Confirm the connectivity between a remote host and a local host.

Action From operational mode, enter the **ping 192.168.10.10 from ethernet0/6** command.

```
s5g5-> ping 192.168.10.10 from ethernet0/6
```

```
Type escape sequence to abort
Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 1 seconds from
ethernet0/6
!!!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=4/4/5 ms
```

Meaning You can confirm end-to-end connectivity by using the **ping** command from the remote host to the local host. In this example, the command is initiated from the SSG5 device.

Failed end-to-end connectivity can indicate an issue with routing, policy, end host, or encryption/decryption of the ESP packets. To verify the exact causes of the failure:

- Check IPsec statistics for details on errors as described in [“Checking IPsec SA Statistics” on page 1053](#).
- Confirm end host connectivity by using the **ping** command from a host on the same subnet as the end host. If the end host is reachable by other hosts, then you can assume that the issue is not with the end host.
- Enable security flow trace options for troubleshooting the routing-related and policy-related issues.

Troubleshooting IKE, PKI, and IPsec Issues

Troubleshoot IKE, PKI, and IPsec issues.

- [Basic Troubleshooting Steps on page 1056](#)
- [Checking the Free Disk Space on Your Device on page 1056](#)
- [Checking the Log Files to Verify Different Scenarios and Uploading Log Files to an FTP on page 1057](#)
- [Enabling IKE Trace Options to View Messages on IKE on page 1057](#)
- [Enabling PKI Trace Options to View Messages on IPsec on page 1059](#)
- [Setting up IKE and PKI Trace Options to Troubleshoot IKE Setup Issues with Certificates on page 1059](#)
- [Analyzing the Phase 1 Success Message on page 1060](#)
- [Analyzing the Phase 1 Failure Message \(Proposal Mismatch\) on page 1060](#)
- [Analyzing the Phase 1 Failure Message \(Authentication Failure\) on page 1061](#)
- [Analyzing the Phase 1 Failure Message \(Timeout Error\) on page 1062](#)

- [Analyzing the Phase 2 Failure Message on page 1063](#)
- [Analyzing the Phase 2 Failure Message on page 1064](#)
- [Troubleshooting Common Problems Related to IKE and PKI on page 1065](#)

Basic Troubleshooting Steps

Problem The basic troubleshooting steps are as follows:

1. Identifying and isolating the problem.
2. Debugging the problem.

The common approach of starting troubleshooting is with the lowest layer of the OSI layers and working your way up the OSI stack to confirm the layer in which the failure occurs.

Solution Basic steps for troubleshooting IKE, PKI, and IPsec are as follows:

- Confirm the physical connectivity of the Internet link at the physical and data link levels.
- Confirm that the Juniper Networks device has connectivity to the Internet next hop and connectivity to the remote IKE peer.
- Confirm IKE Phase 1 completion.
- Confirm IKE Phase 2 completion if IKE Phase 1 completion is successful.
- Confirm the traffic flow across the VPN (if the VPN is up and active).

Junos OS includes the trace options feature. Using this feature, you can enable a trace option flag to write the data from the trace option to a log file, which can be predetermined or manually configured and stored in flash memory. These trace logs can be retained even after a system reboot. Check the available flash storage before implementing trace options.

You can enable the trace options feature in configuration mode and commit the configuration to use the trace options feature. Similarly to disable trace options, you must deactivate trace options in configuration mode and commit the configuration.

Checking the Free Disk Space on Your Device

Problem Check the statistics on the free disk space in your device file systems.

Solution From operational mode, enter the **show system storage** command.

```
user@host> show system storage

Filesystem Size Used Avail Capacity Mounted on
/dev/ad0s1a 213M 74M 137M 35% /
devfs 1.0K 1.0K 0B 100% /dev
devfs 1.0K 1.0K 0B 100% /dev/
/dev/md0 180M 180M 0B 100% /junos
```

```
/cf 213M 74M 137M 35% /junos/cf
devfs 1.0K 1.0K 0B 100% /junos/dev/
procfs 4.0K 4.0K 0B 100% /proc
/dev/bo0s1e 24M 13K 24M 0% /config
/dev/md1 168M 7.6M 147M 5% /mfs
/cf/var/jail 213M 74M 137M 35% /jail/var
```

The `/dev/ad0s1a` represents the onboard flash memory and is currently at 35 percent capacity.

Checking the Log Files to Verify Different Scenarios and Uploading Log Files to an FTP

Problem View the log files to check security IKE debug messages, security flow debugs, and the state of logging to the syslog.

Solution From operational mode, enter the **show log kmd**, **show log pkid**, **show log security-trace**, and **show log messages** commands.

```
user@host> show log kmd
user@host> show log pkid
user@host> show log security-trace
user@host> show log messages
```



NOTE: You can view a list of all logs in the `/var/log` directory by using the **show log** command.

Log files can also be uploaded to an FTP server by using the **file copy** command.

```
(operational mode):
user@host> file copy path/filename dest-path/filename
Example:
```

```
user@host> file copy /var/log/kmd ftp://192.168.10.10/kmd.log
ftp://192.168.10.10/kmd.log 100% of 35 kB 12 MBps
```

Enabling IKE Trace Options to View Messages on IKE

Problem To view success or failure messages for IKE or IPsec, you can view the kmd log by using the **show log kmd** command. Because the kmd log displays some general messages, it can be useful to obtain additional details by enabling IKE and PKI trace options.



NOTE: Generally, it is best practice to troubleshoot the peer that has the responder role. You must obtain the trace output from the initiator and responder to understand the cause of a failure.

Configure IKE tracing options.

Solution

```
user@host> configure
Entering configuration mode

[edit]
user@host# edit security ike traceoptions
[edit security ike traceoptions]
```

```
user@host# set file ?
```

```
Possible completions:
<filename> Name of file in which to write trace information
files Maximum number of trace files (2..1000)
match Regular expression for lines to be logged
no-world-readable Don't allow any user to read the log file
size Maximum trace file size (10240..1073741824)
world-readable Allow any user to read the log file
```

```
[edit security ike traceoptions]
```

```
user@host# set flag ?
```

```
Possible completions:
all Trace everything
certificates Trace certificate events
database Trace security associations database events
general Trace general events
ike Trace IKE module processing
parse Trace configuration processing
policy-manager Trace policy manager processing
routing-socket Trace routing socket messages
timer Trace internal timer events
```



NOTE: If you do not specify file names for the <filename> field, then all IKE trace options are written to the kmd log.

You must specify at least one flag option to write trace data to the log. For example:

- **file size** — Maximum size of each trace file, in bytes. For example, 1 million (1,000,000) can generate a maximum file size of 1 MB.

- **files** — Maximum number of trace files to be generated and stored in a flash memory device.



NOTE: You must commit your configuration to start the trace.

Enabling PKI Trace Options to View Messages on IPsec

Problem Enable PKI trace options to identify whether an IKE failure is related to the certificate or to a non-PKI issue.

Solution [edit security pki traceoptions]

```
user@host# set file ?
```

Possible completions:

```
<filename> Name of file in which to write trace information
files Maximum number of trace files (2..1000)
match Regular expression for lines to be logged
no-world-readable Don't allow any user to read the log file
size Maximum trace file size (10240..1073741824)
world-readable Allow any user to read the log file
```

[edit security pki traceoptions]

```
user@host# set flag ?
```

Possible completions:

```
all Trace with all flags enabled
certificate-verification PKI certificate verification tracing
online-crl-check PKI online crl tracing
```

Setting up IKE and PKI Trace Options to Troubleshoot IKE Setup Issues with Certificates

Problem Configure the recommended settings for IKE and PKI trace options.



NOTE: The IKE and PKI trace options use the same parameters, but the default filename for all PKI-related traces is found in the pkid log.

Solution user@host> configure
Entering configuration mode

```
[edit security ike traceoptions]
user@host# set file size 1m
user@host# set flag ike
user@host# set flag policy-manager
user@host# set flag routing-socket
user@host# set flag certificates
```

```
[edit security pki traceoptions]
user@host# set file size 1m
user@host# set flag all
user@host# commit and-quit
commit complete
Exiting configuration mode
```

Analyzing the Phase 1 Success Message

Problem Understand the output of the **show log kmd** command when the IKE Phase 1 and Phase 2 conditions are successful.

Solution

```
Nov 7 11:52:14 Phase-1 [responder] done for local=ipv4(udp:500,[0..3]=
10.1.1.2) remote=fqdn(udp:500,[0..15]=ssg5.example.net)
Nov 7 11:52:14 Phase-2 [responder] done for
p1_local=ipv4(udp:500,[0..3]=10.1.1.2)
p1_remote=fqdn(udp:500,[0..15]=ssg5.example.net)
p2_local=ipv4_subnet(any:0,[0..7]=192.168.10.0/24)
p2_remote=ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
```

The sample output indicates:

- **10.1.1.2**—Local address.
- **ssg5.example.net** —Remote peer (hostname with FQDN).
- **udp: 500**—NAT-T was not negotiated.
- **Phase 1 [responder] done**—Phase 1 status, along with the role (initiator or responder).
- **Phase 2 [responder] done**—Phase 1 status, along with the proxy ID information.

You can also confirm the IPsec SA status by using the verification commands mentioned in [“Confirming IKE Phase 1 Status” on page 1049](#).

Analyzing the Phase 1 Failure Message (Proposal Mismatch)

Problem Understanding the output of the **show log kmd** command, where the IKE Phase 1 condition is a failure, helps in determining the reason for the VPN not establishing Phase 1.

Solution Nov 7 11:52:14 Phase-1 [responder] failed with error(No proposal chosen) for local=unknown(any:0,[0..0]=) remote=fqdn(udp:500,[0..15]=ssg5.example.net)
 Nov 7 11:52:14 10.1.1.2:500 (Responder) <-> 10.2.2.2:500 { 011359c9 ddef501d - 2216ed2a bfc50f5f [- 1] / 0x00000000 } IP; Error = No proposal chosen (14)

The sample output indicates:

- **10.1.1.2**—Local address.
- **ssg5.example.net** —Remote peer (hostname with FQDN).
- **udp: 500**—NAT-T was not negotiated.
- **Phase-1 [responder] failed with error (No proposal chosen)**—Phase 1 failure because of proposal mismatch.

To resolve this issue, ensure that the parameters for the IKE gateway Phase 1 proposals on both the responder and the initiator match. Also confirm that a tunnel policy exists for the VPN.

Analyzing the Phase 1 Failure Message (Authentication Failure)

Problem Understand the output of the **show log kmd** command when the IKE Phase 1 condition is a failure. This helps in determining the reason for the VPN not establishing Phase 1.

Solution Nov 7 12:06:36 Unable to find phase-1 policy as remote peer:10.2.2.2 is not recognized.
Nov 7 12:06:36 Phase-1 [responder] failed with error(Authentication failed) for local=ipv4(udp:500,[0..3]=10.1.1.2) remote=ipv4(any:0,[0..3]=10.2.2.2)
Nov 7 12:06:36 10.1.1.2:500 (Responder) <-> 10.2.2.2:500 { f725ca38 dad47583 - dab1ba4c ae26674b [- 1] / 0x00000000 } IP; Error = Authentication failed (24)

The sample output indicates:

- **10.1.1.2**—Local address.
- **10.2.2.2**—Remote peer
- **Phase 1 [responder] failed with error (Authentication failed)**—Phase 1 failure due to the responder not recognizing the incoming request originating from a valid gateway peer. In the case of IKE with PKI certificates, this failure typically indicates that an incorrect IKE ID type was specified or entered.

To resolve this issue, confirm that the correct peer IKE ID type is specified on the local peer based on the following:

- How the remote peer certificate was generated
- Subject Alternative Name or DN information in the received remote peer certificate

Analyzing the Phase 1 Failure Message (Timeout Error)

Problem Understand the output of the **show log kmd** command when the IKE Phase 1 condition is a failure.

Solution Nov 7 13:52:39 Phase-1 [responder] failed with error(Timeout) for
local=unknown(any:0,[0..0]=)
remote=ipv4(any:0,[0..3]=10.2.2.2)

The sample output indicates:

- 10.1.1.2—Local address.
- 10.2.2.2—Remote peer.
- Phase 1 [responder] failed with error(Timeout)—Phase 1 failure.

This error indicates that either the IKE packet is lost enroute to the remote peer or there is a delay or no response from the remote peer.

Because this timeout error is the result of waiting on a response from the PKI daemon, you must review the PKI trace options output to see whether there is a problem with PKI.

Analyzing the Phase 2 Failure Message

Problem Understand the output of the **show log kmd** command when the IKE Phase 2 condition is a failure.

Solution

```

Nov 7 11:52:14 Phase-1 [responder] done for local=ipv4(udp:500,[0..3]=
10.1.1.2) remote=fqdn(udp:500,[0..15]=ssg5.example.net)
Nov 7 11:52:14 Failed to match the peer proxy ids
p2_remote=ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
p2_local=ipv4_subnet(any:0,[0..7]=10.10.20.0/24) for the remote
peer:ipv4(udp:500,[0..3]=10.2.2.2)
Nov 7 11:52:14 KMD_PM_P2_POLICY_LOOKUP_FAILURE: Policy lookup for Phase-2
[responder] failed for
p1_local=ipv4(udp:500,[0..3]=10.1.1.2) p1_remote=ipv4(udp:500,[0..3]=10.2.2.2)
p2_local=ipv4_subnet(any:0,[0..7]=10.10.20.0/24)
p2_remote=ipv4_subnet(any:0,[0..7]=192.168.168.0/24)
Nov 7 11:52:14 10.1.1.2:500 (Responder) <-> 10.2.2.2:500 { 41f638eb cc22bbfe -
43fd0e85 b4f619d5 [0]
/ 0xc77fafcf } QM; Error = No proposal chosen (14)

```

The sample output indicates:

- **10.1.1.2**—Local address.
- **ssg5.example.net** —Remote peer (IKE ID type hostname with FQDN).
- **Phase 1 [responder] done**—Phase 1 success.
- **Failed to match the peer proxy ids**—The Incorrect proxy IDs are received. In the previous sample, the two proxy IDs received are 192.168.168.0/24 (remote) and 10.10.20.0/24 (local) (for service=any). Based on the configuration given in this example, the expected local address is 192.168.10.0/24. This shows that there is a mismatch of configurations on the local peer, resulting in the failure of proxy ID match.

To resolve this issue, correct the address book entry or configure the proxy ID on either peer so that it matches the other peer.

The output also indicates the reason for failure is **No proposal chosen**. However in this case you also see the message **Failed to match the peer proxy ids**.

Analyzing the Phase 2 Failure Message

Problem Understand the output of the **show log kmd** command when the IKE Phase 2 condition is a failure.

Solution Nov 7 11:52:14 Phase-1 [responder] done for local=ipv4(udp:500,[0..3]=10.1.1.2) remote=fqdn(udp:500,[0..15]=ssg5.example.net)
 Nov 7 11:52:14 10.1.1.2:500 (Responder) <-> 10.2.2.2:500 { cd9dff36 4888d398 - 6b0d3933 f0bc8e26 [0]
 / 0x1747248b } QM; Error = No proposal chosen (14)

The sample output indicates:

- **10.1.1.2**—Local address.
- **fqdn(udp:500,[0..15]=ssg5.example.net**—Remote peer.
- **Phase 1 [responder] done**—Phase 1 success.
- **Error = No proposal chosen**—No proposal was chosen during Phase 2. This issue is due to proposal mismatch between the two peers.

To resolve this issue, confirm that the Phase 2 proposals match on both peers.

Troubleshooting Common Problems Related to IKE and PKI

Problem Troubleshoot common problems related to IKE and PKI.

Enabling the trace options feature helps you to gather more information on the debugging issues than is obtainable from the normal log entries. You can use the trace options log to understand the reasons for IKE or PKI failures.

Solution Methods for troubleshooting the IKE -and-PKI-related issues:

- Ensure that the clock, date, time zone, and daylight savings settings are correct. Use NTP to keep the clock accurate.
- Ensure that you use a two-letter country code in the "C=" (country) field of the DN.
 For example: use "US" and not "USA" or "United States." Some CAs require that the country field of the DN be populated, allowing you to enter the country code value only with a two-letter value.
- Ensure that if a peer certificate is using multiple OU=or CN= fields, you are using the distinguished name with container method (the sequence must be maintained and is case-sensitive).
- If the certificate is not valid yet, check the system clock and, if required, adjust the system time zone or just add a day in the clock for a quick test.
- Ensure that a matching IKE ID type and value are configured.
- PKI can fail due to a revocation check failure. To confirm this, temporarily disable revocation checking and see whether IKE Phase 1 is able to complete.

To disable revocation checking, use the following command in configure mode:

```
set security pki ca-profile <ca-profile> revocation-check disable
```

- Related Documentation**
- [IPsec VPN Overview on page 31](#)
 - [Understanding Certificates and PKI on page 973](#)

PART 1

Configuration Statements and Operational Commands

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aaa

Syntax	<pre>aaa { access-profile <i>profile-name</i>; }</pre>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 15.1X49-D80.
Description	Specify that extended authentication is performed in addition to IKE Phase 1 authentication for remote users trying to access a VPN tunnel. This authentication can be through Extended Authentication (XAuth) or Extensible Authentication Protocol (EAP). Include a previously created access profile, configured with the edit access profile statement, to specify the access profile to be used for authentication information.
Options	access-profile <i>profile-name</i> —Name of the previously created access profile to reference for authentication information.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

access-profile (Security Dynamic VPN)

Syntax	<code>access-profile <i>profile-name</i>;</code>
Hierarchy Level	<code>[edit security dynamic-vpn]</code>
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Specify the access profile to use for Extended Authentication for remote users trying to download the Access Manager. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

access-profile (Security IKE Gateway)

Syntax	<code>access-profile <i>profile-name</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> aaa]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the access profile to use for extended authentication for remote users trying to access a VPN tunnel.
Options	<i>profile-name</i> —Name of the access profile.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

address (Security Group VPN Server IKE Gateway)

Syntax	<code>address <i>ip-address-or-hostname</i> ;</code>
Hierarchy Level	<code>[edit security group-vpn server ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2 for group-vpn hierarchy.
Description	Specify the IPv4 address of the primary Internet Key Exchange (IKE) gateway. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<i>ip-address-or-hostname</i> —IPv4 address of an IKE gateway.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

address (Security IKE Gateway)

Syntax	<code>address [<i>ip-address-or-hostname</i>];</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.
Description	Specify the IPv4 or IPv6 address or the hostname of the primary Internet Key Exchange (IKE) gateway and up to four backup gateways.
Options	<i>ip-address-or-hostname</i> —IPv4 or IPv6 address or hostname of an IKE gateway.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

address-assignment (Access)

```
Syntax address-assignment {
    abated-utilization percentage;
    abated-utilization-v6 percentage;
    high-utilization percentage;
    high-utilization-v6 percentage;
    neighbor-discovery-router-advertisement ndra-name;
    pool pool-name {
        family {
            inet {
                dhcp-attributes {
                    boot-file boot-file-name;
                    boot-server boot-server-name;
                    domain-name domain-name;
                    grace-period seconds;
                    maximum-lease-time (seconds | infinite);
                    name-server ipv4-address;
                    netbios-node-type (b-node | h-node | m-node | p-node);
                    next-server next-server-name;
                    option dhcp-option-identifier-code {
                        array {
                            byte [8-bit-value];
                            flag [ false | off | on | true];
                            integer [32-bit-numeric-values];
                            ip-address [ip-address];
                            short [signed-16-bit-numeric-value];
                            string [character string value];
                            unsigned-integer [unsigned-32-bit-numeric-value];
                            unsigned-short [16-bit-numeric-value];
                        }
                        byte 8-bit-value;
                        flag (false | off | on | true);
                        integer 32-bit-numeric-values;
                        ip-address ip-address;
                        short signed-16-bit-numeric-value;
                        string character string value;
                        unsigned-integer unsigned-32-bit-numeric-value;
                        unsigned-short 16-bit-numeric-value;
                    }
                }
                option-match {
                    option-82 {
                        circuit-id match-value {
                            range range-name;
                        }
                        remote-id match-value;
                        range range-name;
                    }
                }
            }
        }
        propagate-ppp-settings [interface-name];
        propagate-settings interface-name;
        router ipv4-address;
    }
}
```

```

server-identifier ip-address;
sip-server {
    ip-address ipv4-address;
    name sip-server-name;
}
tftp-server server-name;
wins-server ipv4-address;
}
host hostname {
    hardware-address mac-address;
    ip-address reserved-address;
}
network network address;
range range-name {
    high upper-limit;
    low lower-limit;
}
excluded-range range-name
    high upper-limit;
    low lower-limit;
}
xauth-attributes {
    primary-dns ip-address;
    primary-wins ip-address;
    secondary-dns ip-address;
    secondary-wins ip-address;
}
}
inet6 {
    dhcp-attributes {
        dns-server ipv6-address;
        grace-period seconds;
        maximum-lease-time (seconds | infinite);
        option dhcp-option-identifier-code {
            array {
                byte [8-bit-value];
                flag [ false | off | on | true];
                integer [32-bit-numeric-values];
                ip-address [ip-address];
                short [signed-16-bit-numeric-value];
                string [character string value];
                unsigned-integer [unsigned-32-bit-numeric-value];
                unsigned-short [16-bit-numeric-value];
            }
            byte 8-bit-value;
            flag ( false | off | on | true);
            integer 32-bit-numeric-values;
            ip-address ip-address;
            short signed-16-bit-numeric-value;
            string character string value;
            unsigned-integer unsigned-32-bit-numeric-value;
            unsigned-short 16-bit-numeric-value;
        }
        propagate-ppp-settings [interface-name];
        sip-server-address ipv6-address;
    }
}

```

```

        sip-server-domain-name domain-name;
    }
    prefix ipv6-network-prefix;
    range range-name {
        high upper-limit;
        low lower-limit;
        prefix-length delegated-prefix-length;
    }
    excluded-range range-name
        high upper-limit;
        low lower-limit;
    }
    link pool-name;
}

```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 10.4 for SRX300, SRX320, SRX340, SRX345, SRX550HM devices.

Description The address-assignment pool feature enables you to create IPv4 and IPv6 address pools that different client applications can share. For example, multiple client applications, such as DHCPv4 or DHCPv6, can use an address-assignment pool to provide addresses for their particular clients.

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

Related Documentation

- [Dynamic VPN Overview on page 896](#)

administrator

Syntax	<pre>administrator { e-mail-address <i>e-mail-address</i> ; }</pre>
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify an administrator e-mail address to which the certificate request is sent.
Options	e-mail-address <i>e-mail-address</i> —E-mail address where the certificate request is sent. By default, there is no preset e-mail address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

advpn

```
Syntax  advpn {
        suggester {
            disable;
        }
        partner {
            connection-limit number;
            idle-threshold packets/sec;
            idle-time seconds;
            disable;
        }
    }
```

Hierarchy Level [edit security ike gateway *gateway-name*]

Release Information Statement introduced in Junos OS Release 12.3X48-D10. The range for the **idle-threshold** option and the range and default value for the **idle-time** option revised in Junos OS Release 12.3X48-D20.

Description Enable Auto Discovery VPN (ADVPN) protocol on the specified gateway.

Options **suggester**—VPN peer that can initiate a shortcut exchange to allow shortcut partners to establish dynamic security associations (SAs) with each other. Specify **disable** to disable this role on the gateway.



NOTE: Both suggester and partner roles are enabled if **advpn** is configured without explicitly configuring **suggester** or **partner** keywords. We do not support suggester and partner roles on the same gateway. You must explicitly configure **disable** with the **suggester** or **partner** keyword to disable that particular role. You cannot disable both suggester and partner roles on the same gateway.

partner—VPN peer that can receive a shortcut exchange suggesting that it should establish dynamic SAs with another peer. Specify **disable** to disable this role on the gateway.

The following options can be configured for the partner role:

connection-limit—Maximum number of shortcut tunnels that can be created with different shortcut partners using a particular gateway. The maximum number, which is also the default, is platform-dependent.



NOTE: Reducing the configured `connection-limit` value causes all active shortcut tunnels to be brought down. For example, if `connection-limit` is configured as 100 and you later reconfigure the number to 80, all active shortcut tunnels are brought down. Increasing the configured `connection-limit` value does not cause shortcut tunnels to go down.

idle-threshold—Rate, in packets per second, below which the shortcut is brought down.

Range: 3 through 5,000 packets per second.

Default: 5 packets per second.

idle-time—Duration, in seconds, after which the shortcut is deleted if the traffic remains below the `idle-threshold` value.

Range: 60 seconds through 86,400 seconds.

Default: 300 seconds.

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

Related Documentation	<ul style="list-style-type: none"> • Understanding Auto Discovery VPN on page 439
------------------------------	--

algorithm (Security)

Syntax	algorithm (3des-cbc aes-128-cbc aes-192-cbc aes-256-cbc des-cbc);
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> manual encryption]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Select the encryption algorithm for the internal Routing-Engine-to-Routing-Engine IPsec security association (SA) configuration.
Options	<ul style="list-style-type: none">• 3des-cbc—3DES-CBC encryption algorithm.• aes-128-cbc—AES-CBC 128-bit encryption algorithm.• aes-192-cbc—AES-CBC 192-bit encryption algorithm.• aes-256-cbc—AES-CBC 256-bit encryption algorithm.• des-cbc—DES-CBC encryption algorithm.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

always-send

Syntax	always-send;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dead-peer-detection]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Instructs the device to send dead peer detection (DPD) requests regardless of whether there is outgoing IPsec traffic to the peer.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31


authentication (IPsec SA for OSPF)

Syntax	<pre> authentication { algorithm (hmac-md5-96 hmac-sha1-96); key { ascii-text <i>key</i>; hexadecimal <i>key</i>; } } </pre>
Hierarchy Level	[edit security ipsec security-association <i>sa-name</i> manual direction bidirectional]
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure authentication parameters for a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link.
Options	<p>algorithm—Hash algorithm that authenticates packet data. It can be one of the following:</p> <ul style="list-style-type: none"> hmac-md5-96—Produces a 128-bit digest. This is the default. hmac-sha1-96—Produces a 160-bit digest. <p>key—Type of authentication key. It can be one of the following:</p> <ul style="list-style-type: none"> ascii-text <i>key</i>—ASCII text key. For hmac-md5-96, the key is 16 ASCII characters; for hmac-sha1-96, the key is 20 ASCII characters. hexadecimal <i>key</i>—Hexadecimal key. For hmac-md5-96, the key is 32 hexadecimal characters; for hmac-sha1-96, the key is 40 hexadecimal characters.
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	

authentication (Security IPsec)

Syntax	<pre>authentication { algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha1-96); key (ascii-text <i>key</i> hexadecimal <i>key</i>); }</pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> manual]
Release Information	Statement modified in Junos OS Release 8.5. Support for hmac-sha-256-128 added to SRX5400, SRX5600, and SRX5800 devices in Junos OS Release 12.1X46-D20.
Description	Configure IPsec authentication parameters for a manual security association.
Options	<ul style="list-style-type: none">• algorithm—Hash algorithm that authenticates packet data. It can be one of the following:<ul style="list-style-type: none">• hmac-md5-96—Produces a 128-bit digest.• hmac-sha-256-128—Produces a 256-bit digest, truncated to 128 bits.• hmac-sha1-96—Produces a 160-bit digest.• key—Type of authentication key. It can be one of the following:<ul style="list-style-type: none">• ascii-text <i>key</i>—ASCII text key. For hmac-md5-96, the key is 16 ASCII characters; for hmac-sha1-96, the key is 20 ASCII characters.• hexadecimal <i>key</i>—Hexadecimal key. For hmac-md5-96, the key is 32 hexadecimal characters; for hmac-sha1-96, the key is 40 hexadecimal characters.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31


authentication-algorithm (Security Group VPN IKE)

Syntax	authentication-algorithm (sha-256 sha-384);
Hierarchy Level	[edit security group-vpn member ike proposal <i>proposal-name</i>] [edit security group-vpn server ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure the Internet Key Exchange (IKE) authentication algorithm. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
	<div>  <p>NOTE: The device does not delete existing IPsec SAs when you update the authentication-algorithm configuration in the IKE proposal. The device deletes existing IPsec SAs when you update the authentication-algorithm configuration in the IPsec proposal.</p> </div>
Options	<p>authentication-algorithm—Hash algorithm that authenticates packet data. It can be one of the following algorithms:</p> <ul style="list-style-type: none"> • sha-256—Produces a 256-bit digest. This is the default value. • sha-384—Produces a 384-bit digest.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

authentication-algorithm (Security Group VPN IPsec)

Syntax	authentication-algorithm hmac-sha-256-128;
Hierarchy Level	[edit security group-vpn server ipsec proposal <i>proposal-name</i>]
Release Information	Statement added in Junos OS Release 10.2.
Description	Configure the IPsec authentication algorithm. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	hmac-sha-256-128 —Produces a 256-bit digest, truncated to 128 bits. This is the default value.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747

authentication-algorithm (Security IKE)

Syntax	authentication-algorithm (md5 sha-256 sha-384 sha1 sha-512);
Hierarchy Level	[edit security ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for the sha-384 option added in Junos OS Release 12.1X45-D10. sha-512 option introduced in Junos OS Release 19.1R1.
Description	Configure the Internet Key Exchange (IKE) authentication algorithm.
	<div>  <p>NOTE: The device does not delete existing IPsec SAs when you update the authentication-algorithm configuration in the IKE proposal. The device deletes existing IPsec SAs when you update the authentication-algorithm configuration in the IPsec proposal.</p> </div>
Options	<p>authentication-algorithm—Hash algorithm that authenticates packet data. It can be one of the following algorithms:</p> <ul style="list-style-type: none"> • md5—Produces a 128-bit digest. • sha-256—Produces a 256-bit digest. • sha-384—Produces a 384-bit digest. • sha1—Produces a 160-bit digest. • sha-512—Produces a 512-bit digest.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

authentication-algorithm (Security IPsec)

Syntax	authentication-algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha1-96 hmac-sha-512 hmac-sha-384);
Hierarchy Level	[edit security ipsec proposal <i>proposal-name</i>]
Release Information	Statement modified in Junos OS Release 8.5. Support for hmac-sha-256-128 added to SRX5400, SRX5600, and SRX5800 devices in Junos OS Release 12.1X46-D20. hmac-sha-512 , and hmac-sha-384 options introduced in Junos OS Release 191.R1.
Description	Configure the IPsec authentication algorithm.
Options	The hash algorithm to authenticate data can be one of the following: <ul style="list-style-type: none">• hmac-md5-96—Produces a 128-bit digest.• hmac-sha-256-128—Produces a 256-bit digest, truncated to 128 bits.• hmac-sha1-96—Produces a 160-bit digest.• hmac-sha-512—Produces a 512-bit digest.• hmac-sha-384—Produces a 384-bit digest.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

authentication-method


Syntax	authentication-method (dsa-signatures ecdsa-signatures-256 ecdsa-signatures-384 pre-shared-keys rsa-signatures ecdsa-signatures-521);
Hierarchy Level	[edit security ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for ecdsa-signatures-256 and ecdsa-signatures-384 options added in Junos OS Release 12.1X45-D10. ecdsa-signatures-521 option introduced in Junos OS Release 19.1R1.
Description	Specify the method the device uses to authenticate the source of Internet Key Exchange (IKE) messages. The pre-shared-keys option refers to a preshared key, which is a key for encryption and decryption that both participants must have before beginning tunnel negotiations. The other options refer to types of digital signatures, which are certificates that confirm the identity of the certificate holder.



NOTE: The device does not delete existing IPsec SAs when you update the **authentication-method** configuration in the IKE proposal.

Options	<ul style="list-style-type: none"> • dsa-signatures—Specify that the Digital Signature Algorithm (DSA) is used. • ecdsa-signatures-256—Specify that the Elliptic Curve DSA (ECDSA) using the 256-bit elliptic curve secp256r1, as specified in the <i>Federal Information Processing Standard (FIPS) Digital Signature Standard (DSS) 186-3</i>, is used. • ecdsa-signatures-384—Specify that the ECDSA using the 384-bit elliptic curve secp384r1, as specified in the <i>FIPS DSS 186-3</i>, is used. • pre-shared-keys—Specify that a preshared key, which is a secret key shared between the two peers, is used during authentication to identify the peers to each other. The same key must be configured for each peer. This is the default method. • rsa-signatures—Specify that a public key algorithm, which supports encryption and digital signatures, is used. • ecdsa-signatures-521—Specify that the ECDSA using the 521-bit elliptic curve secp521r1 is used.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

authentication-method (Security Group VPN)

Syntax	authentication-method pre-shared-keys;
Hierarchy Level	[edit security group-vpn member ike proposal <i>proposal-name</i>] [edit security group-vpn server ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify the method the device uses to authenticate the source of Internet Key Exchange (IKE) messages. The pre-shared-keys option refers to a preshared key, which is a key for encryption and decryption that both participants must have before beginning tunnel negotiations. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
	<div>  <p>NOTE: The device does not delete existing IPsec SAs when you update the authentication-method configuration in the IKE proposal.</p> </div>
Options	<ul style="list-style-type: none"> pre-shared-keys—Specify that a preshared key, which is a secret key shared between the two peers, is used during authentication to identify the peers to each other. The same key must be configured for each peer. This is the default method.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

auto-re-enrollment (Security)

```
Syntax auto-re-enrollment {
    cmpv2 {
        certificate-id certificate-id-name {
            ca-profile-name ca-profile-name ;
            re-enroll-trigger-time-percentage percentage ;
            re-generate-keypair;
        }
    }
    scep {
        certificate-id certificate-id-name {
            ca-profile-name ca-profile-name ;
            challenge-password password ;
            re-enroll-trigger-time-percentage percentage ;
            re-generate-keypair;
        }
    }
}
```

Hierarchy Level [edit security pki]

Release Information Statement modified in Junos OS Release 9.0. **cmpv2** and **scep** keywords and options added in Junos OS Release 15.1X49-D40.

Description Configure the automatic reenrollment of a local end-entity (EE) certificate.

Options **cmpv2**—Configure automatic reenrollment of a local certificate using CMPv2.
scep—Configure automatic reenrollment of a local certificate using Simple Certificate Enrollment Protocol (SCEP).

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [Understanding Certificates and PKI on page 973](#)

auxiliary-spi (IPsec SA for OSPF)

Syntax	<code>auxiliary-spi <i>auxiliary-spi-value</i>;</code>
Hierarchy Level	<code>[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure an auxiliary security parameter index (SPI) for a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link.
Options	auxiliary-spi —Auxiliary SPI for the manual IPsec SA. The SPI uniquely identifies the SA to use at the receiving host (the destination address in the packet). Range: 256 through 16639
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62

bind-interface

Syntax	<code>bind-interface <i>interface-name</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i>]</code>
Release Information	Statement modified in Junos OS Release 8.5.
Description	Configure the tunnel interface to which the route-based virtual private network (VPN) is bound.
Options	<i>interface-name</i> —Tunnel interface.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

ca-identity (Security)

Syntax	<code>ca-identity <i>ca-identity</i>;</code>
Hierarchy Level	<code>[edit security pki ca-profile <i>ca-profile-name</i>]</code>
Release Information	Statement modified in Junos OS Release 11.1.
Description	Specify the certificate authority (CA) identity to use in requesting digital certificates.
Options	<ul style="list-style-type: none">• <i>ca-identity</i> —Name of CA identity. This name is typically the domain name of the CA.• <i>routing-instance-name</i> —Name of routing instance. The routing instance name is chosen from the list of configured routing instances.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

ca-profile (Security PKI)

```

Syntax  ca-profile ca-profile-name {
        administrator {
            e-mail-address e-mail-address;
        }
        ca-identity ca-identity;
        enrollment {
            retry number;
            retry-interval seconds;
            url url-name;
        }
        revocation-check {
            disable;
            crl {
                disable {
                    on-download-failure;
                }
                refresh-interval hours;
                url url-name;
            }
            disable;
            ocsf {
                connection-failure (disable | fallback-crl);
                disable-responder-revocation-check;
                nonce-payload (enable | disable);
                url ocsp-url;
            }
            use-ocsp;
        }
        routing-instance routing-instance-name;
        source-address ip-address;
    }

```

Hierarchy Level [edit security pki]

Release Information Statement modified in Junos OS Release 8.5. Support for **ocsp** and **use-ocsp** options added in Junos OS Release 12.1X46-D20.

Description Configure certificate authority (CA) profile.

Options *ca-profile-name* —Name of a trusted CA.

The remaining statements are explained separately. See [CLI Explorer](#).

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

- Related Documentation**
- [Understanding Certificates and PKI on page 973](#)



ca-profile-name

Syntax	<code>ca-profile-name <i>ca-profile-name</i>;</code>
Hierarchy Level	<code>[edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>]</code> <code>[edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]</code>
Release Information	Statement modified in Junos OS Release 9.0. Support for <code>[edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>]</code> and <code>[edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]</code> hierarchies added in Junos OS Release 15.1X49-D40.
Description	Specify the name of the certificate authority (CA) profile to be used for automatic reenrollment. The CA certificate must be present to initiate reenrollment.
Options	<i>ca-profile-name</i> —Name of the CA profile.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

certificate

Syntax	<pre>certificate { local-certificate <i>certificate-id</i>; peer-certificate-type (pkcs7 x509-signature); policy-oids [<i>oid</i>]; trusted-ca { ca-profile <i>ca-profile-name</i>; trusted-ca-group <i>trusted-ca-group-name</i>; } }</pre>
Hierarchy Level	[edit security ike policy <i>policy-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. policy-oids option added in Junos OS Release 12.3X48-D10. Support for trusted-ca option added in Junos OS Release 18.1R1.
Description	Specify usage of a digital certificate to authenticate the virtual private network (VPN) initiator and recipient.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

certificate-id (Security)

Syntax	<pre>certificate-id <i>certificate-id-name</i> { ca-profile-name <i>ca-profile-name</i>; challenge-password <i>password</i>; re-enroll-trigger-time-percentage <i>percentage</i>; re-generate-keypair; }</pre>
Hierarchy Level	<pre>[edit security pki auto-re-enrollment cmpv2] [edit security pki auto-re-enrollment scep]</pre>
Release Information	Statement modified in Junos OS Release 9.0. Support for [edit security pki auto-re-enrollment cmpv2] and [edit security pki auto-re-enrollment scep] hierarchies added in Junos OS Release 15.1X49-D40.
Description	Specify the certificate authority (CA) certificate to use for automatic reenrollment.
	<p> NOTE: The challenge-password option is only applicable for SCEP reenrollment.</p>
Options	<p><i>certificate-id-name</i> —Identifier of the end-entity (EE) certificate to be automatically reenrolled. The certificate must be already enrolled for reenrollment to be initiated.</p> <p> NOTE: Starting in Junos OS Release 19.1R1, a commit check is added to prevent user from adding ., /, %, and space in a certificate identifier while generating a local or remote certificates or a key pair.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

challenge-password (Security)

Syntax	<code>challenge-password <i>password</i>;</code>
Hierarchy Level	<code>[edit security pki auto-re-enrollment certificate-id <i>certificate-id-name</i>]</code> <code>[edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]</code>
Release Information	Statement modified in Junos OS Release 9.0. Support for <code>[edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]</code> hierarchy added in Junos OS Release 15.1X49-D40.
Description	Specify the password used by the certificate authority (CA) for enrollment and revocation. If the CA does not provide the challenge password, choose your own password.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

clients (Security)

Syntax	<pre>clients <i>configuration-name</i> { ipsec-vpn <i>vpn-name</i>; remote-exceptions <i>ip-address/mask</i>; remote-protected-resources <i>ip-address/mask</i>; user <i>username</i>; user-groups <i>user-group-name</i>; }</pre>
Hierarchy Level	[edit security dynamic-vpn]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	<p>Create a client configuration for the dynamic VPN feature. Within the configuration, specify a name for the configuration, reference a standard VPN configuration to use for IPsec negotiations, specify which resources to protect, define any exceptions, and list the users to which the dynamic VPN configuration applies. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.</p>
Options	<p><i>configuration-name</i>—Name of the client configuration.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Dynamic VPN Overview on page 896


config-check (Security Dynamic VPN)

Syntax	config-check;
Hierarchy Level	[edit security dynamic-vpn]
Release Information	Statement introduced in Junos OS Release 12.1X44-D10.
Description	Enable extra dynamic VPN configuration checking. If you include this statement in your configuration, it is automatically enabled. If the statement is not present in your configuration, the configuration check option is not enabled. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Dynamic VPN Overview on page 896

connections-limit

Syntax	connections-limit <i>number</i> ;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dynamic]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the number of concurrent connections that the group profile supports. When the maximum number of connections is reached, no more dynamic virtual private network (VPN) endpoints dialup users attempting to access an IPsec VPN are allowed to begin Internet Key Exchange (IKE) negotiations. This configuration applies to SRX300, SRX320, SRX340, SRX345, SRX550M, SRX1500, SRX4100, SRX4200, and SRX4600 devices and vSRX instances, and to SRX5400, SRX5600, and SRX5800 devices configured for AutoVPN.
Options	<i>number</i> —Maximum number of concurrent connections allowed.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

container

Syntax	<code>container <i>container-string</i>;</code>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dynamic distinguished-name]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify one or more distinguished name (DN) field and value pairs that must match the DN in the VPN peer's digital certificate. The order of the fields and their values must exactly match the DN in the peer's digital certificate.
Options	<i>container-string</i> —DN field and value to be matched. For example, cn=admin, ou=eng, o=example, dc=net .
<div>  <p>NOTE: Add a space between each field and value pair. For example, edit security ike gateway jsr_gateway dynamic distinguished-name container o=example, dc=net.</p> </div>	
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding IKE Identity Configuration on page 60 • wildcard on page 1268

crl (Security)

Syntax	<pre>crl { disable { on-download-failure; } refresh-interval <i>hours</i>; url <i>url-name</i>; }</pre>
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i> revocation-check]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the certificate revocation list (CRL). A CRL is a time-stamped list identifying revoked certificates, which is signed by a CA and made available to the participating IPsec peers on a regular periodic basis.
Options	<ul style="list-style-type: none"> • disable on-download-failure—(Optional) Override the default behavior and permit certificate verification even if the CRL fails to download. • refresh-interval <i>hours</i>—Time interval, in hours, between CRL updates. Range — 0 through 8784 hours. • url <i>url-name</i> —Name of the location from which to retrieve the CRL through HTTP or Lightweight Directory Access Protocol (LDAP). You can specify one URL for each configured CA profile. By default, no location is specified. Use a fully qualified domain name (FQDN) or an IP address and, optionally, a port number. If no port number is specified, port 80 is used for HTTP and port 443 is used for LDAP.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

cryptographic-self-test

Syntax	cryptographic-self-test;
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm when the device or switch detects a cryptographic self-test failure. Cryptographic self-tests are a set of preoperational tests that are performed after the device or switch is powered on. The self-tests run without operator intervention.
Default	No alarm is raised upon failure of a cryptographic self-test.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

dead-peer-detection

Syntax	<pre>dead-peer-detection { (always-send optimized probe-idle-tunnel); interval <i>seconds</i>; threshold <i>number</i>; }</pre>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for the optimized and probe-idle-tunnel options added in Junos OS Release 12.1X46-D10.
Description	Enable the device to use dead peer detection (DPD). DPD is a method used by devices to verify the current existence and availability of IPsec peers. A device performs this verification by sending encrypted IKE Phase 1 notification payloads (R-U-THERE messages) to a peer and waiting for DPD acknowledgements (R-U-THERE-ACK messages) from the peer.
Options	<p>interval—The time between DPD probe messages.</p> <p> Default: 10 seconds</p> <p> Range: 2 through 60 seconds</p> <p>always-send—Send probes periodically regardless of incoming and outgoing data traffic.</p> <p>optimized—Send probes only when there is outgoing and no incoming data traffic - RFC3706 (Default mode).</p> <p>probe-idle-tunnel—Send probes same as in optimized mode and also when there is no outgoing and incoming data traffic.</p> <p>threshold—Maximum number of DPD retransmissions.</p> <p> Default: 5</p> <p> Range: 1 through 5</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding AutoVPN on page 226• IPsec VPN Overview on page 31

dead-peer-detection (Security Group VPN Server)

Syntax	<pre> dead-peer-detection { always-send; interval <i>seconds</i>; threshold <i>number</i>; } </pre>
Hierarchy Level	[edit security group-vpn server ike gateway <i>gateway-name</i>]
Release Information	Support for the Group VPN server added in Junos OS Release 15.1X49-D30 for vSRX. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Description	Enable the device to use dead peer detection (DPD). DPD is a method used by devices to verify the current existence and availability of IPsec peers. A device performs this verification by sending encrypted IKE Phase 1 notification payloads (R-U-THERE messages) to a peer and waiting for DPD acknowledgements (R-U-THERE-ACK messages) from the peer.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

decryption-failures

Syntax	<pre>decryption-failures { threshold <i>value</i>; }</pre>
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm after exceeding a specified number of decryption failures. This statement is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.
Default	Multiple decryption failures do not cause an alarm to be raised.
Options	<p>failures—Number of decryption failures up to which an alarm is not raised. When the configured number is exceeded, an alarm is raised.</p> <p>Range: 0 through 1 through 1,000,000,000.</p> <p>Default: 1000</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31


description (Security Policies)

Syntax	<code>description <i>description</i>;</code>
Hierarchy Level	<pre>[edit security group-vpn member ike policy <i>policy-name</i>] [edit security group-vpn member ike proposal <i>proposal-name</i>] [edit security group-vpn server ike policy <i>policy-name</i>] [edit security group-vpn server ipsec proposal <i>proposal-name</i>] [edit security group-vpn server ike proposal <i>proposal-name</i>] [edit security ike policy <i>policy-name</i>], [edit security ike proposal <i>proposal-name</i>], [edit security ipsec policy <i>policy-name</i>], [edit security ipsec proposal <i>proposal-name</i>] [edit security polices from-zone <i>zone-name</i> to-zone <i>zone-name</i> policy <i>policy-name</i>]</pre>
Release Information	Statement modified in Junos OS Release 8.5. Support for group-vpn hierarchies added in Junos OS Release 10.2. Support for the security policies hierarchy added in Junos OS Release 12.1.
Description	Specify descriptive text for an IKE policy, an IPsec policy, an IKE proposal, an IPsec proposal, or a security policy.
Options	<i>description</i> —Descriptive text about an IKE policy, an IPsec policy, an IKE proposal, an IPsec proposal, or a security policy.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

destination-ip (Security IPsec)

Syntax	<code>destination-ip <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> vpn-monitor]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the destination of the Internet Control Message Protocol (ICMP) pings. If this statement is used, the device uses the peer's gateway address by default.
Options	<i>ip-address</i> —Destination IP address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

df-bit

Syntax	<code>df-bit (clear copy set);</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify how the device handles the Don't Fragment (DF) bit in the outer header.
	<div>  <p>NOTE: On SRX5400, SRX5600, and SRX5800 devices, the DF-bit configuration for VPN only works if the original packet size is smaller than the st0 interface MTU, and larger than the external interface-ipsec overhead.</p> </div>
Options	<ul style="list-style-type: none"> • clear—Clear (disable) the DF bit from the outer header. This is the default. • copy—Copy the DF bit to the outer header. • set—Set (enable) the DF bit in the outer header.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

dh-group (Security IKE)

Syntax	<code>dh-group (group1 group14 group19 group2 group20 group24 group5 group15 group16 group21);</code>
Hierarchy Level	<code>[edit security ike proposal <i>proposal-name</i>]</code>
Release Information	<p>Statement introduced in Junos OS Release 8.5.</p> <p>Support for the group14 option added in Junos OS Release 11.1.</p> <p>Support for group19, group20, and group24 options added in Junos OS Release 12.1X45-D10.</p> <p>Support for group19 and group20 options added in Junos OS Release 15.1X49-D70 for vSRX.</p> <p>group15, group16, and group21 options introduced in Junos OS Release 19.1R1.</p>
Description	Specify the IKE Diffie-Hellman group.



NOTE: The device does not delete existing IPsec SAs when you update the **dh-group** configuration in the IKE proposal.

Options	<p>dh-group—Diffie-Hellman group for key establishment.</p> <ul style="list-style-type: none"> • group1—768-bit Modular Exponential (MODP) algorithm. • group14—2048-bit MODP group. • group19—256-bit random Elliptic Curve Groups modulo a Prime (ECP groups) algorithm. • group2—1024-bit MODP algorithm. • group20—384-bit random ECP groups algorithm. • group24—2048-bit MODP Group with 256-bit prime order subgroup. • group15—3072-bit MODP algorithm. • group16—4096-bit MODP algorithm. • group21—521-bit random ECP groups algorithm.
----------------	--



NOTE: We recommend that you use **group14**, **group15**, **group16**, **group19**, **group20**, or **group21** instead of **group1**, **group2**, or **group5**.

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

Related Documentation • [IPsec VPN Overview on page 31](#)

dh-group (Security Group VPN IKE)

Syntax `dh-group (group14 | group24);`

Hierarchy Level [edit security group-vpn member ike proposal *proposal-name*]
[edit security group-vpn server ike proposal *proposal-name*]

Release Information Statement introduced in Junos OS Release 10.2. Support for the **group14** option added in Junos OS Release 11.1. Support for the **group24** option added in Junos OS Release 15.1X49-D30 for vSRX.

Description Specify the IKE Diffie-Hellman group. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.



NOTE: The device does not delete existing IPsec SAs when you update the **dh-group** configuration in the IKE proposal.

Options **dh-group**—Diffie-Hellman group for key establishment.

- **group14**—2048-bit group. This is the default value.
- **group24**—2048-bit, 256 bit subgroup.

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

Related Documentation • [Group VPNv2 Overview on page 747](#)

disable (PKI)

Syntax	disable;
Hierarchy Level	[edit security pki ca-profile <i>profile-name</i> revocation-check]
Release Information	Statement modified in Junos OS Release 9.0.
Description	Disable revocation checks.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973


distinguished-name (Security)

Syntax	distinguished-name <container <i>container-string</i> > <wildcard <i>wildcard-string</i> >
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dynamic]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify a distinguished name as the identifier for the remote gateway with a dynamic IP address.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

dynamic (Security)

Syntax	<pre>dynamic { connections-limit <i>number</i>; (distinguished-name <container <i>container-string</i>> <wildcard <i>wildcard-string</i>> hostname <i>domain-name</i> inet <i>ip-address</i> inet6 <i>ipv6-address</i> user-at-hostname <i>e-mail-address</i>); ike-user-type (group-ike-id shared-ike-id); }</pre>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement modified in Junos OS Release 8.5. Support for the inet6 option added in Junos OS Release 11.1.
Description	Specify the identifier for the remote gateway with a dynamic IPv4 or IPv6 address. Use this statement to set up a VPN with a gateway that has an unspecified IPv4 or IPv6 address.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

dynamic (Security Group VPN)

Syntax	dynamic { (hostname <i>domain-name</i> inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); }
Hierarchy Level	[edit security group-vpn server ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify the identifier for the remote gateway with a dynamic IPv4 address. Use this statement to set up a VPN with a gateway that has an unspecified IPv4 address. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
	<div>  <p>NOTE: Configuring <code>mode main</code> for group VPN servers or members is not supported when the remote gateway has a dynamic address and the authentication method is <code>pre-shared-keys</code>.</p> </div>
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

dynamic-vpn

Syntax

```
dynamic-vpn {
  access-profile profile-name;
  clients configuration-name {
    ipsec-vpn vpn-name;
    remote-exceptions ip-address/mask;
    remote-protected-resources ip-address/mask;
    user username;
    user-groups user-group-name;
  }
  force-upgrade;
  config-check;
  interface;
  traceoptions {
    file filename;
    flag flag;
  }
}
```

Hierarchy Level [edit security]

Release Information Statement introduced in Junos OS Release Release 9.5.

Description Configure the dynamic VPN feature. The dynamic VPN feature simplifies remote access by enabling users to create IPsec VPN tunnels without having to manually configure settings on their PCs or laptops. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.

Options The remaining statements are explained separately. See [CLI Explorer](#).

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


Related Documentation

- [Dynamic VPN Overview on page 896](#)


encryption (IPsec SA for OSPF)

Syntax	<pre> encryption { algorithm (3des-cbc des-cbc null); key { ascii-text key; hexadecimal key; } } </pre>
Hierarchy Level	[edit security ipsec security-association <i>sa-name</i> manual direction bidirectional]
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure encryption parameters for a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link.
Options	<p>algorithm—Type of encryption algorithm. It can be one of the following:</p> <ul style="list-style-type: none"> • 3des-cbc—Has block size of 8 bytes (64 bits); its key size is 192 bits long. • des-cbc—Has a block size of 8 bytes (64 bits); its key size is 48 bits long. • null—With null encryption, you are choosing not to provide encryption on OSPFv3 headers. <p>key—Type of encryption key. It can be one of the following:</p> <ul style="list-style-type: none"> • ascii-text key—ASCII text key. For the des-cbc option, the key contains 8 ASCII characters; for 3des-cbc, the key contains 24 ASCII characters. • hexadecimal key—Hexadecimal key. For the des-cbc option, the key contains 16 hexadecimal characters; for the 3des-cbc option, the key contains 48 hexadecimal characters.
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62


encryption (Security)

Syntax	<pre> encryption { algorithm (3des-cbc aes-128-cbc aes-192-cbc aes-256-cbc des-cbc); key (ascii-text <i>key</i> hexadecimal <i>key</i>) ; } </pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> manual]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Configure an encryption algorithm and key for a manual Security Association (SA).
Options	<ul style="list-style-type: none"> • algorithm—Type of encryption algorithm. It can be one of the following: <ul style="list-style-type: none"> • des-cbc—Has a block size of 8 bytes (64 bits); its key size is 48 bits long. • 3des-cbc—Has block size of 8 bytes (64 bits); its key size is 192 bits long <p>.....</p> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  </div> <div> <p>NOTE: For 3des-cbc, we recommend that the first 8 bytes be different from the second 8 bytes, and the second 8 bytes be the same as the third 8 bytes.</p> <p>.....</p> </div> </div> <ul style="list-style-type: none"> • aes-128-cbc—Advanced Encryption Standard (AES) 128-bit encryption algorithm. • aes-192-cbc—Advanced Encryption Standard (AES) 192-bit encryption algorithm. • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption algorithm. • key—Type of encryption key. It can be one of the following: <ul style="list-style-type: none"> • ascii-text key—ASCII text key. For the des-cbc option, the key contains 8 ASCII characters; for 3des-cbc, the key contains 24 ASCII characters. • hexadecimal key—Hexadecimal key. For the des-cbc option, the key contains 16 hexadecimal characters; for the 3des-cbc option, the key contains 48 hexadecimal characters.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

encryption-algorithm (Security Group VPN IKE)

Syntax	encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc);
Hierarchy Level	[edit security group-vpn member ike proposal <i>proposal-name</i>] [edit security group-vpn server ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for group-vpn hierarchies added in Junos OS Release 10.2.
Description	Configure an encryption algorithm for an IKE proposal. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
<div>  <p>NOTE: The device does not delete existing IPsec SAs when you update the encryption-algorithm configuration in the IKE proposal.</p> </div>	
Options	<ul style="list-style-type: none"> • aes-128-cbc—Advanced Encryption Standard (AES) 128-bit encryption algorithm. • aes-192-cbc—AES 192-bit encryption algorithm. • aes-256-cbc—AES 256-bit encryption algorithm.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

encryption-algorithm (Security Group VPN IPsec)

Syntax	encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc);
Hierarchy Level	[edit security group-vpn server ipsec proposal <i>proposal-name</i>] [edit security group-vpn member ipsec proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure an encryption algorithm. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
<div>  <p>NOTE: The device deletes existing IPsec SAs when you update the encryption-algorithm configuration in the IPsec proposal.</p> </div>	
Options	<ul style="list-style-type: none"> • aes-128-cbc—Advanced Encryption Standard (AES) 128-bit encryption algorithm. • aes-192-cbc—AES 192-bit encryption algorithm. • aes-256-cbc—AES 256-bit encryption algorithm. This is the default value.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

encryption-algorithm (Security IKE)

Syntax	encryption-algorithm (3des-cbc aes-128-cbc aes-128-gcm aes-192-cbc aes-256-cbc aes-256-gcm des-cbc);
Hierarchy Level	[edit security ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for aes-128-gcm and aes-256-gcm options added in Junos OS Release 15.1X49-D40.
Description	Configure an encryption algorithm for an IKE proposal.



NOTE: The device does not delete existing IPsec SAs when you update the **encryption-algorithm** configuration in the IKE proposal.

- Options**
- 3des-cbc**—Has a block size of 24 bytes; the key size is 192 bits long.
 - aes-128-cbc**—Advanced Encryption Standard (AES) 128-bit encryption algorithm.
 - aes-128-gcm**—AES 128-bit authenticated encryption algorithm supported with IKEv2 only. When this option is used, **aes-128-gcm** should be configured at the [edit security ipsec proposal *proposal-name*] hierarchy level, and the **authentication-algorithm** option should not be configured at the [edit security ike proposal *proposal-name*] hierarchy level.



NOTE: When **aes-128-gcm** or **aes-256-gcm** encryption algorithms are configured in the IPsec proposal, it is not mandatory to configure AES-GCM encryption algorithm in the corresponding IKE proposal.

- aes-192-cbc**—AES 192-bit encryption algorithm.
- aes-256-cbc**—AES 256-bit encryption algorithm.
- aes-256-gcm**—AES 256-bit authenticated encryption algorithm supported with IKEv2 only. When this option is used, **aes-256-gcm** should be configured at the [edit security ipsec proposal *proposal-name*] hierarchy level, and the **authentication-algorithm** option should not be configured at the [edit security ike proposal *proposal-name*] hierarchy level.
- des-cbc**—Has a block size of 8 bytes; the key size is 48 bits long.

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

Related Documentation • [IPsec VPN Overview on page 31](#)

encryption-algorithm (Security IPsec)

Syntax encryption-algorithm (3des-cbc | aes-128-cbc | aes-128-gcm | aes-192-cbc | aes-192-gcm | aes-256-cbc | aes-256-gcm | des-cbc);

Hierarchy Level [edit security ipsec proposal *proposal-name*]

Release Information Statement introduced in Junos OS Release 8.5. Support for **aes-128-gcm**, **aes-192-gcm**, and **aes-256-gcm** options added in Junos OS Release 12.1X45-D10. Support for **aes-128-gcm**, **aes-192-gcm**, and **aes-256-gcm** options added in Junos OS Release 15.1X49-D70 for vSRX.

Description Configure an encryption algorithm.



NOTE: The device deletes existing IPsec SAs when you update the **encryption-algorithm** configuration in the IPsec proposal.

- Options**
- **3des-cbc**—Has a block size of 24 bytes; the key size is 192 bits long.
 - **aes-128-cbc**—Advanced Encryption Standard (AES) 128-bit encryption algorithm.
 - **aes-128-gcm**—AES Galois/Counter Mode (GCM) 128-bit encryption algorithm. This option is for IPsec proposals only.
 - **aes-192-cbc**—AES 192-bit encryption algorithm.
 - **aes-192-gcm**—AES GCM 192-bit encryption algorithm. This option is for IPsec proposals only.
 - **aes-256-cbc**—AES 256-bit encryption algorithm.
 - **aes-256-gcm**—AES GCM 256-bit encryption algorithm. This option is for IPsec proposals only.
 - **des-cbc**—Has a block size of 8 bytes; the key size is 48 bits long.

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

Related Documentation • [IPsec VPN Overview on page 31](#)


encryption-failures

Syntax	<pre>encryption-failures { threshold <i>value</i>; }</pre>
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm after exceeding a specified number of encryption failures. This statement is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.
Default	Multiple encryption failures do not cause an alarm to be raised.
Options	<p>failures—Number of encryption failures up to which an alarm is not raised. When the configured number is exceeded, an alarm is raised.</p> <p>Range: 1 through 1,000,000,000.</p> <p>Default: 1000</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

enrollment (Security)

Syntax	<pre> enrollment { retry <i>number</i>; retry-interval <i>seconds</i>; url <i>url-name</i>; } </pre>
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	Specify the enrollment parameters for a certificate authority (CA).
Options	<ul style="list-style-type: none"> • retry <i>number</i> —Number of automated attempts for online enrollment to be retried in case enrollment response is pending. Range: 0 through 1080 Default: 10 • retry-interval <i>seconds</i> —Time interval between the enrollment retries. Range: 0 through 3600 Default: 900 seconds • url <i>url-name</i> —Enrollment URL where the Simple Certificate Enrollment Protocol (SCEP) or CMPv2 request is sent to the certification authority (CA) as configured in this profile. With SCEP, you enroll CA certificates with the request security pki ca-certificate enroll command and specify the CA profile. There is no separate command to enroll CA certificates with CMPv2. The IP address in the enrollment URL can be an IPv4 or an IPv6 address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding CMPv2 and SCEP Certificate Enrollment on page 1002 • Understanding Certificates and PKI on page 973

establish-tunnels

Syntax	<code>establish-tunnels (immediately on-traffic responder-only responder-only-no-rekey);</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5. responder-only option added in Junos OS Release 19.1R1.
Description	Specify when IKE is activated: immediately after VPN information is configured and configuration changes are committed, or only when data traffic flows. If this configuration is not specified, IKE is activated only when data traffic flows.
Options	<ul style="list-style-type: none"> immediately—IKE is activated immediately after VPN configuration changes are committed.
	<p> NOTE: Starting with Junos OS Release 15.1X49-D70, a warning message is displayed if you configure the establish-tunnels immediately option for an IKE gateway with group-ike-id or shared-ike-id IKE user types (for example, with AutoVPN or a remote access VPN). The establish-tunnels immediately option is not appropriate for these VPNs because multiple VPN tunnels may be associated with a single VPN configuration. Committing the configuration will succeed, however the establish-tunnels immediately configuration is ignored. The state of the tunnel interface will be up all the time, which was not the case in previous releases when the establish-tunnels immediately option was configured.</p>
	<ul style="list-style-type: none"> on-traffic—IKE is activated only when data traffic flows and must to be negotiated with the peer gateway. This is the default behavior. responder-only—Responds to IKE negotiations that are initiated by the peer gateway, but does not initiate IKE negotiations from the device. This option is required when another vendor's peer gateway expects the protocol and port values in the traffic selector from the initiating gateway. responder-only-no-rekey—Option does not establish any VPN tunnel from the device, so the VPN tunnel is initiated from the remote peer. An established tunnel does not start any rekeying from the device and relies on the remote peer to initiate this rekeying. If rekeying does not occur, then the tunnel is brought down after hard-lifetime expires.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.

Related Documentation • [IPsec VPN Overview on page 31](#)

external-interface (Security IKE Gateway)

Syntax	<code>external-interface <i>external-interface-name</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the outgoing interface for IKE SAs. This interface is associated with a zone that acts as its carrier, providing firewall security for it.
Options	<i>external-interface-name</i> —Name of the interface to be used to send traffic to the IPsec VPN.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	• IPsec VPN Overview on page 31

external-interface (Security Manual SA)

Syntax	<code>external-interface <i>external-interface-name</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> manual]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the outgoing interface for the manual SA.
Options	<i>external-interface-name</i> —Name of the outgoing interface.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	• IPsec VPN Overview on page 31

fragmentation (Security)

Syntax	<pre>fragmentation { disable; size <i>bytes</i>; }</pre>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 15.1X49-D80.
Description	<p>Disable IKEv2 packet fragmentation and, optionally, configure the maximum size of an IKEv2 message before the message is split into fragments that are individually encrypted and authenticated. On the receiver, the message fragments are collected, verified, decrypted, and merged into the original message. IKEv2 messages larger than the configured maximum are fragmented as long as both VPN peers indicate support for fragmentation in their IKE_SA_INIT exchanges. IKEv2 message fragmentation allows IKEv2 to operate in environments where IP fragments otherwise might be blocked and peers would not be able to establish an IPsec security association.</p>
Options	<p>disable—Disables IKEv2 fragmentation. IKEv2 fragmentation is enabled by default.</p> <p>size <i>bytes</i>—Maximum size, in bytes, of an IKEv2 message before it is split into fragments. The size applies to both IPv4 and IPv6 messages.</p> <p>Range: 500 to 1300 bytes</p> <p>Default: 576 bytes for IPv4 messages and 1280 bytes for IPv6 messages</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding IKEv2 Fragmentation on page 150

gateway (Security Group VPN Member IKE)

Syntax	<pre>gateway <i>gateway-name</i> { ike-policy <i>policy-name</i>; local address <i>ip-address</i>; local-identity { (hostname <i>hostname</i> inet <i>ip-address</i> inet6 <i>ipv6-address</i> user-at-hostname <i>e-mail-address</i>); } remote-identity { (hostname [<i>hostname</i>] inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); } routing-instance <i>routing-instance</i>; server-address [<i>ip-address</i>]; }</pre>
Hierarchy Level	[edit security group-vpn member ike]
Release Information	Statement introduced in Junos OS Release 10.2. Support for the routing-instance option added in Junos OS Release 15.1X49-D30 for vSRX.
Description	Configure IKE gateway for group VPN member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>gateway-name</i> —Name of the gateway.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

gateway (Security Group VPN Server IKE)

Syntax	<pre> gateway <i>gateway-name</i> { address <i>ip-address</i> ; dead-peer-detection { always-send; interval <i>seconds</i>; threshold <i>number</i>; } dynamic { (hostname <i>hostname</i> inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); } ike-policy <i>policy-name</i>; local-address <i>ip-address</i>; local-identity { (hostname <i>hostname</i> inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); } remote-identity { (hostname [<i>hostname</i>] inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); } routing-instance <i>routing-instance</i>; } </pre>
Hierarchy Level	[edit security group-vpn server ike]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure IKE gateway for group VPN server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>gateway-name</i> —Name of the gateway.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

gateway (Security IKE)

```

Syntax gateway gateway-name {
    aaa {
        access-profile profile-name;
    }
    address [ip-address-or-hostname];
    advpn {
        suggester {
            disable;
        }
        partner {
            connection-limit <number>;
            idle-threshold <packets/sec>;
            idle-time <seconds>;
            disable;
        }
    }
    dead-peer-detection {
        (always-send | optimized | probe-idle-tunnel);
        interval seconds;
        threshold number;
    }
    dynamic {
        connections-limit number;
        (distinguished-name <container container-string> <wildcard wildcard-string> | hostname
         domain-name | inet ip-address | inet6 ipv6-address | user-at-hostname e-mail-address);
        ike-user-type (group-ike-id | shared-ike-id);
    }
    external-interface external-interface-name;
    fragmentation {
        disable;
        size bytes;
    }
    general-ikeid;
    ike-policy policy-name;
    local-address (ipv4-address | ipv6-address);
    local-identity {
        (distinguished-name | hostname hostname | inet ip-address | inet6 ipv6-address |
         user-at-hostname e-mail-address);
    }
    nat-keepalive seconds;
    no-nat-traversal;
    remote-identity {
        (distinguished-name <container container-string> <wildcard wildcard-string> | hostname
         hostname | inet ip-address | inet6 ipv6-address | user-at-hostname e-mail-address);
    }
    tcp-encap-profile profile-name;
    version (v1-only | v2-only);
}

```

Hierarchy Level [edit security ike]

Release Information	Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1. The inet6 option added in Junos OS Release 11.1. Support for the advpn option added in Junos OS Release 12.3X48-D10.
Description	Configure an IKE gateway.
Options	<i>gateway-name</i> —Name of the gateway. The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

[gateway \(Security IPsec VPN\)](#)

Syntax	<i>gateway ip-address;</i>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> ike]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the IP address of the peer.
Options	<i>ip-address</i> —IP address of the peer.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

gateway (Security Manual SA)

Syntax	<code>gateway <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> manual]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.
Description	For a manual security association, specify the IPv4 or IPv6 address of the peer.
Options	<i>ip-address</i> —IPv4 or IPv6 address of the peer.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

general-ikeid

Syntax	<code>general-ikeid;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.4.
Description	Accept general peer IKE ID.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

group (Security Group VPN)

```
Syntax  group name {
        anti-replay-time-window milliseconds;
        description description;
        group-id number;
        ike-gateway gateway-name;
        ipsec-sa name {
            match-policy policy-name {
                destination ip-address/netmask;
                destination-port number;
                protocol number;
                source ip-address/netmask;
                source-port number;
            }
            proposal proposal-name;
        }
        member-threshold number;
        server-cluster {
            ike-gateway gateway-name;
            retransmission-period seconds;
            server-role (root-server | sub-server);
        }
        server-member-communication {
            certificate certificate-id;
            communication-type unicast;
            encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
            lifetime-seconds seconds;
            number-of-retransmission number;
            retransmission-period seconds;
            sig-hash-algorithm (sha-256 | sha-384);
        }
    }
```

Hierarchy Level [edit security group-vpn server]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure group VPN on the group server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Options *name*—Name of the group.

- **anti-replay-time-window *milliseconds***—Configure antireplay time in milliseconds. Specify a value from 1 to 60,000.



NOTE: We recommend that NTP be configured on Group VPNv2 devices to ensure proper antireplay operation.



NOTE: Group members that are running on vSRX instances on a host machine where the hypervisor is running under a heavy load may experience issues that can be corrected by reconfiguring the anti-replay-time-window value. If data that matches the IPsec policy on the group member is not being transferred, check the `show security group-vpn member ipsec statistics` output for D3P errors. Make sure that NTP is operating correctly. If there are errors, adjust the anti-replay-time-window value.

- **description** *description*—Description of the group.
- **group-id** *number*—Identifier for this group VPN. Specify a value from 1 to 4,294,967,295.
- **ike-gateway** *gateway-name*—Define the group member for Phase 1 negotiation. There can be multiple instances of this option configured. When a group member sends its registration request to the server, the server checks to see that the member is configured for the group.

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation • [Group VPNv2 Overview on page 747](#)

group-vpn

```
Syntax group-vpn {
  member {
    ike {
      gateway gateway-name {
        ike-policy policy-name;
        local address ip-address;
        local-identity {
          (hostname hostname | inet ip-address | inet6 ipv6-address | user-at-hostname
            e-mail-address);
        }
        remote-identity {
          (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
        }
        routing-instance routing-instance;
        server-address [ip-address];
      }
      policy policy-name {
        description description;
        mode (aggressive | main);
        pre-shared-key (ascii-text key | hexadecimal key);
        proposals [proposal-name];
      }
      proposal proposal-name {
        authentication-algorithm (sha-256 | sha-384);
        authentication-method pre-shared-keys;
        description description;
        dh-group (group14 | group24);
        encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
        lifetime-seconds seconds;
      }
      traceoptions {
        file {
          filename;
          files number;
          match regular-expression;
          size maximum-file-size;
          (world-readable | no-world-readable);
        }
        flag flag;
        gateway-filter {
          local-address ip-address;
          remote-address ip-address;
        }
        level (all | error | info | notice | verbose | warning);
        no-remote-trace;
      }
    }
  }
  ipsec {
    vpn vpn-name {
      df-bit (clear | copy | set);
      exclude rule rule-name {
```

```

        source-address ip-address/mask;
        destination-address ip-address/mask;
        application application;
    }
    fail-open rule rule-name {
        source-address ip-address/mask;
        destination-address ip-address/mask;
        application application;
    }
    group id;
    group-vpn-external-interface interface;
    ike-gateway gateway-name;
    recovery-probe;
}
}
}
server {
    group name {
        anti-replay-time-window milliseconds;
        description description;
        group-id number;
        ike-gateway gateway-name;
        ipsec-sa name {
            match-policy policy-name {
                destination ip-address/netmask;
                destination-port number;
                protocol number;
                source ip-address/netmask;
                source-port number;
            }
            proposal proposal-name;
        }
        member-threshold number;
        server-cluster {
            ike-gateway gateway-name;
            retransmission-period seconds;
            server-role (root-server | sub-server);
        }
        server-member-communication {
            certificate certificate-id;
            communication-type unicast;
            encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
            lifetime-seconds seconds;
            number-of-retransmission number;
            retransmission-period seconds;
            sig-hash-algorithm (sha-256 | sha-384);
        }
    }
}
ike {
    gateway gateway-name {
        address ip-address;
        dead-peer-detection {
            always-send;
            interval seconds;
            threshold number;
        }
    }
}

```

```

    }
    dynamic {
        (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
    }
    ike-policy policy-name;
    local-address ip-address;
    local-identity {
        (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
    }
    remote-identity {
        (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
    }
    routing-instance routing-instance;
}
policy policy-name {
    description text;
    mode (aggressive | main);
    pre-shared-key (ascii-text key | hexadecimal key);
    proposals [proposal-name];
}
proposal proposal-name {
    authentication-algorithm (sha-256 | sha-384);
    authentication-method pre-shared-keys;
    description description;
    dh-group (group14 | group24);
    encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
}
}
ipsec {
    proposal proposal-name {
        authentication-algorithm hmac-sha-256-128;
        description description;
        encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
        lifetime-seconds seconds;
    }
}
traceoptions {
    file {
        filename;
        files number;
        match regular-expression;
        size maximum-file-size;
        (world-readable | no-world-readable);
    }
    flag flag;
    gateway-filter {
        local-address ip-address;
        remote-address ip-address;
    }
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
}
}
}

```

Hierarchy Level	[edit security]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure Group VPNs in Group VPNv2. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

hostname

Syntax	hostname <i>domain-name</i> ;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dynamic]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Name by which a network-attached device is known on a network.
Options	domain-name —A fully qualified domain name (FQDN), or partial FQDN that can be matched to a peer's X.509 PKI certificate. A partial FQDN is matched to the right-most part of the alternate subject field in the peer device's certificate. For example, the partial FQDN example.net can match devices with host1.example.net or host2.example.net in the alternate subject field of their certificates. Note that the partial FQDN example.net does not match host1.example.network.com or host2.net.com because example.net is not the right-most value in the alternate subject field. For AutoVPN, a partial FQDN combined with ike-user-type group-ike-id can be used to identify a specific remote user or peer when there are multiple peers that share a common domain name.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding Spoke Authentication in AutoVPN Deployments on page 229 • IPsec VPN Overview on page 31

idle-time

Syntax	<code>idle-time <i>seconds</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the maximum amount of idle time to delete a security association (SA).
Options	<p><i>seconds</i> —Maximum amount of idle time.</p> <p>Range: 60 through 999,999 seconds</p> <p>Default: To be disabled</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

ike (Security)

```
Syntax  ike {
    gateway gateway-name {
        aaa {
            access-profile profile-name;
        }
        address [ip-address-or-hostname];
        advpn {
            suggerter {
                disable;
            }
            partner {
                connection-limit <number>;
                idle-threshold <packets/sec>;
                idle-time <seconds>;
                disable;
            }
        }
    }
    dead-peer-detection {
        (always-send | optimized | probe-idle-tunnel);
        interval seconds;
        threshold number;
    }
    dynamic {
        connections-limit number;
        (distinguished-name <container container-string> <wildcard wildcard-string> |
         hostname domain-name | inet ip-address | inet6 ipv6-address | user-at-hostname
         e-mail-address);
        ike-user-type (group-ike-id | shared-ike-id);
    }
    external-interface external-interface-name;
    fragmentation {
        enable;
        size bytes;
    }
    general-ikeid;
    ike-policy policy-name;
    local-address (ipv4-address | ipv6-address);
    local-identity {
        (distinguished-name | hostname hostname | inet ip-address | inet6 ipv6-address |
         user-at-hostname e-mail-address);
    }
    nat-keepalive seconds;
    no-nat-traversal;
    remote-identity {
        (distinguished-name <container container-string> <wildcard wildcard-string> |
         hostname hostname | inet ip-address | inet6 ipv6-address | user-at-hostname
         e-mail-address);
    }
    tcp-encap-profile profile-name;
    version (v1-only | v2-only);
}
```

```

policy policy-name {
  certificate {
    local-certificate certificate-id;
    peer-certificate-type (pkcs7 | x509-signature);
    policy-oids [ oid ];
    trusted-ca {
      ca-profile ca-profile-name;
      trusted-ca-group trusted-ca-group-name;
    }
  }
  description description;
  mode (aggressive | main);
  pre-shared-key (ascii-text key | hexadecimal key);
  proposal-set (basic | compatible | standard | suiteb-gcm-128 | suiteb-gcm-256);
  proposals [proposal-name];
  reauth-frequency number;
}
proposal proposal-name {
  authentication-algorithm (md5 | sha-256 | sha-384 | sha1 | sha-512);
  authentication-method (dsa-signatures | ecdsa-signatures-256 | ecdsa-signatures-384
    | pre-shared-keys | rsa-signatures | ecdsa-signatures-521);
  description description;
  dh-group (group1 | group14 | group19 | group2 | group20 | group24 | group5 | group15 |
    group16 | group21);
  encryption-algorithm (3des-cbc | aes-128-cbc | aes-192-cbc | aes-256-cbc | des-cbc);
  lifetime-seconds seconds;
}
respond-bad-spi <max-responses>;
traceoptions {
  file {
    filename;
    files number;
    match regular-expression;
    size maximum-file-size;
    (world-readable | no-world-readable);
  }
  flag flag;
  no-remote-trace;
  rate-limit messages-per-second;
}
}

```

Hierarchy Level [edit security]

Release Information Statement modified in Junos OS Release 8.5.
 Support for IPv6 addresses added in Junos OS Release 11.1.
inet6 option added in Junos OS Release 11.1.
group15, **group16**, **group21**, **ecdsa-signatures-521**, and **sha-512** options introduced in Junos OS Release 19.1R1.

Description Define Internet Key Exchange (IKE) configuration.

Options The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [IPsec VPN Overview on page 31](#)
- *ALG Overview*
- *Understanding Logical Systems for SRX Series Services Gateways*

ike (Security Group VPN Member)

```
Syntax  ike {
    gateway gateway-name {
        ike-policy policy-name;
        local address ip-address;
        local-identity {
            (hostname hostname | inet ip-address | inet6 ipv6-address | user-at-hostname
             e-mail-address);
        }
        remote-identity {
            (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
        }
        routing-instance routing-instance;
        server-address [ip-address];
    }
    policy policy-name {
        description description;
        mode (aggressive | main);
        pre-shared-key (ascii-text key | hexadecimal key);
        proposals [proposal-name];
    }
    proposal proposal-name {
        authentication-algorithm (sha-256 | sha-384);
        authentication-method pre-shared-keys;
        description description;
        dh-group (group14 | group24);
        encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
        lifetime-seconds seconds;
    }
    traceoptions {
        file {
            filename;
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag flag;
        gateway-filter {
            local-address ip-address;
            remote-address ip-address;
        }
        level (all | error | info | notice | verbose | warning);
        no-remote-trace;
    }
}
```

Hierarchy Level [edit security group-vpn member]

Release Information Statement introduced in Junos OS Release 10.2.

Description	Configure IPsec group VPN on the group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747

ike (Security Group VPN Server)

```
Syntax  ike {
        gateway gateway-name {
            address ip-address ;
            dead-peer-detection {
                always-send;
                interval seconds;
                threshold number;
            }
            dynamic {
                (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
            }
            ike-policy policy-name;
            local-address ip-address;
            local-identity {
                (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
            }
            remote-identity {
                (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
            }
            routing-instance routing-instance;
        }
        policy policy-name {
            description text;
            mode (aggressive | main);
            pre-shared-key (ascii-text key | hexadecimal key);
            proposals [proposal-name];
        }
        proposal proposal-name {
            authentication-algorithm (sha-256 | sha-384);
            authentication-method pre-shared-keys;
            description description;
            dh-group (group14 | group24);
            encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
        }
    }
```

Hierarchy Level [edit security group-vpn server]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure Phase 1 security association (SA) with a member on the group server. The gateway is the group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Options The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation • [Group VPNv2 Overview on page 747](#)

ike (Security IPsec VPN)

Syntax

```
ike {
  gateway gateway-name;
  idle-time seconds;
  install-interval seconds;
  ipsec-policy ipsec-policy-name;
  no-anti-replay;
  proxy-identity {
    local ip-prefix;
    remote ip-prefix;
    service (any | service-name);
  }
}
```

Hierarchy Level [edit security ipsec vpn *vpn-name*]

Release Information Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.

Description Define an IKE-keyed IPsec VPN.

Options The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation • [IPsec VPN Overview on page 31](#)

ike-phase1-failures

Syntax	<pre>ike-phase1-failures { threshold <i>value</i>; }</pre>
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm after exceeding a specified number of Internet Key Exchange (IKE) Phase 1 failures. This statement is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.
Default	Multiple IKE phase 1 failures do not cause an alarm to be raised.
Options	<p>failures—Number of IKE phase 1 failures up to which an alarm is not raised. When the configured number is exceeded, an alarm is raised.</p> <p>Range: 1 through 1,000,000,000.</p> <p>Default: 20</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

ike-phase2-failures

Syntax	ike-phase2-failures { threshold <i>value</i> ; }
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm after exceeding a specified number of Internet Key Exchange (IKE) phase 2 failures. This statement is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, and SRX1500 devices and vSRX instances.
Default	Multiple IKE phase 2 failures do not cause an alarm to be raised.
Options	<p>failures—Number of IKE phase 2 failures up to which an alarm is not raised. When the configured number is exceeded, an alarm is raised.</p> <p>Range: 1 through 1,000,000,000.</p> <p>Default: 20</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

ike-policy (Security Gateway)

Syntax	<code>ike-policy <i>policy-name</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the IKE policy to be used for the gateway.
Options	<i>policy-name</i> —IKE policy name.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

ike-user-type

Syntax	<code>ike-user-type (group-ike-id shared-ike-id);</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dynamic]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the type of IKE user for a remote access connection.
Options	<ul style="list-style-type: none"> • group-ike-id—E-mail address or fully qualified domain name (FQDN) shared by a group of remote access users so that each user does not need to configure a separate IKE profile. When group IKE IDs are configured, the IKE ID of each user is a concatenation of a user-specific part and a part that is common to all group IKE ID users. For example, the user Bob might use "Bob.example.net" as his full IKE ID, where ".example.net" is common to all users. The full IKE ID is used to uniquely identify each user connection. Group IKE IDs require the generation of a unique preshared key based on the username supplied during VPN connection, which can be viewed with the show security ike pre-shared-key command. • shared-ike-id—E-mail address shared by a large number of remote access users so that each user does not need to configure a separate IKE profile. When a shared IKE ID is configured, all users share a single IKE ID and a single IKE preshared key. Each user is authenticated through the mandatory XAuth phase, where the credentials of individual users are verified either with an external RADIUS server or with a local access database. XAuth is required for shared IKE IDs.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

inet (Security Dynamic Peer)

Syntax	<code>inet <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dynamic]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify IP address to identify the dynamic peer.
Options	<i>ip-address</i> —IP address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

inet6 (Security IKE Gateway)

Syntax	<code>inet6 <i>ipv6-address</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dynamic]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Specify an IPv6 address to identify the dynamic peer.
Options	<i>ipv6-address</i> —IPv6 address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

install-interval

Syntax	<code>install-interval <i>seconds</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the maximum number of seconds to allow for the installation of a rekeyed outbound security association (SA) on the device.
Options	<i>seconds</i> —Maximum amount of idle time. Range: 0 through 10 seconds
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

internal (Security IPsec)

Syntax	<pre> internal { security-association { manual { encryption { algorithm 3des-cbc; aes-128-cbc; iked-encryption enable; key ascii-text <i>ascii-text</i>; } } } } </pre>
Hierarchy Level	[edit security ipsec internal-security-association]
Release Information	<p>Statement introduced in Junos OS Release 12.1X45-D10.</p> <p>Support for iked-encryption option added in Junos OS Release 12.1X47-D15.</p> <p>Support for aes-128-cbc option added in Junos OS Release 19.1R1.</p>
Description	<p>Enable secure login and to prevent attackers from gaining privileged access through this control port by configuring the internal IP security (IPsec) security association (SA).</p> <p>When the internal IPsec is configured, IPsec-based rlogin and remote command (rcmd) are enforced, so an attacker cannot gain unauthorized information.</p>
Options	<p>security-association—Specify an IPsec SA. An SA is a simplex connection that allows two hosts to communicate with each other securely by means of IPsec.</p> <p>manual encryption—Specify a manual SA. Manual SAs require no negotiation; all values, including the keys, are static and specified in the configuration.</p> <p>algorithm 3des-cbc—Specify the encryption algorithm for the internal Routing-Engine-to-Routing-Engine IPsec SA configuration.</p> <p>algorithm aes-128-cbc—Specify the encryption algorithm for high availability encryption link.</p> <p>iked-encryption—Enable encryption for internal messages.</p> <p>Values:</p> <ul style="list-style-type: none"> enable—Enable HA link encryption IKE internal messages <p>key—Specify the encryption key. You must ensure that the manual encryption key is in ASCII text and 24 characters long; otherwise, the configuration will result in a commit failure.</p>

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Example: Configuring an Active/Passive Chassis Cluster on SRX5800 Devices</i> • <i>show security internal-security-association</i>

interval (Security IKE)

Syntax	<code>interval seconds;</code>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dead-peer-detection]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the amount of time that the peer waits for traffic from its destination peer before sending a dead-peer-detection (DPD) request packet.
Options	<p>seconds —Number of seconds that the peer waits before sending a DPD request packet.</p> <p>Range: 10 through 60 seconds</p> <p>Default: 10 seconds</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

interface (Security Dynamic VPN)

Syntax	<code>interface [<i>interface-names</i>];</code>
Hierarchy Level	<code>[edit security dynamic-vpn]</code>
Release Information	Statement introduced in Junos OS Release 12.1X44-D10.
Description	Specify a list of interfaces to set the interfaces that allow access to dynamic VPN. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Options	<i>interface-names</i> —Names of one or more Interfaces that accept dynamic VPN client access, separated by spaces.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

ipsec (Security)

```
Syntax ipsec {
    policy policy-name {
        description description;
        perfect-forward-secrecy keys (group1 | group14 | group19 | group2 | group20 | group24 |
            group5 | group15 | group16 | group21);
        proposal-set (basic | compatible | standard | suiteb-gcm-128 | suiteb-gcm-256);
        proposals [proposal-name];
    }
    proposal proposal-name {
        authentication-algorithm (hmac-md5-96 | hmac-sha-256-128 | hmac-sha1-96 |
            hmac-sha-512 | hmac-sha-384);
        description description;
        encryption-algorithm (3des-cbc | aes-128-cbc | aes-128-gcm | aes-192-cbc | aes-192-gcm
            | aes-256-cbc | aes-256-gcm | des-cbc);
        lifetime-kilobytes kilobytes;
        lifetime-seconds seconds;
        protocol (ah | esp);
    }
    security-association sa-name {
        manual {
            direction bidirectional {
                authentication {
                    algorithm (hmac-md5-96 | hmac-sha1-96);
                    key {
                        ascii-text key;
                        hexadecimal key;
                    }
                }
            }
            auxiliary-spi auxiliary-spi-value;
            encryption {
                algorithm (3des-cbc | des-cbc | null);
                key {
                    ascii-text key;
                    hexadecimal key;
                }
            }
            protocol (ah | esp);
            spi spi-value;
        }
    }
    mode transport;
}
traceoptions {
    flag flag;
}
vpn vpn-name {
    bind-interface interface-name;
    copy-outer-dscp;
    establish-tunnels (immediately | on-traffic);
    ike {
        gateway gateway-name;
    }
}
```

```

idle-time seconds;
install-interval seconds;
ipsec-policy ipsec-policy-name;
no-anti-replay;
proxy-identity {
    local ip-prefix;
    remote ip-prefix;
    service (any | service-name);
}
}
manual {
    authentication {
        algorithm (hmac-md5-96 | hmac-sha-256-128 | hmac-sha1-96);
        key (ascii-text key | hexadecimal key);
    }
    encryption {
        algorithm (3des-cbc | aes-128-cbc | aes-192-cbc | aes-256-cbc | des-cbc);
        key (ascii-text key | hexadecimal key);
    }
    external-interface external-interface-name;
    gateway ip-address;
    protocol (ah | esp);
    spi spi-value;
}
traffic-selector traffic-selector-name {
    local-ip ip-address/netmask;
    remote-ip ip-address/netmask;
}
}
vpn-monitor {
    destination-ip ip-address;
    optimized;
    source-interface interface-name;
    verify-path {
        destination-ip ip-address;
        packet-size bytes;
    }
}
}
vpn-monitor-options {
    interval seconds;
    threshold number;
}
}

```

Hierarchy Level [edit security]

Release Information Statement modified in Junos OS Release 8.5.
group15, **group16**, **group21**, **hmac-sha-512** and **hmac-sha-384** options introduced in Junos OS Release 19.1R1.

Description Define IPsec configuration.

Options The remaining statements are explained separately. See [CLI Explorer](#).

Required Privilege security—To view this statement in the configuration.

Level security-control—To add this statement to the configuration.

Related Documentation • [IPsec VPN Overview on page 31](#)

ipsec (Security Group VPN Member)

```
Syntax  ipsec {
        vpn vpn-name {
            df-bit (clear | copy | set);
            exclude rule rule-name {
                source-address ip-address/mask;
                destination-address ip-address/mask;
                application application;
            }
            fail-open rule rule-name {
                source-address ip-address/mask;
                destination-address ip-address/mask;
                application application;
            }
        }
        group id;
        group-vpn-external-interface interface;
        ike-gateway gateway-name;
        recovery-probe;
    }
```

Hierarchy Level [edit security group-vpn member]

Release Information Statement introduced in Junos OS Release 10.2. **df-bit**, **exclude rule**, **fail-open rule**, and **recovery-probe** options added in Junos OS Release 15.1X49-D30 for vSRX.

Description Configure IPsec for Phase 2 exchange on the group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Options **vpn *vpn-name***—Name of the VPN.

df-bit—Specifies pre-fragmentation and post-fragmentation of IPsec traffic on the group member. One of the following options can be configured:

- **clear**—Sets the outer IP do not fragment (DF) bit to 0. When the packet size is larger than the path maximum transmission unit (path MTU), pre-fragmentation is done if the DF bit is not set in the inner packet and post-fragmentation is done if the DF bit is set in the inner packet. This is the default.
- **copy**—Copies the DF bit from the inner header to the outer header. When the packet size is larger than the path PMTU, pre-fragmentation is done if the DF bit is not set in the inner packet. If the DF bit is set in the inner packet, the packet is dropped and an ICMP message is sent back.
- **set**—Sets the outer IP DF bit to 1. When the packet size is larger than the path MTU, pre-fragmentation is done if the DF bit is not set in the inner packet. If the DF bit is set in the inner packet, the packet is dropped and an ICMP message is sent back.

exclude rule—Specifies traffic to be excluded from Group VPN encryption. A maximum of 10 exclude rules can be configured. Source and destination addresses must be specified in *ip-address/mask* format; address books and address sets are not supported. Predefined and user-defined applications are supported, but application sets are not supported.

fail-open rule—Specifies the traffic to be sent in cleartext mode if there is no valid SA key available to protect the traffic. Traffic that is not specified by the fail-open rule is blocked if there is no valid SA key available to protect the traffic. A maximum of 10 fail-open rules can be configured. Source and destination addresses must be specified in *ip-address/mask* format; address books and address sets are not supported. Predefined and user-defined applications are supported, but application sets are not supported.

group id—Identifier configured for the Group VPN.

group-vpn-external-interface interface—Interface used by the group member to connect to the Group VPN peers. The interface must belong to the same zone as the **to-zone** configured at the [edit security ipsec-policy] hierarchy level for Group VPN traffic.

ike-gateway gateway-name—Name of the IKE gateway for the Group VPN.

recovery-probe—Enables initiation of **groupkey-pull** exchanges at specific intervals to update the member's SA from the group server if the group member is determined to be out of synchronization with the group server and other group members. This option is disabled by default.

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

Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747
------------------------------	--

ipsec (Security Group VPN Server)

Syntax	<pre>ipsec { proposal <i>proposal-name</i> { authentication-algorithm hmac-sha-256-128; description <i>description</i>; encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc); lifetime-seconds <i>seconds</i>; } }</pre>
Hierarchy Level	[edit security group-vpn server]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure IPsec proposal for Phase 2 exchange on the group server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>proposal <i>proposal-name</i>—Name of the proposal. The proposal name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747


ipsec-performance-acceleration (Security Flow)

Syntax	<code>ipsec-performance-acceleration;</code>
Hierarchy Level	<code>[edit security flow]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D10 on SRX5400, SRX5600, and SRX5800 devices. Support on SRX4100 and SRX4200 devices and vSRX instances added in Junos OS Release 18.1R1.
Description	Enables IPsec VPN performance acceleration.
Options	None.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Accelerating the IPsec VPN Traffic Performance on page 955 • <code>show security flow status</code>

ipsec-policy (Security)

Syntax	<code>ipsec-policy <i>ipsec-policy-name</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the IPsec policy name.
Options	<i>ipsec-policy-name</i> —Name of the IPsec policy.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

ipsec-policy (Security Group VPN)

Syntax	<code>ipsec-policy from-zone <i>zone-name</i> to-zone <i>zone-name</i> ipsec-group-vpn <i>vpn-name</i>;</code>
Hierarchy Level	<code>[edit security]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Specifies that matching traffic is checked against rules associated with the specified Group VPN. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. Exclude and fail-open rules are configured at the <code>[edit security group-vpn member ipsec vpn <i>vpn-name</i>]</code> hierarchy level.
Options	<p>from-zone <i>zone-name</i>—Specify the incoming zone for Group VPN traffic.</p> <p>to-zone <i>zone-name</i>—Specify the outgoing zone for Group VPN traffic.</p>
	<p> NOTE: The to-zone zone must include the interface configured with the group-vpn-external-interface option at the <code>[edit security group-vpn member ipsec vpn <i>vpn-name</i>]</code> hierarchy level.</p>
	<p>ipsec-group-vpn <i>vpn-name</i>—Specify the Group VPN to which the traffic applies. Only one Group VPN can be referenced by a specific from-zone/to-zone pair.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Traffic Steering Group VPNv2 Overview on page 747

ipsec-vpn (Security Dynamic VPNs)

Syntax	<code>ipsec-vpn <i>vpn-name</i>;</code>
Hierarchy Level	<code>[edit security dynamic-vpn clients <i>vpn-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Use this statement to specify which IPsec VPN configuration the dynamic VPN feature should use to secure traffic. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

ipsec-sa (Security Group VPN)

Syntax	<pre> ipsec-sa <i>name</i> { match-policy <i>policy-name</i> { destination <i>ip-address/netmask</i>; destination-port <i>number</i>; protocol <i>number</i>; source <i>ip-address/netmask</i>; source-port <i>number</i>; } proposal <i>proposal-name</i>; } </pre>
Hierarchy Level	[edit security group-vpn server group <i>name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure the group SAs to be downloaded to members. There can be multiple group SAs downloaded to group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>ipsec-sa <i>name</i>—Define the group SAs to be downloaded to members.</p> <ul style="list-style-type: none"> match-policy <i>policy-name</i>—Configure the group policy with source address, source port, destination address, destination port, and protocol. Use 0.0.0.0 to specify any source or destination. Use 0 to specify any source port, destination port, or protocol. proposal <i>proposal-name</i>—Specify the name of the IPsec proposal configured with the proposal configuration statement at the [edit security group-vpn server ipsec] hierarchy.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

ipsec-vpn (Security Flow)

Syntax	<pre>ipsec-vpn { mss <i>value</i>; }</pre>
Hierarchy Level	[edit security flow tcp-mss]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the TCP maximum segment size (TCP MSS) for the TCP packets that are about to go into an IPsec VPN tunnel. This value overrides the value specified in the all-tcp-mss statement.
Options	<p>mss <i>value</i>—TCP MSS value for TCP packets entering an IPsec VPN tunnel. Value is optional.</p> <p>Range: 64 through 65,535 bytes</p> <p>Default: 1320 bytes</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

key-generation-self-test

Syntax	key-generation-self-test;
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm when the device or switch detects a key generation self-test failure. Key generation is the process of generating keys for cryptography. A key is used to encrypt and decrypt data. The self-tests run without operator intervention.
Default	No alarm is raised upon failure of a key generation self-test.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

lifetime-kilobytes

Syntax	lifetime-kilobytes <i>kilobytes</i> ;
Hierarchy Level	[edit security ipsec proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the lifetime (in kilobytes) of an IPsec security association (SA).
Options	<i>kilobytes</i> —Lifetime of the IPsec security association (SA). If this statement is not configured, the number of kilobytes used for the SA lifetime is unlimited. Range: 64 through 1,048,576 kilobytes
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

lifetime-seconds (Security Group VPN)

Syntax	<code>lifetime-seconds <i>seconds</i>;</code>
Hierarchy Level	<code>[edit security group-vpn member ike proposal <i>proposal-name</i>]</code> <code>[edit security group-vpn server ipsec proposal <i>proposal-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify the lifetime (in seconds) of an IKE or IPsec security association (SA) for group VPN. When the SA expires, it is replaced by a new SA and security parameter index (SPI) or terminated. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<i>seconds</i> —Lifetime of the IKE or IPsec SA. Range: 180 through 86,400 seconds Default: 3600 seconds
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

lifetime-seconds (Security IKE)

Syntax	lifetime-seconds <i>seconds</i> ;
Hierarchy Level	[edit security ike proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Default value modified in Junos OS Release 10.2.
Description	Specify the lifetime (in seconds) of an IKE security association (SA). When the SA expires, it is replaced by a new SA and security parameter index (SPI) or terminated.
Options	seconds —Lifetime of the IKE SA. Range: 180 through 86,400 seconds Default: 28,800 seconds
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31• <i>Junos OS User Authentication Methods</i>

lifetime-seconds (Security IPsec)

Syntax	lifetime-seconds <i>seconds</i> ;
Hierarchy Level	[edit security ipsec proposal <i>proposal-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Default value modified in Junos OS Release 10.2.
Description	Specify the lifetime (in seconds) of an IPsec security association (SA). When the SA expires, it is replaced by a new SA and security parameter index (SPI) or terminated.
Options	<p>seconds—Lifetime of the IPsec SA.</p> <p>Range: 180 through 86,400 seconds</p> <p>Default: 3600 seconds</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31


load-distribution

Syntax	<pre>load distribution { session-affinity ipsec; }</pre>
Hierarchy Level	[edit security flow]
Release Information	Statement introduced in Junos OS Release 11.4R5.
Description	Enable load distribution for a data flow. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices and vSRX instances.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

local (Security IPsec)

Syntax	<pre>local <i>ip-prefix</i>;</pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> ike proxy-identity]
Release Information	Statement modified in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.
Description	Specify the local IPv4 or IPv6 address and subnet mask for the proxy identity.
Options	<i>ip-prefix</i> —IPv4 or IPv6 address and subnet mask.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

local-address

Syntax	<code>local-address (ipv4-address ipv6-address);</code>
Hierarchy Level	<code>[edit security ike gateway gateway-name]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D10.
Description	<p>Specify the local gateway address. Multiple addresses in the same address family can be configured on an external physical interface to a VPN peer. If this is the case, we recommend that local-address be configured. If there is only one IPv4 and one IPv6 address configured on an external physical interface, local-address configuration is not necessary.</p> <p> NOTE: The local-address value must be an IP address that is configured on an interface on the SRX Series device. We recommend that local-address belong to the external interface of the IKE gateway. If local-address does not belong to the external interface of the IKE gateway, the interface must be in the same zone as the external interface of the IKE gateway and an intra-zone security policy must be configured to permit traffic.</p> <p>The local-address value and the remote IKE gateway address must be in the same address family, either IPv4 or IPv6.</p>
Options	<p>ipv4-address—IPv4 address for the local gateway.</p> <p>ipv6-address—IPv6 address for the local gateway.</p>
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31



local-address (Security Group VPN Member)

Syntax	<code>local-address <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security group-vpn member ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure the IP address the member uses when accessing the group server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<i>ip-address</i> —IPv4 address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747


local-address (Security Group VPN Server)

Syntax	<code>local-address <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security group-vpn server ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Configure the source IP address the group VPN server uses when communicating with a group member or a root-server. This statement is normally used when there are multiple IP addresses bound to an interface. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<code>local-address <i>ip-address</i></code> —Specify an IPv4 address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

local-certificate (Security)

Syntax	<code>local-certificate <i>certificate-id</i>;</code>
Hierarchy Level	<code>[edit security ike policy <i>policy-name</i> certificate]</code>
Release Information	Statement modified in Junos OS Release 8.5.
Description	Specify a particular certificate when the local device has multiple loaded certificates.
	<p> NOTE: The device deletes existing IKE and IPsec SAs when you update the <code>local-certificate</code> configuration in the IKE policy.</p>
Options	<code><i>certificate-id</i></code> —Name of the specific certificate to be used.
	<p> NOTE: Starting in Junos OS Release 19.1R1, a commit check is added to prevent user from adding <code>., /, %, and space</code> in a certificate identifier while generating a local or remote certificates or a key pair.</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

local-identity

Syntax	<pre>local-identity { (hostname <i>hostname</i> inet <i>ip-address</i> inet6 <i>ipv6-address</i> user-at-hostname <i>e-mail-address</i>); }</pre>
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. The inet6 option added in Junos OS Release 11.1.
Description	Specify the local IKE identity to send in the exchange with the destination peer to establish communication. If you do not configure a local-identity, the device uses the IPv4 or IPv6 address corresponding to the local endpoint by default.
	<div>  <p>NOTE: For Network Address Translation Traversal (NAT-T), both local identity and remote identity must be configured.</p> </div>
Options	<ul style="list-style-type: none"> • hostname <i>hostname</i>—Specify identity as a fully qualified domain name (FQDN). • inet <i>ip-address</i>—Specify identity as an IPv4 address. • user-at-hostname <i>e-mail-address</i>—Specify identity as an e-mail address.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

local-identity (Security Group VPN)

Syntax	<pre>local-identity { (hostname <i>hostname</i> inet <i>ip-address</i> inet6 <i>ipv6-address</i> user-at-hostname <i>e-mail-address</i>); }</pre>
Hierarchy Level	<pre>[edit security group-vpn member ike gateway <i>gateway-name</i>] [edit security group-vpn server ike gateway <i>gateway-name</i>]</pre>
Release Information	Support for group-vpn hierarchies added in Junos OS Release 10.2.
Description	Specify the local IKE identity to send in the exchange with the destination peer to establish communication. If you do not configure a local-identity, the device uses the IPv4 corresponding to the local endpoint by default. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> • hostname <i>hostname</i>—Specify identity as a fully qualified domain name (FQDN). • inet <i>ip-address</i>—Specify identity as an IPv4 address. • user-at-hostname <i>e-mail-address</i>—Specify identity as an e-mail address.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

manual (Security IPsec)

Syntax	<pre> manual { authentication { algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha1-96); key (ascii-text <i>key</i> hexadecimal <i>key</i>); } encryption { algorithm (3des-cbc aes-128-cbc aes-192-cbc aes-256-cbc des-cbc); key (ascii-text <i>key</i> hexadecimal <i>key</i>); } external-interface <i>external-interface-name</i>; gateway <i>ip-address</i>; protocol (ah esp); spi <i>spi-value</i> ; } </pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i>]
Release Information	Statement modified in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.
Description	Define a manual IPsec security association (SA).
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> IPsec VPN Overview on page 31

member (Security Group VPN)

```
Syntax member {
    ike {
        gateway gateway-name {
            ike-policy policy-name;
            local address ip-address;
            local-identity {
                (hostname hostname | inet ip-address | inet6 ipv6-address | user-at-hostname
                 e-mail-address);
            }
            remote-identity {
                (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
            }
            routing-instance routing-instance;
            server-address [ip-address];
        }
        policy policy-name {
            description description;
            mode (aggressive | main);
            pre-shared-key (ascii-text key | hexadecimal key);
            proposals [proposal-name];
        }
        proposal proposal-name {
            authentication-algorithm (sha-256 | sha-384);
            authentication-method pre-shared-keys;
            description description;
            dh-group (group14 | group24);
            encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
            lifetime-seconds seconds;
        }
        traceoptions {
            file {
                filename;
                files number;
                match regular-expression;
                size maximum-file-size;
                (world-readable | no-world-readable);
            }
            flag flag;
            gateway-filter {
                local-address ip-address;
                remote-address ip-address;
            }
            level (all | error | info | notice | verbose | warning);
            no-remote-trace;
        }
    }
    ipsec {
        vpn vpn-name {
            df-bit (clear | copy | set);
            exclude rule rule-name {
                source-address ip-address/mask;
            }
        }
    }
}
```

```

        destination-address ip-address/mask;
        application application;
    }
    fail-open rule rule-name {
        source-address ip-address/mask;
        destination-address ip-address/mask;
        application application;
    }
    group id;
    group-vpn-external-interface interface;
    ike-gateway gateway-name;
    recovery-probe;
}
}
}

```

Hierarchy Level [edit security group-vpn]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure group VPN member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Options Configure group VPN member. You configure the following on the group member:

- Phase 1 IKE SA with the group server. The IKE gateway is the group server.



NOTE: We recommend that you do not change the default value for `lifetime-seconds` for the IKE proposal on the member. Increasing the value might cause the member device to continue to use the existing Phase 1 IKE SA key even in the event of a crash; this can delay the recovery process.

- IPsec group VPN.



NOTE: A scope policy must also be configured on the group member. To configure a scope policy, use the `policies` configuration statement at the [edit security] hierarchy and specify the IPsec group VPN for the `ipsec-group-vpn` option.

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [Group VPNv2 Overview on page 747](#)

member-threshold (Security Group VPN)

Syntax	<code>member-threshold <i>number</i>;</code>
Hierarchy Level	<code>[edit security group-vpn server group <i>group-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Specify the maximum number of group VPN members that can be accepted in the group. The same member-threshold value must be configured on the root-server and all sub-servers in a group server cluster. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	member-threshold <i>number</i> —Specify the maximum number of group VPN members that can be accepted in the group. There is no default number.



NOTE: The maximum number you can configure for a group is dependent upon the group server platform. Also, the sum of the **member-threshold** numbers for all groups configured on the group server must not exceed the capacity of the group server platform.



Required Privilege Level

security—To view this statement in the configuration.
security-control—To add this statement to the configuration.



Related Documentation

- [Group VPNv2 Overview on page 747](#)
- [Understanding Group VPNv2 Server Clusters on page 795](#)

mode (Security Group VPN)

Syntax	<code>mode (aggressive main);</code>
Hierarchy Level	<code>[edit security group-vpn member ike policy <i>policy-name</i>]</code> <code>[edit security group-vpn server ike policy <i>policy-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Support for group-vpn hierarchies added in Junos OS Release 10.2.
Description	<p>Define the mode used for Internet Key Exchange (IKE) Phase 1 negotiations. Use aggressive mode only when you need to initiate an IKE key exchange without ID protection, as when a peer unit has a dynamically assigned IP address. (The main option is not supported on dynamic VPN implementations.) Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.</p>
	<p> NOTE:</p> <ul style="list-style-type: none"> • IKEv2 protocol does not negotiate using mode configuration. • The device deletes existing IKE and IPsec SAs when you update the mode configuration in the IKE policy.
Options	<ul style="list-style-type: none"> • aggressive—Aggressive mode. • main—Main mode. Main mode is the recommended key-exchange method because it conceals the identities of the parties during the key exchange.
	<p> NOTE: Configuring mode main for group VPN servers or members is not supported when the remote gateway has a dynamic address and the authentication method is pre-shared-keys.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

mode (Security IKE Policy)

Syntax	mode (aggressive main);
Hierarchy Level	[edit security ike policy <i>policy-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Define the mode used for Internet Key Exchange (IKE) Phase 1 negotiations. Use aggressive mode only when you need to initiate an IKE key exchange without ID protection, as when a peer unit has a dynamically assigned IP address.
	<div>  NOTE: <ul style="list-style-type: none"> • IKEv2 protocol does not negotiate using mode configuration. • The device deletes existing IKE and IPsec SAs when you update the mode configuration in the IKE policy. </div>
Options	<ul style="list-style-type: none"> • aggressive—Aggressive mode. • main—Main mode. Main mode is the recommended key-exchange method because it conceals the identities of the parties during the key exchange.
	<div>  NOTE: Configuring mode main for group VPN servers or members is not supported when the remote gateway has a dynamic address and the authentication method is pre-shared-keys. </div>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

multi-sa

Syntax	<pre>multi-sa { forwarding-class <i>name</i>; }</pre>
Hierarchy Level	[edit security ipsec vpn]
Release Information	Statement introduced in Junos OS Release 18.2R1.
Description	Negotiate multiple security association (SAs) based on configuration choice. Multiple SAs negotiates with the same traffic selector on the same IKE SA. By negotiating multiple SAs, the peer gateways have more replay windows. If the peer gateways create separate multiple SAs for the configured Forwarding-Classes (FC), then potentially a separate anti-replay window is available for each FC value. With this mapping, even if CoS can reorder packets, reordering is done with in a given multiple SA, thus avoiding packets drop due to the anti-replay checks.
Required Privilege Level	security
Related Documentation	<ul style="list-style-type: none">• show security ipsec security-associations on page 1393• Understanding CoS-Based IPsec VPNs with Multiple IPsec SAs on page 539• Example: Configuring CoS-Based IPsec VPNs on page 544

nat-keepalive

Syntax	<code>nat-keepalive <i>seconds</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Default value changed from 5 seconds to 20 seconds in Junos OS Release 12.1X46-D10.
Description	Specify the interval at which NAT keepalive packets can be sent so that NAT translation continues.
Options	<p><i>seconds</i> —Maximum interval in seconds at which NAT keepalive packets can be sent.</p> <p>Range: 1 through 300 seconds.</p> <p>Default: 20 seconds.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

no-anti-replay (Security)

Syntax	<code>no-anti-replay;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Disable the antireplay checking feature of IPsec. Antireplay is an IPsec feature that can detect when a packet is intercepted and then replayed by attackers. By default, antireplay checking is enabled. On SRX Series devices, the antireplay window size is 64 bits and is not configurable.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

no-nat-traversal

Syntax	no-nat-traversal;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Disables UDP encapsulation of IPsec Encapsulating Security Payload (ESP) packets, otherwise known as Network Address Translation Traversal (NAT-T). NAT-T is enabled by default.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

non-cryptographic-self-test

Syntax	non-cryptographic-self-test;
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm when the device or switch detects a noncryptographic self-test failure. The self-tests run without operator intervention.
Default	No alarm is raised upon failure of a noncryptographic self-test.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

ocsp (Security PKI)

Syntax	<pre>ocsp { connection-failure (disable fallback-crl); disable-responder-revocation-check; nonce-payload (enable disable); url <i>ocsp-url</i>; }</pre>
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i> revocation-check]
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure Online Certificate Status Protocol (OCSP) to check the revocation status of a certificate.
Options	<p>connection-failure—(Optional) Specify action to take if there is a connection failure to the OCSP responder. If this option is not configured and there is no response from the OCSP responder, certificate validation will fail.</p> <p>disable—Skip the revocation check if the OCSP responder is not reachable.</p> <p>fallback-crl—Use CRL to check the revocation status of the certificate.</p> <p>disable-responder-revocation-check —(Optional) Disable revocation check for the CA certificate received in an OCSP response. The certificates received in an OCSP response generally have shorter lifetimes and revocation check is not required.</p> <p>nonce-payload—(Optional) Send a nonce payload to prevent replay attack. A nonce payload is sent by default unless it is explicitly disabled. If enabled, the SRX Series device expects OCSP responses to contain a nonce payload, otherwise the revocation check will fail. If OCSP responders are not capable of responding with a nonce payload, disable this option.</p> <p>disable—Explicitly disable the sending of a nonce payload.</p> <p>enable—Enable the sending of a nonce payload. This is the default.</p> <p>url <i>ocsp-url</i>—Specify HTTP addresses for OCSP responders. A maximum of two HTTP URL addresses can be configured. If the configured URLs are not reachable, or URLs are not configured, the URL from the certificate being verified is checked.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

optimized

Syntax	optimized;
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> vpn-monitor]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Specify that VPN monitoring optimization is enabled for the VPN object. When VPN monitoring optimization is enabled, the SRX Series device only sends ICMP echo requests (pings) when there is outgoing traffic and no incoming traffic from the configured peer through the VPN tunnel. If there is incoming traffic through the VPN tunnel, the SRX Series device considers the tunnel to be active and does not send pings to the peer.</p> <p>Because ICMP echo requests are only sent when needed to determine peer liveliness, VPN monitoring optimization can save resources on the SRX Series device. Also, ICMP echo requests can activate costly backup links that would otherwise not be used.</p> <p>This option is disabled by default.</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31


optimized (DPD)

Syntax	optimized;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dead-peer-detection]
Release Information	Statement introduced in Junos OS Release 12.1X46-D10.
Description	<p>Send dead peer detection (DPD) messages if there is no incoming IKE or IPsec traffic within the configured interval after outgoing packets are sent to the peer. This is the default DPD mode.</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

peer-certificate-type

Syntax	peer-certificate-type (pkcs7 x509-signature);
Hierarchy Level	[edit security ike policy <i>policy-name</i> certificate]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify a preferred type of certificate (PKCS7 or X509).
Options	<ul style="list-style-type: none">• pkcs7—Public-Key Cryptography Standard #7.• x509-signature—X509 is an ITU-T standard for public key infrastructure. This is the default value.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

perfect-forward-secrecy (Security IPsec)

Syntax	perfect-forward-secrecy keys (group1 group14 group19 group2 group20 group24 group5 group15 group16 group21);
Hierarchy Level	[edit security ipsec policy <i>policy-name</i>]
Release Information	<p>Statement introduced in Junos OS Release 8.5.</p> <p>Support for group14 options added in Junos OS Release 11.1.</p> <p>Support for group19, group20, and group24 options added in Junos OS Release 12.1X45-D10.</p> <p>group15, group16, and group21 options introduced in Junos OS Release 19.1R1.</p>
Description	Specify Perfect Forward Secrecy (PFS) as the method that the device uses to generate the encryption key. PFS generates each new encryption key independently from the previous key.
<div>  <p>NOTE: The device deletes existing IPsec SAs when you update the perfect-forward-secrecy configuration in the IPsec policy.</p> </div>	
Options	<ul style="list-style-type: none"> • group1—Diffie-Hellman Group 1. • group14—Diffie-Hellman Group 14. • group19—Diffie-Hellman Group 19. • group2—Diffie-Hellman Group 2. • group20—Diffie-Hellman Group 20. • group24—Diffie-Hellman Group 24. • group5—Diffie-Hellman Group 5. • group15—Diffie-Hellman Group 15. • group16—Diffie-Hellman Group 16. • group21—Diffie-Hellman Group 21.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

pki

```
Syntax  pki {
    auto-re-enrollment {
        certificate-id certificate-id-name {
            ca-profile-name ca-profile-name ;
            challenge-password password ;
            re-enroll-trigger-time-percentage percentage ;
            re-generate-keypair;
        }
    }
    ca-profile ca-profile-name {
        administrator {
            e-mail-address e-mail-address;
        }
        ca-identity ca-identity;
        enrollment {
            retry number;
            retry-interval seconds;
            url url-name;
        }
        revocation-check {
            crl {
                disable {
                    on-download-failure;
                }
                refresh-interval hours;
                url url-name;
            }
            disable;
            ocsp {
                connection-failure (disable | fallback-crl);
                disable-responder-revocation-check;
                nonce-payload (enable | disable);
                url ocsp-url;
            }
            use-ocsp;
        }
        routing-instance routing-instance-name;
        source-address ip-address;
    }
    traceoptions {
        file {
            filename;
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag flag;
        no-remote-trace;
    }
    trusted-ca-group name {
```

```
    ca-profiles ca-profiles;  
  }  
}
```

Hierarchy Level [edit security]

Release Information Statement modified in Junos OS Release 8.5.

Description Configure an IPsec profile to request digital certificates.

Options The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [Understanding Certificates and PKI on page 973](#)

pki-local-certificate

Syntax pki-local-certificate *name*;

Hierarchy Level [edit system services web-management https]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the name of the certificate that is generated by public key infrastructure (PKI) and authenticated by certificate authority (CA).

Options *name* —Name of certificate.

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

Related Documentation

- [Understanding Certificates and PKI on page 973](#)

policy (Security Group VPN IKE)

Syntax	<pre> policy <i>policy-name</i> { description <i>description</i>; mode (aggressive main); pre-shared-key (ascii-text <i>key</i> hexadecimal <i>key</i>); proposals [<i>proposal-name</i>]; } </pre>
Hierarchy Level	<pre> [edit security group-vpn member ike] [edit security group-vpn server ike] </pre>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Configure an IKE policy. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>policy-name</i>—Name of the IKE policy. The policy name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747


policy (Security IKE)

Syntax	<pre> policy <i>policy-name</i> { certificate { local-certificate <i>certificate-id</i>; peer-certificate-type (pkcs7 x509-signature); policy-oids [<i>oid</i>]; trusted-ca { ca-profile <i>ca-profile-name</i>; trusted-ca-group <i>trusted-ca-group-name</i>; } } description <i>description</i>; mode (aggressive main); pre-shared-key (ascii-text <i>key</i> hexadecimal <i>key</i>); proposal-set (basic compatible standard suiteb-gcm-128 suiteb-gcm-256); proposals [<i>proposal-name</i>]; reauth-frequency <i>number</i>; } </pre>
Hierarchy Level	[edit security ike]
Release Information	Statement modified in Junos OS Release 8.5. Support for suiteb-gcm-128 and suiteb-gcm-256 options added in Junos OS Release 12.1X45-D10. Support for policy-oids option added in Junos OS Release 12.3X48-D10. Support for trusted-ca option added in Junos OS Release 18.1R1.
Description	Configure an IKE policy.
Options	<p><i>policy-name</i>—Name of the IKE policy. The policy name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> IPsec VPN Overview on page 31


policy (Security IPsec)

Syntax	<pre> policy <i>policy-name</i> { description <i>description</i>; perfect-forward-secrecy keys (group1 group14 group19 group2 group20 group24 group5 group15 group16 group21); proposal-set (basic compatible standard suiteb-gcm-128 suiteb-gcm-256); proposals [<i>proposal-name</i>]; }</pre>
Hierarchy Level	[edit security ipsec]
Release Information	<p>Statement modified in Junos OS Release 8.5.</p> <p>Support for group 14 is added in Junos OS Release 11.1.</p> <p>group15, group16, group21 options introduced in Junos OS Release 19.1R1.</p>
Description	Define an IPsec policy.
Options	<p><i>policy-name</i> —Name of the IPsec policy.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31


policy-oids

Syntax	policy-oids [<i>oid</i>];
Hierarchy Level	[edit security ike policy <i>policy-name</i> certificate]
Release Information	Statement introduced in Junos OS Release 12.3X48-D10.
Description	Configure policy object identifiers (OIDs). This configuration is optional.
Options	oid —Policy OID contained in a peer's certificate or certificate chain. Up to five policy OIDs can be configured. Each OID can be up to 63 bytes long.
<div> NOTE: You must ensure that at least one of the configured policy OIDs is included in a peer's certificate or certificate chain. Note that the policy-oids field in a peer's certificate is optional. If you configure policy OIDs in an IKE policy and the peer's certificate chain does not contain any policy OIDs, certificate validation for the peer fails.</div>	
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Digital Certificate Validation on page 984

power-mode-ipsec

Syntax	power-mode-ipsec;
Hierarchy Level	[edit security flow (Security Flow)]
Release Information	<p>Statement introduced in Junos OS Release 18.3R1 for vSRX instances.</p> <p>Statement introduced in Junos OS Release 18.4R1 for SRX4100 and SRX4200 devices.</p> <p>Statement introduced in Junos OS Release 18.2R2 and 19.1R1 for SRX5400, SRX5600, and SRX5800 devices.</p> <p>Statement introduced in Junos OS Release 19.1R1 for SRX4600 devices.</p>
Description	<p>Enable PowerMode IPsec. processing. PMI is a new mode of operation that provides IPsec performance improvements.</p> <div>  <p>NOTE: For SRX4100, SRX4200 devices running Junos OS Release 18.4R1 and vSRX instances running Junos OS Release 18.3R1, after you enable or disable the PMI, you must reboot the device for the configuration to take effect.</p> <p>Packets cannot go through the PMI when firewall or advanced security services are combined with IPsec. Hence, PMI must not be used when firewall or advanced security services are combined with IPsec.</p> </div>
Required Privilege Level	flow-tap
Related Documentation	<ul style="list-style-type: none"> • Improving IPsec Performance with PowerMode IPsec on page 956

pre-shared-key (Security IKE Policy)

Syntax	pre-shared-key (ascii-text <i>key</i> hexadecimal <i>key</i>);
Hierarchy Level	[edit security ike policy <i>policy-name</i>]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Define a preshared key for an IKE policy.
<div>  <p>NOTE: The device deletes existing IKE and IPsec SAs when you update the pre-shared-key configuration in the IKE policy.</p> </div>	
Options	<p>ascii-text <i>key</i>—Specify a string of 1 to 255 ASCII text characters for the key. Characters @ + - or = are not allowed. To include the special characters () [] { } , ; , enclose either the entire key string or the special character in quotation marks; for example “str)ng” or str)”ng. Other use of quotation marks within the string is not allowed. With des-cbc encryption, the key contains 8 ASCII characters. With 3des-cbc encryption, the key contains 24 ASCII characters.</p> <p>hexadecimal <i>key</i>—Specify a string of 1 to 255 hexadecimal characters for the key. Characters must be hexadecimal digits 0 through 9, or letters a through f or A through F. With des-cbc encryption, the key contains 16 hexadecimal characters. With 3des-cbc encryption, the key contains 48 hexadecimal characters.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

probe-idle-tunnel

Syntax	probe-idle-tunnel;
Hierarchy Level	[edit security ike gateway <i>gateway-name</i> dead-peer-detection]
Release Information	Statement introduced in Junos OS Release 12.1X46-D10.
Description	Send dead peer detection (DPD) messages during idle traffic time between peers.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding VPN Monitoring on page 941

profile (Access)

```
Syntax  profile profile-name {
    accounting {
        accounting-stop-on-access-deny;
        accounting-stop-on-failure;
        coa-immediate-update;
        duplication;
        immediate-update;
        order [accounting-method];
        statistics (time | volume-time);
        update-interval minutes;
    }
    accounting-order [accounting-method];
    address-assignment pool pool-name;
    authentication-order [ldap | none | password | securid];
    authorization-order [jsrc];
    client client-name {
        chap-secret chap-secret;
        client-group [ group-names ];
        firewall-user {
            password password;
        }
        no-rfc2486;
        pap-password pap-password;
        x-auth ip-address;
    }
    client-name-filter {
        count number;
        domain-name domain-name;
        separator special-character;
    }
    ldap-options {
        assemble {
            common-name common-name;
        }
        base-distinguished-name base-distinguished-name;
        revert-interval seconds;
        search {
            admin-search {
                distinguished-name distinguished-name;
                password password;
            }
            search-filter search-filter-name;
        }
    }
    ldap-server server-address {
        port port-number;
        retry attempts;
        routing-instance routing-instance-name;
        source-address source-address;
        timeout seconds;
    }
}
```

```

provisioning-order (gx-plus | jsr);
service {
  accounting-order {
    activation-protocol;
    radius;
  }
}
session-options {
  client-group [group-name];
  client-idle-timeout minutes;
  client-session-timeout minutes;
}
}

```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 10.4.

Description Create a profile containing a set of attributes that define device management access.

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

Related Documentation

- *Understanding Interfaces*
- *Understanding User Authentication for Security Devices*
- *Ethernet Switching and Layer 2 Transparent Mode Overview*

profile (TCP Encapsulation)

Syntax	<pre>profile <i>profile-name</i>; ssl-profile <i>ssl-profile-name</i>; log ; }</pre>
Hierarchy Level	[edit security tcp-encap]
Release Information	Statement introduced in Junos OS Release 15.1X49-D80. Support for the ssl-profile option added in Junos OS Release 18.1R1.
Description	Configure a TCP encapsulation profile for a remote access client to a remote access gateway on an SRX Series device to define the data encapsulation operation.
Options	<p>profile <i>profile-name</i>—Name for the TCP encapsulation profile.</p> <ul style="list-style-type: none">ssl-profile <i>ssl-profile-name</i>—Specify the SSL termination profile that is configured at the [edit services ssl termination profile] hierarchy level. This parameter is required for NCP Exclusive Remote Access Client of Full SSL Session. <p>log—Enable logging for remote access client connections.</p>
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880

proposal (Security Group VPN Member IKE)

Syntax	<pre>proposal <i>proposal-name</i> { authentication-algorithm (sha-256 sha-384); authentication-method pre-shared-keys; description <i>description</i>; dh-group (group14 group24); encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc); lifetime-seconds <i>seconds</i>; }</pre>
Hierarchy Level	[edit security group-vpn member ike]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Define an IKE proposal. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>proposal-name</i>—Name of the IKE proposal. The proposal name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

proposal (Security Group VPN Server IKE)

Syntax	<pre>proposal <i>proposal-name</i> { authentication-algorithm (sha-256 sha-384); authentication-method pre-shared-keys; description <i>description</i>; dh-group (group14 group24); encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc); }</pre>
Hierarchy Level	[edit security group-vpn server ike]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Define an IKE proposal for group VPN server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>proposal-name</i>—Name of the IKE proposal. The proposal name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

proposal (Security Group VPN Server IPsec)

Syntax	<pre>proposal <i>proposal-name</i> { authentication-algorithm hmac-sha-256-128; description <i>description</i>; encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc); lifetime-seconds <i>seconds</i>; }</pre>
Hierarchy Level	[edit security group-vpn server ipsec]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Define an IPsec proposal. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p><i>proposal-name</i>—Name of the IPsec proposal.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

proposal (Security IKE)

Syntax	<pre>proposal <i>proposal-name</i> { authentication-algorithm (md5 sha-256 sha-384 sha1 sha-512); authentication-method (dsa-signatures ecdsa-signatures-256 ecdsa-signatures-384 pre-shared-keys rsa-signatures ecdsa-signatures-521); description <i>description</i>; dh-group (group1 group14 group19 group2 group20 group24 group5 group15 group16 group21); encryption-algorithm (3des-cbc aes-128-cbc aes-192-cbc aes-256-cbc des-cbc); lifetime-seconds <i>seconds</i>; }</pre>
Hierarchy Level	[edit security ike]
Release Information	<p>Statement modified in Junos OS Release 8.5.</p> <p>Support for dh-group group 14 and dsa-signatures added in Junos OS Release 11.1.</p> <p>Support for sha-384, ecdsa-signatures-256, ecdsa-signatures-384, group19, group20, and group24 options added in Junos OS Release 12.1X45-D10.</p> <p>sha-512, group15, group16, group21, and ecdsa-signatures-521 options introduced in Junos OS Release 19.R1.</p>
Description	Define an IKE proposal.
Options	<p><i>proposal-name</i>—Name of the IKE proposal. The proposal name can be up to 32 alphanumeric characters long.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> IPsec VPN Overview on page 31

proposal (Security IPsec)

Syntax	<pre> proposal <i>proposal-name</i> { authentication-algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha1-96 hmac-sha-512 hmac-sha-384); description <i>description</i>; encryption-algorithm (3des-cbc aes-128-cbc aes-128-gcm aes-192-cbc aes-192-gcm aes-256-cbc aes-256-gcm des-cbc); lifetime-kilobytes <i>kilobytes</i>; lifetime-seconds <i>seconds</i>; protocol (ah esp); }</pre>
Hierarchy Level	[edit security ipsec]
Release Information	<p>Statement modified in Junos OS Release 8.5.</p> <p>hmac-sha-512 and hmac-sha-384 options introduced in Junos OS Release 19.1R1.</p>
Description	Define an IPsec proposal.
Options	<p><i>proposal-name</i>—Name of the IPsec proposal.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

proposals (Security Group VPN)

Syntax	<code>proposals [<i>proposal-name</i>];</code>
Hierarchy Level	<code>[edit security group-vpn member ike policy <i>policy-name</i>]</code> <code>[edit security group-vpn server ike policy <i>policy-name</i>]</code>
Release Information	Statement modified in Junos OS Release 8.5. Support for group-vpn hierarchies added in Junos OS Release 10.2.
Description	Specify up to four Phase 1 proposals for an IKE policy. If you include multiple proposals, use the same Diffie-Hellman group in all of the proposals. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<i>proposal-name</i> —Names of up to four configured Phase 1 proposals.
Required Privilege Level	<code>security</code> —To view this statement in the configuration. <code>security-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747

proposals (Security IKE)

Syntax	<code>proposals [<i>proposal-name</i>];</code>
Hierarchy Level	<code>[edit security ike policy <i>policy-name</i>]</code>
Release Information	Statement modified in Junos OS Release 8.5. Support for group-vpn hierarchies added in Junos OS Release 10.2.
Description	Specify up to four Phase 1 proposals for an IKE policy. If you include multiple proposals, use the same Diffie-Hellman group in all of the proposals.
Options	<i>proposal-name</i> —Names of up to four configured Phase 1 proposals.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

proposals (Security IPsec)

Syntax	<code>proposals [<i>proposal-name</i>];</code>
Hierarchy Level	<code>[edit security ipsec policy <i>policy-name</i>]</code>
Release Information	Statement modified in Junos OS Release 8.5.
Description	Specify one or more proposals for an IPsec policy.
Options	<i>proposal-name</i> —Name of a configured proposal.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

proposal-set (Security IKE)

Syntax	proposal-set (basic compatible prime-128 prime-256 standard suiteb-gcm-128 suiteb-gcm-256);
Hierarchy Level	[edit security ike policy <i>policy-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for suiteb-gcm-128 and suiteb-gcm-256 options added in Junos OS Release 12.1X45-D10. Support for prime-128 and prime-256 options added in Junos OS Release 15.1X49-D40.
Description	Specify a set of default Internet Key Exchange (IKE) proposals.



NOTE: The **prime-128** and **prime-256** proposal sets require IKEv2 and certificate-based authentication.

- Options**
- **basic**—Includes a basic set of two IKE proposals:
 - Proposal 1—Preshared key, Data Encryption Standard (DES) encryption, and Diffie-Hellman (DH) group 1 and Secure Hash Algorithm 1 (SHA-1) authentication.
 - Proposal 2—Preshared key, DES encryption, and DH group 1 and Message Digest 5 (MD5) authentication.
 - **compatible**—Includes a set of four commonly used IKE proposals:
 - Proposal 1—Preshared key, triple DES (3DES) encryption, and Diffie-Hellman (DH) group 2 (DH group 2) and SHA-1 authentication.
 - Proposal 2—Preshared key, 3DES encryption, and DH group 2 and MD5 authentication.
 - Proposal 3—Preshared key, DES encryption, and DH group 2 and SHA-1 authentication.
 - Proposal 4—Preshared key, DES encryption, and DH group 2 and MD5 authentication.
 - **prime-128**—Provides the following proposal set (this option is not supported on Group VPNv2):
 - Authentication method—Elliptic Curve Digital Signature Algorithm (ECDSA) 256-bit signatures.
 - Diffie-Hellman Group—19.
 - Encryption algorithm—Advanced Encryption Standard (AES) 128-bit Galois/Counter Mode (GCM).
 - Authentication algorithm—None (AES-GCM provides both encryption and authentication).

When this option is used, **prime-128** should also be configured at the [**edit security ipsec policy *policy-name* proposal-set**] hierarchy level.

- **prime-256**—Provides the following proposal set (this option is not supported on Group VPNv2):
 - Authentication method—ECDSA 384-bit signatures.
 - Diffie-Hellman Group—20.
 - Encryption algorithm—AES 256-bit GCM.
 - Authentication algorithm—None (AES-GCM provides both encryption and authentication).

When this option is used, **prime-256** should also be configured at the [**edit security ipsec policy *policy-name* proposal-set**] hierarchy level.

- **standard**—Includes a standard set of two IKE proposals:
 - Proposal 1—Preshared key, 3DES encryption, and DH group 2 and SHA-1 authentication.
 - Proposal 2—Preshared key, AES 128-bit encryption, and DH group 2 and SHA-1 authentication.
- **suiteb-gcm-128**—Provides the following Suite B proposal set (this option is not supported on Group VPNv2):
 - Authentication method—ECDSA 256-bit signatures
 - Diffie-Hellman Group—19
 - Encryption algorithm—Advanced Encryption Standard (AES) 128-bit cipher block chaining (CBC)



NOTE: CBC mode is used instead of GCM.

- Authentication algorithm—SHA-256
- **suiteb-gcm-256**—Provides the following Suite B proposal set (this option is not supported on Group VPNv2):
 - Authentication method—ECDSA 384-bit signatures
 - Diffie-Hellman Group—20
 - Encryption algorithm—AES 256-bit CBC



NOTE: CBC mode is used instead of GCM.

- Authentication algorithm—SHA-384

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

Related • [IPsec VPN Overview on page 31](#)
Documentation

proposal-set (Security IPsec)

Syntax	<code>proposal-set (basic compatible prime-128 prime-256 standard suiteb-gcm-128 suiteb-gcm-256);</code>
Hierarchy Level	<code>[edit security ipsec policy <i>policy-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.4. Support for suiteb-gcm-128 and suiteb-gcm-256 options added in Junos OS Release 12.1X45-D10. Support for prime-128 and prime-256 options added in Junos OS Release 15.1X49-D40.
Description	Define a set of default IPsec proposals.

- Options**
- **basic**—nopfs-esp-des-sha and nopfs-esp-des-md5
 - **compatible**—nopfs-esp-3des-sha, nopfs-esp-3des-md5, nopfs-esp-des-sha, and nopfs-esp-des-md5
 - **prime-128**—Provides the following proposal set:
 - Encapsulating Security Payload (ESP) protocol
 - Encryption algorithm—Advanced Encryption Standard Galois/Counter mode (AES-GCM)128-bit
 - Authentication algorithm—None (AES-GCM provides both encryption and authentication)



NOTE: This option is not supported on Group VPNv2.

- **prime-256**—Provides the following proposal set:
 - ESP protocol
 - Encryption algorithm—AES-GCM 256-bit
 - Authentication algorithm—None (AES-GCM provides both encryption and authentication)



NOTE: This option is not supported on Group VPNv2.

- **standard**—g2-esp-3des-sha and g2-esp-aes128-sha
- **suiteb-gcm-128**—Provides the following proposal set:
 - ESP protocol

- Encryption algorithm—AES-GCM 128-bit
- Authentication algorithm—None (AES-GCM provides both encryption and authentication)



NOTE: This option is not supported on Group VPNv2.

- **suiteb-gcm-256**—Provides the following proposal set:
 - ESP protocol
 - Encryption algorithm—AES-GCM 256-bit
 - Authentication algorithm—None (AES-GCM provides both encryption and authentication)



NOTE: This option is not supported on Group VPNv2.



NOTE: The Perfect Forward Secrecy setting in IPsec policy overrides the settings in proposal sets.

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


Related Documentation

- [IPsec VPN Overview on page 31](#)

protocol (IPsec SA for OSPF)

Syntax	<code>protocol (ah esp);</code>
Hierarchy Level	<code>[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure the IPsec protocol for a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link.
Options	<p>protocol—Define the IPsec protocol for the manual SA. The protocol can be one of the following:</p> <ul style="list-style-type: none"> • ah—Authentication Header (AH) protocol. • esp—Encapsulating Security Payload (ESP) protocol. This is the default.
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62

protocol (Security IPsec)

Syntax	protocol (ah esp);
Hierarchy Level	[edit security ipsec proposal <i>proposal-name</i>]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Define the IPsec protocol for a manual or dynamic security association (SA). <div> NOTE: The device deletes existing IPsec SAs when you update the encryption-algorithm configuration in the IPsec proposal.</div>
Options	<ul style="list-style-type: none">• ah—Authentication Header protocol.• esp—Encapsulating Security Payload (ESP) protocol.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

protocol (Security IPsec Manual SA)

Syntax	protocol (ah esp)
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> manual]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Define the IPsec protocol for the manual security association.
Options	<ul style="list-style-type: none"> • ah—Authentication Header protocol. • esp—ESP protocol (To use the ESP protocol, you must also use the tunnel statement at the [edit security ipsec security-association <i>sa-name</i> mode] hierarchy level.)
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

proxy-profile

Syntax	<code>proxy-profile <i>proxy-profile</i>;</code>
Hierarchy Level	<code>[edit security pki ca-profile]</code>
Release Information	Statement introduced in Junos OS Release 18.2R1.
Description	<p>Use specified proxy server. If proxy profile is configured in CA profile, the device connects to the proxy host instead of the CA server while certificate enrollment, verification or revocation. The proxy host communicates with the CA server with the requests from the device, and then relay the response to the device.</p> <p>Public key infrastructure (PKI) uses proxy profile configured at the system-level. The proxy profile being used in the CA profile must be configured at the [edit services proxy] hierarchy. There can be more than one proxy profile configured under [edit services proxy] hierarchy. Each CA profile is referred to the most one such proxy profile. You can configure host and port of the proxy profile at the [edit system services proxy] hierarchy.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Understanding Certificate Authority Profiles on page 992• Example: Configuring a CA Profile on page 993

proxy-identity

Syntax	<pre> proxy-identity { local <i>ip-prefix</i>; remote <i>ip-prefix</i>; service (all <i>service-name</i>); } </pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> ike]
Release Information	Statement introduced in Junos OS Release 8.5. Support for IPv6 added in Junos OS Release 12.1X46-D10.
Description	Optionally specify the IPsec proxy ID to use in negotiations. The default is the identity based on the IKE gateway. If the IKE gateway is an IPv6 site-to-site gateway, the default proxy ID is ::/0. If the IKE gateway is an IPv4 gateway or a dynamic endpoint or dialup gateway, the default proxy ID is 0.0.0.0/0.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

reauth-frequency

Syntax	<code>reauth-frequency <i>number</i>;</code>
Hierarchy Level	<code>[edit security ike policy <i>policy-name</i>];</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D60.
Description	Configure the reauthentication frequency to trigger a new IKEv2 reauthentication. Reauthentication creates a new IKE SA, creates new child SAs within the IKE SA, and then deletes the old IKE SA.
Default	This feature is disabled by default.
Options	reauth-frequency <i>number</i> —Number of IKE rekeys that occurs before reauthentication occurs. If reauth-frequency is 1, reauthentication occurs every time there is an IKE rekey. If reauth-frequency is 2, reauthentication occurs at every other IKE rekey. If reauth-frequency is 3, reauthentication occurs at every third IKE rekey. Default: 0 (disable) Range: 0-100
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding IKEv2 Reauthentication on page 138

re-enroll-trigger-time-percentage (Security PKI)

Syntax	re-enroll-trigger-time-percentage <i>percentage</i> ;
Hierarchy Level	[edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>] [edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]
Release Information	Statement modified in Junos OS Release 9.0. Support for [edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>] and [edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>] hierarchies added in Junos OS Release 15.1X49-D40.
Description	Specify the certificate reenrollment trigger as a percentage of the end-entity (EE) certificate's lifetime that remains before certificate reenrollment is initiated. For example, if the renewal request is to be sent when the certificate's remaining lifetime is 10 percent, then configure 10 for re-enroll-trigger-time-percentage value. The time at which the certificate reenrollment is initiated is based on the certificate expiry date.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

re-generate-keypair

Syntax	re-generate-keypair;
Hierarchy Level	[edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>] [edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Support for [edit security pki auto-re-enrollment cmpv2 certificate-id <i>certificate-id-name</i>] and [edit security pki auto-re-enrollment scep certificate-id <i>certificate-id-name</i>] hierarchies added in Junos OS Release 15.1X49-D40.
Description	Specifies new key pair generation for automatic certificate reenrollment. If this statement is not configured, the current key pair is used. If the key pair does not change, the CA does not issue new certificates. We recommend that a new key pair be generated during reenrollment as it provides better security.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

refresh-interval

Syntax	refresh-interval <i>hours</i> ;
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i> revocation-check <i>crl</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the amount of time between certificate revocation list (CRL) updates.
Options	<i>number-of-hours</i> —Time interval, in hours, between CRL updates. Range: 0 through 8784 Default: 6
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• crl (Security) on page 1104

remote (Security IPsec)

Syntax	<code>remote <i>ip-prefix</i>;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike proxy-identity]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1.
Description	Specify the remote IPv4 or IPv6 address and subnet mask for the proxy identity.
Options	<i>ip-prefix</i> —IPv4 or IPv6 address and subnet mask.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

remote-exceptions

Syntax	<code>remote-exceptions <i>ip-address/mask</i>;</code>
Hierarchy Level	<code>[edit security dynamic-vpn clients <i>configuration-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.5. This statement is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Description	Use this statement to specify exceptions to the remote protected resources list for the specified dynamic VPN configuration. Traffic to the specified IP address will not go through the dynamic VPN tunnel and therefore will not be protected by the firewall's security policies.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Dynamic VPN Overview on page 896

remote-identity

Syntax `remote-identity {
 (distinguished-name <container container-string> <wildcard wildcard-string> | hostname
hostname | inet ip-address | inet6 ipv6-address | user-at-hostname e-mail-address);
}`

Hierarchy Level [edit security ike gateway *gateway-name*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Specify the remote IKE identity to exchange with the destination peer to establish communication. If you do not configure a remote-identity, the device uses the IPv4 or IPv6 address corresponding to the remote endpoint by default.



NOTE: For Network Address Translation Traversal (NAT-T), both remote identity and local identity must be configured.

Options

- **distinguished-name**—Specify identity as the distinguished name (DN) from the certificate. If there is more than one certificate on the device, use the **security ike gateway *gateway-name* policy *policy-name* certificate local-certificate *certificate-id***.

Optional container and wildcard strings can be specified:

- **container *container-string***—Specify a string for the container.
- **wildcard *wildcard-string***—Specify a string for the wildcard.
- **hostname *hostname***—Specify identity as a fully qualified domain name (FQDN).
- **inet *ip-address***—Specify identity as an IPv4 address.
- **inet6 *ipv6-address***—Specify identity as an IPv6 address.
- **user-at-hostname *e-mail-address***—Specify identity as an e-mail address.

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

Related Documentation

- [IPsec VPN Overview on page 31](#)

remote-identity (Security Group VPN)

Syntax	<pre>remote-identity { (hostname [<i>hostname</i>] inet <i>ip-address</i> user-at-hostname <i>e-mail-address</i>); }</pre>
Hierarchy Level	<pre>[edit security group-vpn member ike gateway <i>gateway-name</i>] [edit security group-vpn server ike gateway <i>gateway-name</i>]</pre>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Specify the remote IKE identity of the destination peer. If you do not configure a remote identity, the device uses, by default, the IPv4 address that corresponds to the destination peer. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>hostname <i>hostname</i>—Specify a fully qualified domain name (FQDN).</p> <p>inet <i>ip-address</i>—Specify an IPv4 address.</p> <p>user-at-hostname <i>username_FQDN</i>—Specify a fully qualified username.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747

remote-protected-resources

Syntax	remote-protected-resources <i>ip-address/mask</i> ;
Hierarchy Level	[edit security dynamic-vpn clients <i>configuration-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5. This statement is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Description	Use this statement to specify which resources to protect using the dynamic VPN feature. Traffic to the protected resource will go through the specified dynamic VPN tunnel and will therefore be protected by the firewall's security policies.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

replay-attacks

Syntax	<pre>replay-attacks { threshold <i>value</i>; }</pre>
Hierarchy Level	[edit security alarms potential-violation]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Raise a security alarm when the device detects a replay attack. A replay attack is a form of network attack in which a valid data transmission is maliciously or fraudulently repeated or delayed.
Default	Replay attacks do not raise security alarms.
Options	<ul style="list-style-type: none"> threshold <i>value</i>—Number of reply attacks up to which an alarm is not raised. When the configured number is exceeded, an alarm is raised. <p>Range: Range: 0 through 100,00,00,000.</p>
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> IPsec VPN Overview on page 31

respond-bad-spi

Syntax	<code>respond-bad-spi <max-responses>;</code>
Hierarchy Level	[edit security ike]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Enable response to invalid IPsec Security Parameter Index (SPI) values. If the security associations (SAs) between two peers of an IPsec VPN become unsynchronized, the device resets the state of a peer so that the two peers are synchronized.
Options	max-responses —(Optional) Number of times to respond to invalid SPI values per gateway. Range: 1 through 30 Default: 5
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

revocation-check (Security PKI)

Syntax	<pre> revocation-check { crl { disable { on-download-failure; } refresh-interval <i>hours</i>; url <i>url-name</i>; } disable; ocsf { connection-failure (disable fallback-crl); disable-responder-revocation-check; nonce-payload (enable disable); url <i>ocsf-url</i>; } use-ocsf; } </pre>
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i>]
Release Information	Statement modified in Junos OS Release 8.5. Support for ocsf and use-ocsf options added in Junos OS Release 12.1X46-D20.
Description	Specify the method the device uses to verify the revocation status of digital certificates.
Options	<p>disable—Disable verification of status of digital certificates.</p> <p>crl—Only certificate revocation list (CRL) is supported. A CRL is a time-stamped list identifying revoked certificates, which is signed by a CA and made available to the participating IPsec peers on a regular periodic basis. By default, crl is enabled. Local certificates are being validated against certificate revocation list (CRL) even when CRL check is disabled. This can be stopped by disabling the CRL check through the Public Key Infrastructure (PKI) configuration. When CRL check is disabled, PKI will not validate local certificate against CRL.</p> <p>The remaining statements are explained separately. See CLI Explorer.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Certificates and PKI on page 973

routing-instance (Security Group VPN)

Syntax	<code>routing-instance <i>routing-instance</i>;</code>
Hierarchy Level	<code>[edit security group-vpn member ike gateway <i>gateway-name</i>]</code> <code>[edit security group-vpn server ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Configure the routing instance that the group VPN server or member uses when communicating with a group member or server. This statement is used when the IKE gateway is not configured in the default routing instance. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	routing-instance <i>routing-instance</i> —Specify the name of a routing instance. If this is not specified, the default inet.0 routing instance is used.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747

routing-instance (Security PKI)

Syntax	<code>routing-instance <i>routing-instance-name</i></code>
Hierarchy Level	<code>[edit security pki ca-profile <i>ca-profile-name</i>]</code>
Release Information	Statement modified in Junos OS Release 9.0.
Description	Specify the routing-instance to be used.
Options	<ul style="list-style-type: none">• <i>routing-instance-name</i>—Name of the routing instance.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

security-association

```
Syntax security-association sa-name {
    manual {
        direction bidirectional {
            authentication {
                algorithm (hmac-md5-96 | hmac-sha1-96);
                key {
                    ascii-text key;
                    hexadecimal key;
                }
            }
        }
        auxiliary-spi auxiliary-spi-value;
        encryption {
            algorithm (3des-cbc | des-cbc | null);
            key {
                ascii-text key;
                hexadecimal key;
            }
        }
        protocol (ah | esp);
        spi spi-value;
    }
}
mode transport;
}
```

Hierarchy Level [edit security ipsec]

Release Information Statement introduced in Junos OS Release 12.1X46-D20.

Description Configure a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link. IPsec can provide authentication and confidentiality to OSPF or OSPFv3 routing packets.

Options *sa-name*—Name of the SA.

mode—SA mode. For this feature, the mode must be **transport**.

direction—Direction of the manual SA. For this feature, the direction must be **bidirectional**.

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62](#)

server (Security Group VPN)

```
Syntax  server {
    group name {
        anti-replay-time-window milliseconds;
        description description;
        group-id number;
        ike-gateway [gateway-name];
        ipsec-sa name {
            match-policy policy-name {
                destination ip-address/netmask;
                destination-port number;
                protocol number;
                source ip-address/netmask;
                source-port number;
            }
            proposal proposal-name;
        }
        member-threshold number;
        server-cluster {
            ike-gateway gateway-name;
            retransmission-period seconds;
            server-role (root-server | sub-server);
        }
        server-member-communication {
            certificate certificate-id;
            communication-type unicast;
            encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
            lifetime-seconds seconds;
            number-of-retransmission number;
            retransmission-period seconds;
            sig-hash-algorithm (sha-256 | sha-384);
        }
    }
}
ike {
    gateway gateway-name {
        address ip-address;
        dead-peer-detection {
            always-send;
            interval seconds;
            threshold number;
        }
        dynamic {
            (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
        }
        ike-policy policy-name;
        local-address ip-address;
        local-identity {
            (hostname hostname | inet ip-address | user-at-hostname e-mail-address);
        }
        remote-identity {
            (hostname [hostname] | inet ip-address | user-at-hostname e-mail-address);
        }
    }
}
```

```

    routing-instance routing-instance;
  }
  policy policy-name {
    description text;
    mode (aggressive | main);
    pre-shared-key (ascii-text key | hexadecimal key);
    proposals [proposal-name];
  }
  proposal proposal-name {
    authentication-algorithm (sha-256 | sha-384);
    authentication-method pre-shared-keys;
    description description;
    dh-group (group14 | group24);
    encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
  }
}
ipsec {
  proposal proposal-name {
    authentication-algorithm hmac-sha-256-128;
    description description;
    encryption-algorithm (aes-128-cbc | aes-192-cbc | aes-256-cbc);
    lifetime-seconds seconds;
  }
}
traceoptions {
  file {
    filename;
    files number;
    match regular-expression;
    size maximum-file-size;
    (world-readable | no-world-readable);
  }
  flag flag;
  gateway-filter {
    local-address ip-address;
    remote-address ip-address;
  }
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
}


```

Hierarchy Level [edit security group-vpn]


Release Information Statement introduced in Junos OS Release 10.2.

Description	Configure group VPN server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. You configure the following on the group server: <ul style="list-style-type: none">• Phase 1 IKE SA for group members• Phase 2 IPsec proposal• Group identifier, group members, server-member communications, and group policies to be downloaded to members• Group VPN trace options
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747

server-address (Security Group VPN Member)

Syntax	<code>server-address [<i>ip-address</i>];</code>
Hierarchy Level	<code>[edit security group-vpn member ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	<p>Specify the group server that this member registers through a groupkey-pull exchange. Up to four server IP addresses can be configured. The group member attempts to register with the first configured server. If registration with a configured server is not successful, the group member tries to register with the next configured server. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.</p>
	<div>  <p>NOTE: We recommend that group members only register with sub-servers in a server cluster and not the root-server.</p> </div>
Options	<i>ip-address</i> —IPv4 address of an IKE gateway.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747

server-cluster (Security Group VPN Server)

Syntax	<pre>server-cluster { ike-gateway <i>gateway-name</i>; retransmission-period <i>seconds</i>; server-role (root-server sub-server); }</pre>
Hierarchy Level	[edit security group-vpn server group <i>name</i>]
Release Information	Statement introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	<p>Configure the Group Domain of Interpretation (GDOI) group controller/key server (GCKS) cluster for the specified group. All servers in a group VPN server cluster must be SRX Series devices. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.</p>
Options	<p>ike-gateway <i>gateway-name</i>—(Required) Specify the name of the IKE gateway for the local device in the group server cluster. IKE gateways are configured at the [edit security group-vpn server ike] hierarchy level.</p> <p>If the local device is a root-server, the IKE gateway name must be a sub-server in the cluster; up to four sub-server IKE gateways can be specified.</p> <p>If the local device is a sub-server, the IKE gateway name must be the root-server.</p> <p>retransmission-period <i>seconds</i>—(Optional) Specify the time after which the root-server retransmits a cluster-update message if it has not received an acknowledgement from a sub-server.</p> <p>Range: 2 to 60 seconds.</p> <p>Default: 10 seconds.</p> <p>server-role—(Required) Assign the role of the local device in the group server cluster, either root-server or sub-server. Only one device in the cluster can be configured as the root-server. You can configure up to four other devices as a sub-server in a group server cluster.</p>
	<p> NOTE: You must ensure that there is only one root-server at any time for a group VPN server cluster.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>

- Related Documentation**
- [Group VPNv2 Overview on page 747](#)
 - [Understanding Group VPNv2 Server Clusters on page 795](#)

server-member-communication (Security Group VPN Server)

Syntax	<pre> server-member-communication { certificate <i>certificate-id</i>; communication-type unicast; encryption-algorithm (aes-128-cbc aes-192-cbc aes-256-cbc); lifetime-seconds <i>seconds</i>; number-of-retransmission <i>number</i>; retransmission-period <i>seconds</i>; sig-hash-algorithm (sha-256 sha-384); } </pre>
Hierarchy Level	[edit security group-vpn server group <i>name</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	<p>Enable and configure server to member communication. When these options are configured, group members receive new keys before current keys expire. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances. Starting with Junos OS Release 15.1X49-D80, the minimum value that you can configure for the lifetime-seconds option is 300 seconds instead of 180 seconds.</p>
Options	<ul style="list-style-type: none"> • certificate <i>certificate-id</i>—Specify the certificate identification. Only RSA keys are supported. • communication-type—Configure unicast (the default). • encryption-algorithm—Encryption used for communications between the group server and group member. Specify aes-128-cbc, aes-192-cbc, or aes-256-cbc. • lifetime-seconds <i>seconds</i>—Lifetime, in seconds, of the key encryption key (KEK). Specify a value from 300 to 86,400. The default is 3600 seconds. • number-of-retransmission <i>number</i>—For unicast communications, the number of times the group server retransmits messages to a group member when there is no reply. Specify a value from 0 to 60. The default is 2. • retransmission-period <i>seconds</i>—The time period between a transmission and the first retransmission when there is no reply from the group member. Specify a value from 2 to 60. The default is 10 seconds. • sig-hash-algorithm—Authentication algorithm used to authenticate the group member to the group server. Specify sha-256 or sha-384.
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>

Related Documentation • [Group VPNv2 Overview on page 747](#)

service (Security IPsec)

Syntax	<code>service (all <i>service-name</i>);</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> ike proxy-identity]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the service (port and protocol combination) to protect.
Options	<i>service-name</i> —Name of the service, as defined with system-services (Interface Host-Inbound Traffic) and system-services (Zone Host-Inbound Traffic) .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	• IPsec VPN Overview on page 31

session-affinity

Syntax	<code>session-affinity ipsec</code>
Hierarchy Level	<code>[edit security flow load-distribution]</code>
Release Information	Statement introduced in Junos OS Release 11.4R5. Starting with Junos OS Release 15.1X49-D10, IPsec session affinity is supported for IPsec tunnel-based traffic by the SRX5K-MPC3-100G10G (IOC3) and the SRX5K-MPC3-40G10G (IOC3) for SRX5400, SRX5600, and SRX5800 devices through improved flow module and session cache.
Description	Enable VPN session affinity. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices and vSRX instances.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	• IPsec VPN Overview on page 31

source-address (Security PKI)

Syntax	<code>source-address <i>ip-address</i>;</code>
Hierarchy Level	<code>[edit security pki ca-profile <i>ca-profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D60.
Description	Specifies a source IPv4 or IPv6 address to be used instead of the IP address of the egress interface for communications with external servers. External servers are used for certificate enrollment and reenrollment using Simple Certificate Enrollment Protocol (SCEP) or Certificate Management Protocol version 2 (CMPv2), downloading certificate revocation lists (CRLs) using HTTP or LDAP, or checking certificate revocation status with Online Certificate Status Protocol (OCSP).
Default	If this option is not specified then the IP address of the egress interface is used as the source address.
Options	<code>source-address <i>ip-address</i></code> —IPv4 or IPv6 address used to communicate with external servers.
Required Privilege Level	<code>security</code> —To view this statement in the configuration. <code>security-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

source-interface (Security)

Syntax	<code>source-interface <i>interface-name</i> ;</code>
Hierarchy Level	<code>[edit security ipsec vpn <i>vpn-name</i> vpn-monitor]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the source interface for ICMP requests (VPN monitoring “hellos”). If no source interface is specified, the device automatically uses the local tunnel endpoint interface.
Options	<i>interface-name</i> —Name of the interface for the ICMP requests.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

spi (IPsec SA for OSPF)

Syntax	<code>spi <i>spi-value</i>;</code>
Hierarchy Level	<code>[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Configure a security parameter index (SPI) for a manual IPsec security association (SA) to be applied to an OSPF or OSPFv3 interface or virtual link.
Options	spi —SPI for the manual SA. The SPI uniquely identifies the SA to use at the receiving host (the destination address in the packet). Range: 256 through 16,639
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62

spi (Security IPsec)

Syntax	<code>spi spi-value;</code>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> manual]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Configure a security parameter index (SPI) for a security association (SA).
Options	<i>spi-value</i> —An arbitrary value that uniquely identifies which security association (SA) to use at the receiving host (the destination address in the packet). Range: 256 through 16,639
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

tcp-encap

```
Syntax  tcp-encap {
        profile profile-name;
        ssl-profile ssl-profile-name;
        log ;
    }
    traceoptions {
        file {
            filename;
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag (all | configuration | session | tunnel);
        level (all | error | info | notice | verbose | warning);
        no-remote-trace'
    }
```

Hierarchy Level [edit security]

Release Information Statement introduced in Junos OS Release 15.1X49-D80.
Support for the **ssl-profile** option added in Junos OS Release 18.1R1.

Description Specify TCP encapsulation operations for a remote access client to a remote access gateway on an SRX Series device to support IPsec messages encapsulated within a TCP connection.

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

Related Documentation

- [Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880](#)

tcp-encap-profile

Syntax	<code>tcp-encap-profile <i>profile-name</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 15.1X49-D80.
Description	Specify the TCP encapsulation profile to be used for TCP connections for remote access clients. The profile is configured with the tcp-encap configuration statement at the [edit security] hierarchy level.
Options	<i>profile-name</i> —Name of the TCP encapsulation profile.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880• tcp-encap on page 1243

threshold (Security IKE Gateway)

Syntax	<code>threshold <i>number</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dead-peer-detection]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the maximum number of unsuccessful dead peer detection (DPD) requests to be sent before the peer is considered unavailable.
Options	<i>number</i> —Maximum number of unsuccessful DPD requests to be sent. Range: 1 through 5 Default: 5
Required Privilege Level	security —To view this statement in the configuration. security-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

traceoptions (Security Dynamic VPN)

Syntax	<pre>traceoptions { file <i>filename</i>; flag { all <detail extensive terse>; } }</pre>
Hierarchy Level	[edit security dynamic-vpn]
Release Information	Statement introduced in Junos OS Release 12.1X44-D10.
Description	Configure dynamic VPN tracing options. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Options	<ul style="list-style-type: none">• file—Configure the trace file options. file <i>filename</i>—Name of the file to receive the output of the tracing operation.• flag—Trace operation to perform. To specify more than one trace operation, include multiple flag statements.<ul style="list-style-type: none">• all—Enable all tracing operations<ul style="list-style-type: none">• detail—Display moderate amount of data in trace.• extensive—Display extensive amount of data in trace.• terse—Display minimum amount of data in trace.
Required Privilege Level	trace—To view this statement in the configuration. trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

traceoptions (Security Group VPN)

Syntax	<pre> traceoptions { file { filename; files number; match regular-expression; size maximum-file-size; (world-readable no-world-readable); } flag flag; gateway-filter { local-address ip-address; remote-address ip-address; } level (all error info notice verbose warning); no-remote-trace; } </pre>
Hierarchy Level	<pre> [edit security group-vpn member ike] [edit security group-vpn server] </pre>
Release Information	Statement introduced in Junos OS Release 10.2. Support for gateway-filter options and for the [edit security group-vpn member ike] hierarchy level added in Junos OS Release 15.1X49-D30 for vSRX.
Description	Configure group VPN trace options. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> file—Configure the trace file options. <ul style="list-style-type: none"> filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. files number—Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed to trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. The oldest archived file is overwritten. <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000 files</p> <p>Default: 10 files</p> match regular-expression—Refine the output to include lines that contain the regular expression.

- **size *maximum-file-size***—Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named ***trace-file*** reaches this size, it is renamed ***trace-file.0***. When the ***trace-file*** again reaches its maximum size, ***trace-file.0*** is renamed ***trace-file.1*** and ***trace-file*** is renamed ***trace-file.0***. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option and filename.

Syntax: **x k** to specify KB, **xm** to specify MB, or **xg** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

- **world-readable | no-world-readable**—By default, log files can be accessed only by the user who configures the tracing operation. The **world-readable** option enables any user to read the file. To explicitly set the default behavior, use the **no-world-readable** option.
- **flag**—Trace operation to perform. To specify more than one trace operation, include multiple **flag** statements.
 - **all**—Trace all activity.
 - **certificates**—Trace certificate-related activity.
 - **config**—Trace configuration activity.
 - **database**—Trace SA-related database activity.
 - **general**—Trace general activity.
 - **high-availability**—Trace high-availability operations.
 - **ike**—Trace IKE protocol activity.
 - **next-hop-tunnels**—Trace next-hop tunnel operations.
 - **parse**—Trace configuration processing.
 - **policy-manager**—Trace IKE callback activity.
 - **routing-socket**—Trace routing socket activity.
 - **thread**—Trace thread processing.
 - **timer**—Trace timer activity.
- **gateway-filter**—Configure debugging for the tunnel between the group VPN server and a group member. This option is configured on a group VPN server or member.
 - **local-address**—When configured on a server, the IP address of the group VPN server. When configured on a member, the IP address of the group VPN member.
 - **remote-address**—When configured on a server, the IP address of the group VPN member. When configured on a member, the IP address of the group VPN server.

- **level**—Set the level of debugging.
 - **all**—Match all levels.
 - **error**—Match error conditions.
 - **info**—Match informational messages.
 - **notice**—Match conditions that should be handled specifically.
 - **verbose**—Match verbose messages.
 - **warning**—Match warning messages.
- **no-remote-trace**—Disable remote tracing.

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

Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747
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traceoptions (Security IKE)

Syntax	<pre> traceoptions { file { filename; files number; match regular-expression; size maximum-file-size; (world-readable no-world-readable); } flag flag; no-remote-trace; rate-limit messages-per-second; } </pre>
Hierarchy Level	[edit security ike]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Configure IKE tracing options to aid in troubleshooting the IKE issues. This helps troubleshoot one or multiple tunnels negotiation by standard tracefile configuration. IKE tracing allows the user to view the detailed packet exchange and the negotiation information in Phase 1 and Phase 2. IKE tracing is not enabled by default. By default, all IKE or IPsec negotiations are logged into <code>/var/log/kmd</code>. But user can also specify customized file name while configuring the IKE traceoptions.</p>
Options	<ul style="list-style-type: none"> • file—Configure the trace file options. <ul style="list-style-type: none"> • filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <code>/var/log</code>. Default: <code>kmd</code> • files number—Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed to trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. The oldest archived file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename. Range: 2 through 1000 files Default: 10 files • match regular-expression—Refine the output to include lines that contain the regular expression. • size maximum-file-size—Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file again reaches its maximum size, trace-file.0

is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option and filename.

Syntax: **x k** to specify KB, **x m** to specify MB, or **x g** to specify GB

Range: 10 KB through 1 GB

Default: 1024 KB

- **world-readable | no-world-readable**—By default, log files can be accessed only by the user who configures the tracing operation. The **world-readable** option enables any user to read the file. To explicitly set the default behavior, use the **no-world-readable** option.
- **flag**—Trace operation to perform. To specify more than one trace operation, include multiple **flag** statements.
 - **all**—Trace all ike process modules activity
 - **certificates**—Trace certificate-related activity
 - **config**—Trace configuration download processing
 - **database**—Trace VPN-related database activity
 - **general**—Trace general activity
 - **high-availability**—Trace high-availability operations
 - **ike**—Trace IKE protocol activity
 - **next-hop-tunnels**—Trace next-hop tunnels operations
 - **parse**—Trace VPN parsing activity
 - **policy-manager**—Trace ike callback activity
 - **routing-socket**—Trace routing socket activity
 - **thread**—Trace thread processing
 - **timer**—Trace timer activity

By default, the **flag** statement is not set. You need to explicitly configure the **flag** statement to perform trace operation.

- **no-remote-trace**—Set remote tracing as disabled.
- **rate-limit messages-per-second**—Configure the incoming rate of trace messages.

Range: 0 through 4,294,967,295

Default: 0

Required Privilege Level	trace —To view this statement in the configuration. trace-control —To add this statement to the configuration.
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Related Documentation • [IPsec VPN Overview on page 31](#)

traceoptions (Security IPsec)

Syntax

```
traceoptions {
  flag flag;
}
```

Hierarchy Level [edit security ipsec]

Release Information Statement introduced in Junos OS Release 8.5.

Description Configure IPsec tracing options.



NOTE: Configure IPsec tracing options only when instructed to do so by your Juniper support representative.

Trace operations are written to the trace file `/var/log/kmd`.

- Options**
- **flag**—To specify more than one trace operation, include multiple **flag** statements.
 - **all**—Trace with all flags enabled
 - **next-hop-tunnel-binding**—Trace next-hop tunnel binding events
 - **packet-drops**—Trace packet drop activity
 - **packet-processing**—Trace data packet processing events
 - **security-associations**—Trace security association (SA) management events

Required Privilege Level

trace—To view this statement in the configuration.
 trace-control—To add this statement to the configuration.

Related Documentation • [IPsec VPN Overview on page 31](#)

traceoptions (Security PKI)

Syntax	<pre> traceoptions { file { filename; files number; match regular-expression; size maximum-file-size; (world-readable no-world-readable); } flag flag; no-remote-trace; } </pre>
Hierarchy Level	[edit security pki]
Release Information	Statement modified in Junos OS Release 8.5.
Description	Configure public key infrastructure (PKI) tracing options.
Options	<ul style="list-style-type: none"> file—Configure the trace file options. <ul style="list-style-type: none"> filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <code>/var/log</code>. By default, the name of the file is the name of the process being traced. files number—Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed to trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. The oldest archived file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename. Range: 2 through 1000 files Default: 10 files match regular-expression—Refine the output to include lines that contain the regular expression. size maximum-file-size—Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum file size, you also must specify a maximum number of trace files with the files option and a filename.

Syntax: **x K** to specify KB, **x m** to specify MB, or **x g** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

- **world-readable | no-world-readable**—By default, log files can be accessed only by the user who configures the tracing operation. The **world-readable** option enables any user to read the file. To explicitly set the default behavior, use the **no-world-readable** option.
- **flag**—Trace operation to perform. To specify more than one trace operation, include multiple **flag** statements.
 - **all**—Trace with all flags enabled
 - **certificate-verification**—Trace PKI certificate verification events
 - **online-crl-check**—Trace PKI online certificate revocation list (CRL) events
- **no-remote-trace**—Set remote tracing as disabled.

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

Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973
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traceoptions (TCP Encapsulation)

Syntax	<pre> traceoptions { file { filename; files number; match regular-expression; size maximum-file-size; (world-readable no-world-readable); } flag (all configuration session tunnel); level (all error info notice verbose warning); no-remote-trace; } </pre>
Hierarchy Level	[edit security tcp-encap]
Release Information	Statement introduced in Junos OS Release 15.1X49-D80.
Description	Configure TCP encapsulation tracing options.
Options	<p>file—Configure the trace file options.</p> <ul style="list-style-type: none"> • filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <code>/var/log</code>. • files number—Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed to trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. The oldest archived file is overwritten. <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000 files</p> <p>Default: 10 files</p> <ul style="list-style-type: none"> • match regular-expression—Refine the output to include lines that contain the regular expression. • size maximum-file-size—Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0. When trace-file.0 reaches its maximum size, it is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten. <p>If you specify a maximum file size, you also must specify a maximum number of trace files with the files option and filename.</p>

Syntax: **x k** to specify KB, **x m** to specify MB, or **x g** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

- **world-readable | no-world-readable**—By default, log files can be accessed only by the user who configures the tracing operation. The **world-readable** option enables any user to read the file. To explicitly set the default behavior, use the **no-world-readable** option.

flag—Trace operation to perform. To specify more than one trace operation, include multiple flag statements.

- **all**—Trace all activity.
- **configuration**—Trace configuration events.
- **session**—Trace session related events.
- **tunnel**—Trace tunnel events.

level—Set the level of debugging.

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specifically.
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
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Related Documentation	<ul style="list-style-type: none">• Understanding SSL Remote Access VPNs with NCP Exclusive Remote Access Client on page 880• tcp-encap on page 1243
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traffic-selector

Syntax	<pre>traffic-selector <i>traffic-selector-name</i> { local-ip <i>ip-address/netmask</i>; remote-ip <i>ip-address/netmask</i>; }</pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i>]
Release Information	Statement introduced in Junos OS Release 12.1X46-D10.
Description	Configure local and remote IP addresses for a traffic selector.
Options	<p>local-ip <i>ip-address/netmask</i>—A local IP address or a local subnetwork protected by the local VPN device.</p> <p>remote-ip <i>ip-address/netmask</i>—A remote IP address or a remote subnetwork protected by the peer VPN device.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

trusted-ca (Security IKE Policy)

Syntax	<pre>trusted-ca { ca-profile <i>ca-profile-name</i>; trusted-ca-group <i>name</i>; }</pre>
Hierarchy Level	[edit security ike policy <i>policy-name</i> certificate]
Release Information	Statement introduced in Junos OS Release 8.5. Statement modified in Junos OS Release 18.1R1.
Description	Specify the preferred certificate authority (CA) to use when requesting a certificate from the peer. If no value is specified, then no certificate request is sent (although incoming certificates are still accepted). You can associate an IKE policy to a single trusted CA profile or a trusted CA group. During certificate validation the IKE policy will limit itself to the configured group of CAs while establishing a secure connection. Any certificate issued other than the single trusted CA or the trusted CA group are not validated.
Options	<p>name—Specify a name for the trusted CA group. A minimum of one CA profile is mandatory to create a trusted CA group and a maximum of 20 CAs are allowed in one trusted CA group. Any CA from a particular group can validate the certificate for that particular entity.</p> <p>ca-profiles—Specify a name for the CA profiles. A Certificate Authority (CA) is an entity that issues digital certificates which helps to establish secure connection between peers through certificate validation.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973 • Understanding Certificate Authority Profiles on page 992

trusted-ca-group

Syntax	<pre>trusted-ca-group <i>name</i> { ca-profiles <i>ca-profiles</i>; }</pre>
Hierarchy Level	[edit security pki]
Release Information	Statement introduced in Junos OS Release 18.1R1.
Description	You can group multiple CA profiles in one trusted CA group for a given topology. These certificates are used to establish connection between two endpoints. To establish an IPsec connection, both the endpoints must trust the same CA. If either of the endpoints are unable to validate the certificate using their respective trusted CA (ca-profile) or trusted CA group, the connection is not established.
Options	<p>name—Specify a name for the trusted CA group. A minimum of one CA profile is mandatory to create a trusted CA group and a maximum of 20 CAs are allowed in one trusted CA group. Any CA from a particular group can validate the certificate for that particular topology.</p> <p>ca-profiles—Specify a name for the CA profiles. A CA is an entity that issues digital certificates which helps to establish secure connection between peers through certificate validation.</p>
Required Privilege Level	security
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973

use-ocsp (Security PKI)

Syntax	<code>use-ocsp;</code>
Hierarchy Level	<code>[edit security pki ca-profile <i>ca-profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 12.1X46-D20.
Description	Specify the Online Certificate Status Protocol (OCSP) as the method to check the revocation status of a certificate. CRL is the default method.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973

user (Security Dynamic VPN)

Syntax	<code>user <i>username</i>;</code>
Hierarchy Level	<code>[edit security dynamic-vpn client <i>configuration-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Specify which users can access the selected dynamic VPN configuration. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic VPN Overview on page 896

user-at-hostname

Syntax	<code>user-at-hostname <i>e-mail-address</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dynamic]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure an e-mail address.
Options	<i>e-mail-address</i> —Valid e-mail address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

user-groups (Security Dynamic VPN)

Syntax	<code>user-groups <i>user-group-name</i>;</code>
Hierarchy Level	<code>[edit security dynamic-vpn client <i>configuration-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 12.1X44-D10.
Description	Specify which users can access the selected dynamic VPN configuration. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Dynamic VPN Overview on page 896

verify-path

Syntax	<pre>verify-path { destination-ip <i>ip-address</i>; packet-size <i>bytes</i>; }</pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i> vpn-monitor]
Release Information	Statement introduced in Junos OS Release 15.1X49-D70. packet-size option added in Junos OS Release 15.1X49-D120.
Description	<p>Verify the IPsec datapath before the secure tunnel (st0) interface is activated and route(s) associated with the interface are installed in the Junos OS forwarding table. This configuration is useful in network topologies where there is a transit firewall located between the VPN tunnel endpoints, and where IPsec data traffic that uses active routes for an established VPN tunnel on the st0 interface might be blocked by the transit firewall.</p> <p>When this option is configured, the source interface and destination IP addresses that can be configured for VPN monitor operation are not used for IPsec datapath verification. The source for the ICMP requests in the IPsec datapath verification is the local tunnel endpoint.</p> <p>When IPsec datapath verification is configured, the following actions occur:</p> <ol style="list-style-type: none"> 1. Upon the establishment of the VPN tunnel, an ICMP request is sent to the peer tunnel endpoint to verify the IPsec datapath. <p>The peer tunnel endpoint must be reachable by VPN monitor ICMP requests and must be able to respond to the ICMP request. While the datapath verification is in progress, "V" is displayed in the VPN Monitoring field in the show security ipsec security-association detail command output.</p> 2. The st0 interface is activated only when a response is received from the peer. <p>The show interface st0.x command output shows the st0 interface status during and after the datapath verification: Link-Layer-Down before the verification finishes and Up after the verification finishes successfully.</p> 3. If no ICMP response is received from the peer, another ICMP request is sent at the configured VPN monitor interval (the default is 10 seconds) until the VPN monitor threshold (the default is 10 times) is reached. <p>If the verification does not succeed, the KMD_VPN_DOWN_ALARM_USER system log entry indicates the reason as a VPN monitoring verify-path error. The error is logged under tunnel events in the show security ipsec security-association detail command output. The show security ipsec tunnel-events-statistics command displays the number of times the error occurred.</p>



NOTE: VPN monitor interval and threshold values are configured with `vpn-monitor-options` at the `[edit security ipsec]` hierarchy level.

4. If no ICMP response is received from the peer after the VPN monitor threshold is reached, the established VPN tunnel is brought down and the VPN tunnel is renegotiated.

Options `destination-ip ip-address`—Original, untranslated IP address of the peer tunnel endpoint that is behind a NAT device. This IP address must not be the NAT translated IP address. This option is required if the peer tunnel endpoint is behind a NAT device. The verify-path ICMP request is sent to this IP address so that the peer can generate an ICMP response.

`packet-size bytes`—(Optional) The size of the packet that is used to verify an IPsec datapath before the st0 interface is brought up.



NOTE: The packet size must be lower than the path maximum transmission unit (PMTU) minus tunnel overhead. The packet used for IPsec datapath verification must not be fragmented.

Range: 64 to 1350 bytes

Default: 64 bytes

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

Related Documentation

version (Security IKE Gateway)

Syntax	version (v1-only v2-only);
Hierarchy Level	[edit security ike gateway <i>gateway-name</i>]
Release Information	Statement introduced in Junos OS Release 11.3.
Description	Specify the IKE version to use to initiate the connection.
Options	<p>v1-only—The connection must be initiated using IKE version 1. This is the default.</p> <p>v2-only—The connection must be initiated using IKE version 2.</p>
Required Privilege Level	<p>security—To view this statement in the configuration.</p> <p>security-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

vpn (Security)

```
Syntax  vpn vpn-name {
        bind-interface interface-name;
        copy-outer-dscp;
        establish-tunnels (immediately | on-traffic);
        ike {
            gateway gateway-name;
            idle-time seconds;
            install-interval seconds;
            ipsec-policy ipsec-policy-name;
            no-anti-replay;
            proxy-identity {
                local ip-prefix;
                remote ip-prefix;
                service (any | service-name);
            }
        }
        manual {
            authentication {
                algorithm (hmac-md5-96 | hmac-sha-256-128 | hmac-sha1-96);
                key (ascii-text key | hexadecimal key);
            }
            encryption {
                algorithm (3des-cbc | aes-128-cbc | aes-192-cbc | aes-256-cbc | des-cbc);
                key (ascii-text key | hexadecimal key);
            }
            external-interface external-interface-name;
            gateway ip-address;
            protocol (ah | esp);
            spi spi-value;
        }
        traffic-selector traffic-selector-name {
            local-ip ip-address/netmask;
            remote-ip ip-address/netmask;
        }
        vpn-monitor {
            destination-ip ip-address;
            optimized;
            source-interface interface-name;
            verify-path {
                destination-ip ip-address;
                packet-size bytes;
            }
        }
    }
```

Hierarchy Level [edit security ipsec]

Release Information Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 11.1. Support for **copy-outer-dscp** added in Junos OS Release

15.1X49-D30. **verify-path** keyword and **destination-ip** added in Junos OS Release 15.1X49-D70. **packet-size** option added in Junos OS Release 15.1X49-D120.

Description	Configure an IPsec VPN.
Options	vpn-name —Name of the VPN. The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31


vpn-monitor

Syntax	<pre>vpn-monitor { destination-ip <i>ip-address</i>; optimized; source-interface <i>interface-name</i>; verify-path { destination-ip <i>ip-address</i>; packet-size <i>bytes</i>; } }</pre>
Hierarchy Level	[edit security ipsec vpn <i>vpn-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5. verify-path keyword and destination-ip added in Junos OS Release 15.1X49-D70. packet-size option added in Junos OS Release 15.1X49-D120.
Description	Configure settings for VPN monitoring.
Options	The remaining statements are explained separately. See CLI Explorer .
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

vpn-monitor-options

Syntax	<pre>vpn-monitor-options { interval <i>seconds</i>; threshold <i>number</i>; }</pre>
Hierarchy Level	[edit security ipsec]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure VPN monitoring options.
Options	<ul style="list-style-type: none"> • interval <i>seconds</i> —Interval at which to send ICMP requests to the peer. Range: 2 through 3600 seconds Default: 10 seconds • threshold <i>number</i> —Number of consecutive unsuccessful pings before the peer is declared unreachable. Range: 1 through 65,536 pings Default: 10 pings
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IPsec VPN Overview on page 31

wildcard

Syntax	<code>wildcard <i>string</i>;</code>
Hierarchy Level	<code>[edit security ike gateway <i>gateway-name</i> dynamic distinguished-name]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify one or more distinguished name (DN) field and value pairs that must match the DN in the VPN peer's digital certificate. The configured field and value must match the DN in the peer's digital certificate but the order of the fields in the DN does not matter.
Options	<i>string</i> —DN field and value pairs to be matched. For example, cn=admin , ou=eng , o=example , dc=net .
<div> NOTE: Add a space between each field and value pair. For example, <code>edit security ike gateway jsr_gateway dynamic distinguished-name wildcard o=example, dc=net</code>.</div>	
Required Privilege Level	security —To view this statement in the configuration. security-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding IKE Identity Configuration on page 60• container on page 1103

xauth-attributes

Syntax	<pre>xauth-attributes { primary-dns <i>IP address</i>; primary-wins <i>IP address</i>; secondary-dns <i>IP address</i>; secondary-wins <i>IP address</i>; }</pre>
Hierarchy Level	[edit access address-assignment pool <name> family (inet inet6)]
Release Information	Statement introduced in Junos OS Release 10.4.
Description	Configure XAuth attributes.
Options	<ul style="list-style-type: none"> • apply-groups—Groups from which to inherit configuration data. • apply-groups-except—Do not inherit configuration data from these groups. • primary-dns—Specify the primary-dns IP address. • secondary-dns—Specify the secondary-dns IP address. • primary-wins—Specify the primary-wins IP address. • secondary-wins—Specify the secondary-wins IP address.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Dynamic VPN Overview on page 896

xauth-client-username

Syntax	<code>username <i>username</i>;</code>
Hierarchy Level	[edit security ike gateway (Security IKE) name xauth client]
Release Information	Statement introduced in Junos OS Release 15.1X49-D80.
Description	An IKE gatewayExtended Authentication (XAuth) is used to authenticate the remote access user. Specify that extended authentication is performed in addition to IKE Phase 1 authentication for remote users trying to access a VPN tunnel. This authentication can be through XAuth or Extensible Authentication Protocol (EAP). The maximum number of characters allowed for XAuth client username is 128.
Required Privilege Level	security—To view this statement in the configuration. security-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IPsec VPN Overview on page 31

CHAPTER 13

Operational Commands

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clear security dynamic-vpn all

Syntax	clear security dynamic-vpn all
Release Information	Command introduced in Junos Release 10.4.
Description	Clear all dynamic VPN user connections. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show security dynamic-vpn users on page 1326• show security dynamic-vpn users terse on page 1328
List of Sample Output	clear security dynamic-vpn all on page 1274
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear security dynamic-vpn all

```
user@host> clear security dynamic-vpn all
2 user connection entries cleared
```

clear security dynamic-vpn user

Syntax	<code>clear security dynamic-vpn user <i>username</i> ike-id <i>id</i></code>
Release Information	Command introduced in Junos Release 10.4.
Description	Clear the dynamic VPN user connection for the specified username. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show security dynamic-vpn users on page 1326 • show security dynamic-vpn users terse on page 1328
List of Sample Output	clear security dynamic-vpn user on page 1275
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear security dynamic-vpn user

```
user@host> clear security dynamic-vpn user user ike-id bob.example.net
Connection entry for user user has been cleared
```

clear security group-vpn member group

Syntax	<code>clear security group-vpn member group <vpn <i>vpn-name</i>> <group-id <i>group-id</i>></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX. Command introduced in Junos OS Release 15.1F5 for MX Series routers.
Description	Clear all current information for IKE, TEK, and KEK SAs. Group VPNv2 is supported on MX Series routers, SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	none —Clear SA information for all groups. vpn <i>vpn-name</i> —(Optional) Clear SA information for the specified VPN name. group-id <i>group-id</i> —(Optional) Clear SA information for the specified group identifier.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

clear security group-vpn member ike security-associations

Syntax	clear security group-vpn member ike security-associations [<i>index SA-index</i>] [<i>peer-ipaddress</i>]
Release Information	Command introduced in Junos OS Release 10.2.
Description	Clear IKE security association (SA) for a group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> • none—Clear all IKE SAs for the group member. • <i>index</i>—(Optional) Clear the IKE SA with this index number. • <i>peer-ipaddress</i>—(Optional) Clear the IKE SA with this peer.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show security group-vpn member ike security-associations on page 1330 • Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

[clear security group-vpn member ipsec security-associations](#)

Syntax	<code>clear security group-vpn member ipsec security-associations [index SA-index]</code>
Release Information	Command introduced in Junos OS Release 10.2.
Description	Clear group VPN SA for a group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none">• none—Clear all group VPN SAs for the group member.• index—(Optional) Clear the group VPN SA with this index number.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show security group-vpn member ipsec security-associations on page 1337• Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

clear security group-vpn member ipsec security-associations statistics

Syntax	clear security group-vpn member ipsec security-associations statistics <group-id <i>group-id</i> >
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Clear IPsec SA statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	none —Clear IPsec SA statistics for all groups. group-id <i>group-id</i> —(Optional) Clear IPsec SA statistics for the specified group identifier.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

clear security group-vpn member ipsec statistics

Syntax	clear security group-vpn member ipsec statistics <index <i>index</i> >
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Clear IPsec statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	none —Clear IPsec statistics for all groups. index <i>index</i> —(Optional) Clear the IPsec statistics for the SA with this index number.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

clear security group-vpn server

Syntax clear security group-vpn server [*group group-name* | *group-id group-id*] [*now*]

Description Clear active members for a specified group. If no options are specified, members are cleared from all groups. After this command is issued, members will need to reregister. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.



NOTE: An IKE SA can be used by a group member to register to multiple groups. When you clear members for a specified group, all existing IKE SAs that could be used to register to the group are also cleared.

- Options**
- **none**—All members are cleared from all groups.
 - **group**—(Optional) Clear members and SAs for the specified group name.
 - **group-id**—(Optional) Clear members and SAs for the specified group identifier.
 - **now**—(Optional) Immediately clear all group-related information.

Required Privilege Level clear

- Related Documentation**
- [show security group-vpn server registered-members on page 1359](#)
 - [Group VPNv2 Overview on page 747](#)

- Output Fields** If there is a problem with the command, one of the following messages appears:
- Group does not exist
 - Group is in the process of deletion
 - Error in clear members
 - Warning Message; Fail to push delete to members as server-member-communication is not configured.

clear security group-vpn server server-cluster statistics

Syntax	<code>clear security group-vpn server server-cluster statistics <group <i>group-name</i>> <group-id <i>group-id</i>></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Clear Group VPNv2 server cluster statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>none—Clear Group VPNv2 server cluster statistics for all groups.</p> <p>group <i>group-name</i>—(Optional) Clear Group VPNv2 server cluster statistics for the specified group name.</p> <p>group-id <i>group-id</i>—(Optional) Clear Group VPNv2 server cluster statistics for the specified group identifier.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• Group VPNv2 Overview on page 747• Understanding Group VPNv2 Server Clusters on page 795
Output Fields	This command produces no output.

clear security group-vpn server statistics

Syntax	<code>clear security group-vpn server statistics <group <i>group-name</i>> <group-id <i>group-id</i>></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Clear group statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>none—Clear statistics for all groups.</p> <p>group <i>group-name</i>—(Optional) Clear statistics for the specified group name.</p> <p>group-id <i>group-id</i>—(Optional) Clear statistics for the specified group identifier.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show security group-vpn server statistics on page 1364• Group VPNv2 Overview on page 747
Output Fields	This command produces no output.

clear security ike respond-bad-spi-count

Syntax clear security ike respond-bad-spi-count <*gateway-name*>

Release Information Command introduced in Junos OS Release 8.5.

Description Clear information about invalid Internet Key Exchange (IKE) security parameter index (SPI) counters.

- Options**
- none—Clear all invalid SPI counters.
 - *gateway-name* —(Optional) Clear the invalid SPI counters for the given gateway.

Required Privilege Level clear

Related Documentation • [respond-bad-spi on page 1228](#)

Output Fields This command produces no output.

clear security ike security-associations

Syntax clear security ike security-associations
 <peer-address>
 <family (inet | inet6)>
 <fpc slot-number>
 <index SA-index-number>
 <kmd-instance (all | kmd-instance-name)>
 <pic slot-number>
 <port port-number>
 <sa-type shortcut>

Release Information Command introduced in Junos OS Release 8.5. The **fpc**, **pic**, and **kmd-instance** options added in Junos OS Release 9.3. The **port** option added in Junos OS Release 10.0. The **family** option added in Junos OS Release 11.1.

Description Clear information about the current Internet Key Exchange security associations (IKE SAs). For IKEv2, the device clears the information about the IKE SAs and the associated IPSec SA.

- Options**
- none—Clear all IKE SAs.
 - **peer-address** —(Optional) Clear IKE SAs for the destination peer at this IP address.
 - **family**—(Optional) Clear IKE SAs by family.
 - **inet**—IPv4 address family.
 - **inet6**—IPv6 address family.
 - **fpc slot-number** —Specific to SRX Series devices. Clear information about existing IKE SAs in this Flexible PIC Concentrator (FPC) slot.
 - **index SA-index-number** —(Optional) Clear the IKE SA with this index number.
 - **kmd-instance**—Specific to SRX Series devices. Clear information about existing IKE SAs in the key management process (the daemon, which in this case is KMD) identified by FPC **slot-number** and PIC **slot-number**.
 - **all**—All KMD instances running on the Services Processing Unit (SPU).
 - **kmd-instance-name**—Name of the KMD instance running on the SPU.
 - **pic slot-number** —Specific to SRX Series devices. Clear information about existing IKE SAs in this PIC slot.
 - **port port-number**—(Optional) Port number of SA (1 through 65,535).
 - **sa-type shortcut**—(Optional for ADVPN) Type of SA. **shortcut** is the only option for this release.

Required Privilege Level clear

Related Documentation • [show security ike security-associations on page 1371](#)

Output Fields This command produces no output.

clear security ipsec security-associations

Syntax	<pre>clear security ipsec security-associations <family (inet inet6)> <fpc slot-number> <index SA-index-number> <kmd-instance (all kmd-instance-name)> <pic slot-number></pre>
Release Information	Command introduced in Junos OS Release 8.5. The fpc , pic , and kmd-instance options added in Junos OS Release 9.3. The family option added in Junos OS Release 11.1.
Description	Clear information about IPsec security associations (SAs).
Options	<ul style="list-style-type: none"> • none—Clear all IPsec SAs. • family—(Optional) Clear SAs by family. <ul style="list-style-type: none"> • inet—IPv4 address family. • inet6—IPv6 address family. • fpc slot-number—Specific to SRX Series devices. Clear information about existing IPsec SAs in this Flexible PIC Concentrator (FPC) slot. • index SA-index-number—(Optional) Clear the IPsec SA with this index number. • kmd-instance—Specific to SRX Series devices. Clear information about existing IPsec SAs in the key management process (the daemon, which in this case is KMD) identified by FPC <i>slot-number</i> and PIC <i>slot-number</i>. <ul style="list-style-type: none"> • all—All KMD instances running on the Services Processing Unit (SPU). • kmd-instance-name—Name of the KMD instance running on the SPU. <p>pic slot-number—Specific to SRX Series devices. Clear information about existing IPsec SAs in this PIC slot.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show security ipsec security-associations on page 1393
Output Fields	This command produces no output.

clear security ipsec statistics

Syntax	<pre>clear security ike statistics <fpc slot-number> <index SA-index-number> <kmd-instance (all kmd-instance-name)> <pic slot-number></pre>
Release Information	Command introduced in Junos OS Release 8.5. fpc and pic options added in Junos OS Release 9.3. kmd-instance option added in Junos OS Release 10.4.
Description	Clear IPsec statistics on the device.
Options	<ul style="list-style-type: none">• none—Clear all IPsec statistics.• fpc slot-number—Specific to SRX Series devices. Clear statistics about existing IPsec security associations (SAs) in this Flexible PIC Concentrator (FPC) slot.• index SA-index-number—(Optional) Clear the IPsec statistics for the SA with this index number.• kmd-instance—Specific to SRX Series devices. Clear information about existing IKE SAs in the key management process (the daemon, which in this case is KMD) identified by FPC <i>slot-number</i> and PIC <i>slot-number</i>.<ul style="list-style-type: none">• all—All KMD instances running on the Services Processing Unit (SPU).• kmd-instance-name—Name of the KMD instance running on the SPU.• pic slot-number—Specific to SRX Series devices. Clear statistics about existing IPsec SAs in this PIC slot.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show security ipsec statistics on page 1410
Output Fields	This command produces no output.


clear security ipsec tunnel-events-statistics

Syntax	clear security ipsec tunnel-events-statistics
Release Information	Command introduced in Junos OS Release 12.3X48-D10.
Description	Clear IPsec tunnel event statistics.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• <i>show security ipsec tunnel-events-statistics</i>
Output Fields	This command produces no output.

clear security pki key-pair (Local Certificate)

Syntax	clear security pki key-pair (all certificate-id <i>certificate-id</i>)
Release Information	Command introduced in Junos OS Release 8.5.
Description	Clear public key infrastructure (PKI) key pair information for local digital certificates on the device.
Options	<ul style="list-style-type: none">• all—Clear key pair information for all local certificates.• certificate-id <i>certificate-id</i> —Clear key pair information for the local certificate with this certificate ID.
Required Privilege Level	clear and security
Related Documentation	<ul style="list-style-type: none">• show security pki certificate-request (View) on page 1425
Output Fields	This command produces no output.

clear security pki local-certificate (Device)

Syntax	clear security pki local-certificate (all certificate-id <i>certificate-id</i> system-generated)
Release Information	Command modified in Junos OS Release 9.1.
Description	Clear public key infrastructure (PKI) information for local digital certificates on the device.
Options	<ul style="list-style-type: none"> all—Clear information for all the local digital certificates on the device.
	<p> NOTE: You cannot clear the automatically generated self-signed certificate using <code>clear security pki local-certificate all</code> command. To clear the self-signed certificate you need to use <code>system-generated</code> as an option.</p>
	<ul style="list-style-type: none"> certificate-id <i>certificate-id</i>—Clear the specified local digital certificate with this certificate ID. system-generated—Clear the existing automatically generated self-signed certificate and generate a new self-signed certificate.
Required Privilege Level	clear and security
Related Documentation	<ul style="list-style-type: none"> show security pki local-certificate (View) on page 1430 request security pki local-certificate generate-self-signed (Security) on page 1312
List of Sample Output	clear security pki local-certificate all on page 1291 clear security pki local-certificate system-generated on page 1291
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear security pki local-certificate all

```
user@host> clear security pki local-certificate all
```

Sample Output

clear security pki local-certificate system-generated

```
user@host> clear security pki local-certificate system-generated
```

request security ike debug-disable

Syntax	request security ike debug-disable
Release Information	Command introduced in Release Junos OS 11.4R3.
Description	Disable IKE debugging.
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none">• request security ike debug-enable on page 1293• show security ike debug-status on page 1369
Output Fields	This command produces no output.

request security ike debug-enable

Syntax `request security ike debug-enable local local-ip-address remote remote-ip-address`

Release Information Command introduced in Junos OS Release 11.4R3.

Description Enable IKE tracing on a single VPN tunnel specified by a local and a remote IP address. Use of this command is an alternative to configuring IKE traceoptions; no configuration is required to use this command. This command only traces a single tunnel, whereas configuring IKE traceoptions affects all VPN tunnels on the SRX Series device.

To use this command:

1. Identify the local and remote IP addresses of the VPN tunnel you want to trace.
2. Enable IKE tracing on the VPN tunnel with this command.
3. Attempt tunnel establishment to capture trace information to the `/var/log/kmd` file.



NOTE: If you have configured a file for IKE traceoptions, the trace information is stored in the specified filename.

4. Disable per-tunnel IKE tracing with the `request security ike debug-disable` command.
5. Review the `/var/log/kmd` file with the `show log kmd` command.

You can use the `show security ike debug-status` command to see the status of the per-tunnel IKE tracing operation.

- Options**
- `local local-ip-address`—The address of the local VPN peer.
 - `remote remote-ip-address`—The address of the remote VPN peer.

Required Privilege Level maintenance

- Related Documentation**
- [request security ike debug-disable on page 1292](#)
 - [show security ike debug-status on page 1369](#)

clear security tcp-encap statistics

Syntax	clear security tcp-encap statistics
Release Information	Command introduced in Junos OS Release 15.1X49-D80.
Description	Clear TCP encapsulation statistics.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show security tcp-encap statistics on page 1438
Output Fields	This command produces no output.

request security pki ca-certificate ca-profile-group load

Syntax	<code>request security pki ca-certificate ca-profile-group load ca-group-name <i>ca-group-name</i> filename [<i>path/filename</i> default]</code>
Release Information	Command introduced in Junos OS Release 12.1; default option added in Junos OS Release 12.1X47-D10.
Description	<p>For SSL forward proxy, you need to load trusted CA certificates on your system. By default, Junos OS provides a list of trusted CA certificates that include default certificates used by common browsers. Alternatively, you can define your own list of trusted CA certificates and import them on to your system.</p> <p>Use this command to load the default certificates or to specify a path and filename of trusted CA certificates that you define.</p>
Options	<p>ca-group-name <i>ca-group-name</i>—Load the specified CA group profile.</p> <p>filename <i>path/filename</i>—Directory location and filename of the trusted CA certificates defined by you.</p> <p>filename default—Load the trusted CA certificates available by default.</p>
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none"> <code>show security pki ca-certificate</code> Understanding Certificates and PKI on page 973
List of Sample Output	request security pki ca-certificate ca-profile-group load (default) on page 1295 request security pki ca-certificate ca-profile-group load (path/filename) on page 1296
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki ca-certificate ca-profile-group load (default)

```

user@host> request security pki ca-certificate ca-profile-group load ca-group-name ca-default
filename default

Do you want to load this CA certificate ? [yes,no] (no) yes
Loading 157 certificates for group 'ca-default'.
ca-default_1: Loading done.
ca-default_2: Loading done.
ca-default_3: Loading done.
.....

```

Sample Output

request security pki ca-certificate ca-profile-group load (path/filename)

```
user@host> request security pki ca-certificate ca-profile-group load ca-group-name ca-manual  
filename /var/tmp/firefox-all.pem
```

```
Do you want to load this CA certificate ? [yes,no] (no) yes
```

```
Loading 196 certificates for group 'ca-manual'.
```

```
ca-manual_1_sysgen: Loading done.
```

```
ca-manual_2_sysgen: Loading done.
```

```
ca-manual_3_sysgen: Loading done.
```

```
ca-manual_4_sysgen: Loading done.
```

```
ca-manual_5_sysgen: Loading done.
```

```
ca-manual_6_sysgen: Loading done.
```

```
...
```

```
ca-manual_195_sysgen: Loading done.
```

```
ca-manual_196_sysgen: Loading done.
```

```
ca-profile-group 'ca-manual' successfully loaded. Success[193] Skipped[3]
```

request security pki ca-certificate enroll (Security)

Syntax	<code>request security pki ca-certificate enroll ca-profile <i>ca-profile-name</i></code>
Release Information	Command introduced in Junos OS Release 7.5.
Description	Request a digital certificate from a certificate authority (CA) online by using the Simple Certificate Enrollment Protocol (SCEP).
Options	ca-profile <i>ca-profile-name</i> —CA profile name.
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none"> • show security pki ca-certificate (View) on page 1421 • Understanding Certificates and PKI on page 973
List of Sample Output	request security pki ca-certificate enroll on page 1297
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki ca-certificate enroll

```

user@host> request security pki ca-certificate enroll ca-profile entrust
Received following certificates:
Certificate: C=us, O=example, CN=First Officer
Fingerprint: 46:71:15:34:f0:a6:41:76:65:81:33:4f:68:47:c4:df:78:b8:e3:3f
Certificate: C=us, O=example, CN=First Officer
Fingerprint: bc:78:87:9b:a7:91:13:20:71:db:ac:b5:56:71:42:ad:1a:b6:46:17
Certificate: C=us, O=example
Fingerprint: 00:8e:6f:58:dd:68:bf:25:0a:e3:f9:17:70:d6:61:f3:53:a7:79:10
Do you want to load the above CA certificate ? [yes,no] (no) yes

```

request security pki ca-certificate load (Security)

Syntax	<code>request security pki ca-certificate load ca-profile <i>ca-profile-name</i> filename <i>path/filename</i></code>
Release Information	Command introduced in Junos OS Release 7.5.
Description	Manually load a certificate authority (CA) digital certificate from a specified location.
Options	<p>ca-profile <i>ca-profile-name</i>—Load the specified CA profile.</p> <p>filename <i>path/filename</i>—Directory location and filename of the CA digital certificate.</p>
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none"> <code>show security pki ca-certificate</code> Understanding Certificates and PKI on page 973
List of Sample Output	request security pki ca-certificate load on page 1298
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki ca-certificate load

```

user@host> request security pki ca-certificate load ca-profile 2Kkey filename /var/tmp/2Kkey.pem

Fingerprint:
  a0:08:bb:1f:75:96:76:cd:ee:db:36:10:b6:c6:d8:df:5e:02:05:05 (sha1)
  f5:58:6b:de:7c:d6:cd:90:5a:18:c3:0e:3d:95:da:25 (md5)
Do you want to load this CA certificate ? [yes,no] (no) yes

CA certificate for profile 2Kkey loaded successfully

```

request security pki ca-certificate verify (Security)

Syntax	<code>request security pki ca-certificate verify ca-profile <i>ca-profile-name</i></code>
Release Information	Command introduced in Junos OS Release 8.5.
Description	Verify the digital certificate installed for the specified certificate authority (CA).
Options	<code>ca-profile <i>ca-profile-name</i></code> —Display the specified CA profile.
Required Privilege Level	maintenance and security
Related Documentation	<ul style="list-style-type: none"> • ca-profile (Security PKI) on page 1096 • show security pki ca-certificate (View) on page 1421 • Understanding Certificates and PKI on page 973
List of Sample Output	request security pki ca-certificate verify ca-profile ca1 (CRL downloaded) on page 1299 request security pki ca-certificate verify ca-profile ca1 (CRL not downloaded) on page 1299
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

This user has downloaded the certificate revocation list (CRL).

request security pki ca-certificate verify ca-profile ca1 (CRL downloaded)

```
user@host> request security pki ca-certificate verify ca-profile ca1
CA certificate ca1 verified successfully
```

Sample Output

This user has not downloaded the certificate revocation list (CRL).

request security pki ca-certificate verify ca-profile ca1 (CRL not downloaded)

```
user@host> request security pki ca-certificate verify ca-profile ca1
CA certificate ca1: CRL verification in progress. Please check the PKId debug
logs for completion status
```

request security pki crt load (Security)

Syntax	<code>request security pki crt load ca-profile <i>ca-profile-name</i> filename <i>path/filename</i></code>
Release Information	Command introduced in Junos OS Release 8.1.
Description	Manually install a certificate revocation list (CRL) on the device from a specified location.
Options	ca-profile <i>ca-profile-name</i> —Load the specified certificate authority (CA) profile. filename <i>path/filename</i> —Directory location and filename of the CRL.
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none">• Understanding Certificates and PKI on page 973
List of Sample Output	request security pki crt load on page 1300
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki crt load

```
user@host> request security pki crt load ca-profile ca-test filename example-inter-ca.crl
CRL for CA profile ca-test loaded successfully
```


request security pki generate-certificate-request (Security)

Syntax request security pki generate-certificate-request certificate-id *certificate-id-name*
 domain-name *domain-name* subject *subject-distinguished-name*
 <add-ca-constraint>
 <digest (sha1 | sha256)>
 <email *email-address*>
 <filename (*path* | terminal)>
 <ip-address *ip-address*>

Release Information Command introduced in Junos OS Release 7.5. Support for **digest** option added in Junos OS Release 12.1X45-D10.

Description Manually generate a local digital certificate request in the Public-Key Cryptography Standards #10 (PKCS-10) format.

Options **certificate-id** *certificate-id-name*—Name of the local digital certificate and the public/private key pair.

domain-name *domain-name*—Fully qualified domain name (FQDN) provides the identity of the certificate owner for Internet Key Exchange (IKE) negotiations and provides an alternative to the subject name.

subject *subject-distinguished-name*—Distinguished name format contains the following information:

- **DC**—Domain component
- **CN**—Common name
- **OU**—Organizational unit name
- **O**—Organization name
- **L**—Locality
- **ST**—State
- **C**—Country

digest—(Optional) Hash algorithm used to sign the certificate request.

- **sha1**—SHA-1 digests (default value for RSA or DSA only).
- **sha256**—SHA-256 digests for RSA or ECDSA only (default value for ECDSA).
- **sha-384**—SHA-384 digests for ECDSA only.

Starting in Junos OS Release 18.1R3, the default encryption algorithm that is used for validating automatically and manually generated self-signed PKI certificates is Secure Hash Algorithm 256 (SHA-256). Prior to Junos OS Release 18.1R3, SHA-1 is used as default encryption algorithm.

email *email-address*—(Optional) E-mail address of the certificate holder.

filename (*path* | *terminal*)—(Optional) Location where the local digital certificate request should be placed or the login terminal.

ip-address *ip-address*—(Optional) IP address of the router.

Required Privilege Level maintenance

Related Documentation

- [show security pki certificate-request \(View\) on page 1425](#)

List of Sample Output [request security pki generate-certificate-request on page 1302](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki generate-certificate-request

```
user@host> request security pki generate-certificate-request certificate-id local-entrust2
domain-name router2.example.net filename entrust-req2 subject cn=router2.example.net
```

```
Generated certificate request
-----BEGIN CERTIFICATE REQUEST-----
MIIBoTCCAQoCAQAwGjEYMBYGA1UEAxMPdHhXlmp1bm1wZXIubmVOMIGfMA0GCSqG
SIb3DQEBAQUAA4GNADCBiQKBgQCiuFklQws1Ud+AqN5DDxRs2kVyKEhh9qoVFnz+
Hz4c9vsy3B8E1wTJlkmIt2cB3yifB6zePd+6WYpf57Crwre7YqPkiXM31F6z3YjX
H+1BPNbCxNWYvyrnSyVYDbFj8o0Xyqog8ACDfVL2JBWrPNBYy7imq/K9soDBbAs6
5hZqqwIDAQABoEcwRQYJKoZIhvcNAQkOMTgwNjA0BgNVHQ8BAf8EBAMCB4AwJAYD
VR0RAQH/BBowGIIWdHhXlmp1bm1wZXIubmVOMIGfMA0GCSqGSIb3DQEBAQUAA4GN
AA0BgQBc2rq1v5S0QXH7LCb/FdqAL8ZM6GoaNSd6cGwq4bB6a7UQFgtoH406gQ3G
3iH0ZFz4xMIBpJYuGd1dkqgvcDoH3AgTsLkfn7Wi3x5H2qeQVs9bvL4P5nvEZLND
EIMUHWteolZCiZ70f09Fer9cXWHSQs1UtXtgPqQJy2xIeImLgw==
-----END CERTIFICATE REQUEST-----
Fingerprint:
0d:90:b8:d2:56:74:fc:84:59:62:b9:78:71:9c:e4:9c:54:ba:16:97 (sha1)
1b:08:d4:f7:90:f1:c4:39:08:c9:de:76:00:86:62:b8 (md5)
```

request security pki generate-key-pair (Security)

Syntax request security pki generate-key-pair certificate-id *certificate-id-name*
 <size (256 | 384 | 1024 | 2048 | 4096 | 521)>
 <type (dsa | ecdsa | rsa)>

Release Information Command introduced in Junos OS Release 11.1.
 Options to support Elliptic Curve Digital Signature Algorithm (ECDSA) added in Junos OS Release 12.1X45-D10.
521 option to support ECDSA introduced in Junos OS Release 19.1R1.

Description Generate a public key infrastructure (PKI) public/private key pair for a local digital certificate.

Options **certificate-id** *certificate-id-name*—Name of the local digital certificate and the public/private key pair.

size—Key pair size. The key pair size can be 256, 384, 521, 1024, 2048, or 4096 bits. Key pair sizes of 256, 384, and 521 bits are compatible with ECDSA. For Digital Signal Algorithm (DSA) and Rivest Shamir Adleman (RSA), algorithms the size must be 1024, 2048, or 4096. The default key pair size is 1024 for DSA and 2048 for RSA.



NOTE: The following are supported when ECDSA-521 signatures are used:

- Load a complete certificate, which is generated using an external tool like OpenSSL into PKI.
- Manually generate a Certificate Signing Request (CSR) for a local certificate and sending the CSR to a (Certificate Authority) CA server to enroll.
- Automatic enroll with CA server.

type—The algorithm to be used for encrypting the public/private key pair:

- **ecdsa**—ECDSA encryption
- **dsa**— DSA encryption
- **rsa**—RSA encryption (default)

Required Privilege Level maintenance

Related Documentation • [Understanding Certificates and PKI on page 973](#)

List of Sample Output [request security pki generate-key-pair on page 1304](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

`request security pki generate-key-pair`

```
user@host> request security pki generate-key-pair type [xxx] size [xxx] certificate-id test
Generated key pair test, key size [xxx] bits
```

request security pki key-pair export

Syntax	<code>request security pki key-pair export certificate-id <i>certificate-id</i> filename <i>filename</i> <passphrase <i>string</i>> < type (der pem)></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D60.
Description	Export the keypair for an end-entity (EE) certificate. The exported keypair is encrypted and can be imported along with the EE certificate. Using the CLI request security pki key-pair export command, you can export the pki key-pairs file as a backup or to check the file for troubleshooting purposes. We recommend denying access to the CLI request security pki key-pair export command to all users and restrict this command only to the privileged users.
Options	<p>certificate-id <i>certificate-id</i>—Name of the local digital certificate.</p> <p>filename <i>filename</i>—Target directory location and filename of the CA digital certificate.</p> <p>passphrase <i>passphrase</i>—(Optional) Passphrase to protect the keypair data for PEM format. The passphrase can be up to 64 characters. If specified, the passphrase must be used when importing the keypair.</p> <p>type (der pem)—(Optional) Type of format, either DER or PEM. PEM is the default.</p>
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none"> request security pki local-certificate export on page 1311
Output Fields	This command produces no output.

request security pki local-certificate enroll cmpv2

Syntax

```
request security pki local-certificate enroll cmpv2
  ca-dn subject-dn
  ca-profile ca-profile name
  ca-reference reference
  ca-secret shared-secret
  certificate-id certificate-id-name
  domain-name domain-name
  email email-address
  ip-address ip-address
  ipv6-address ipv6-address
  subject subject-distinguished-name
```

Release Information Command introduced in Junos OS Release 15.1X49-D40.

Description Enroll and install a local digital certificate online by using CMPv2. This command loads both end-entity (EE) and CA certificates based on the CA server configuration. Certificate revocation list (CRL) or Online Certificate Status Protocol (OCSP) can be used to check the revocation status of a certificate.

Options **ca-dn *subject-dn***—The distinguished name (DN) of the CA enrolling the EE certificate must be specified during enrollment. This optional parameter is mandatory if the CA certificate is not already enrolled. If the CA certificate is already enrolled, the subject DN is extracted from the CA certificate.

ca-profile *ca-profile-name*—CA profile name.

ca-reference *reference*—Out-of-band reference value received from the CA server.

ca-secret *shared-secret*—Out-of-band secret value received from the CA server.

certificate-id *certificate-id-name*—Name of the local digital certificate and the public/private key pair.

domain-name *domain-name*—Fully qualified domain name (FQDN). The FQDN provides the identity of the certificate owner for Internet Key Exchange (IKE) negotiations and provides an alternative to the subject name.

email *email-address*—E-mail address of the certificate holder.

ip-address *ip-address*—IP address of the router.

ipv6-address *ipv6-address*—IPv6 address of the router for the alternate subject.

subject *subject-distinguished-name*—Distinguished Name (DN) format that contains the domain component, common name, department, serial number, company name, state, and country in the following format: DC, CN, OU, O, SN, L, ST, C.

- **DC**—Domain component
- **CN**—Common name
- **OU**—Organizational unit name
- **O**—Organization name
- **SN**—Serial number of the device



NOTE: If you define SN in the subject field without the serial number, then the serial number is read directly from the device and added to the certificate signing request (CSR).

- **ST**—State
- **C**—Country

Required Privilege Level maintenance and security

Related Documentation

- [show security pki local-certificate \(View\) on page 1430](#)
- [clear security pki local-certificate \(Device\) on page 1291](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

```
user@host> request security pki local-certificate enroll cmpv2 ca-profile root-552 ca-dn
DC=example,CN=root-552 certificate-id tc552 email tc552-root@example.net domain-name
example.net ip-address 192.0.2.22 ca-secret example ca-reference 51892 subject
CN=example,OU=SBU,O=552-22
```

```
Certificate enrollment has started. To view the status of your enrollment, check
the public key infrastructure log (pkid) log file at /var/log/pkid.
```

request security pki local-certificate enroll scep

Syntax request security pki local-certificate enroll scep
 ca-profile *ca-profile name*
 certificate-id *certificate-id-name*
 challenge-password *challenge-password*
 digest (sha-1 | sha-256)
 domain-name *domain-name*
 email *email-address*
 ip-address *ip-address*
 ipv6-address *ipv6-address*
 scep-digest-algorithm (md5 | sha-1)
 scep-encryption-algorithm (des | des3)
 subject *subject-distinguished-name*

Release Information Command introduced in Junos OS Release 9.1. Serial number (SN) option added to the subject string output field in Junos OS Release 12.1X45. **scep** keyword and **ipv6-address** option added in Junos OS Release 15.1X49-D40.

Description Enroll and install a local digital certificate online by using Simple Certificate Enrollment Protocol (SCEP).



NOTE: If you enter the **request security pki local-certificate enroll** command without specifying the **scep** or **cmpv2** keyword, SCEP is the default method for enrolling a local certificate.

- Options**
- ca-profile** *ca-profile-name*—CA profile name.
 - certificate-id** *certificate-id-name*—Name of the local digital certificate and the public/private key pair.
 - challenge-password** *password*—Password set by the administrator and normally obtained from the SCEP enrollment webpage of the CA. The password is 16 characters in length.
 - digest** (sha-1 | sha-256)—Hash algorithm used for signing RSA certificates, either SHA-1 or SHA-256. SHA-1 is the default.
 - domain-name** *domain-name*—Fully qualified domain name (FQDN). The FQDN provides the identity of the certificate owner for Internet Key Exchange (IKE) negotiations and provides an alternative to the subject name.
 - email** *email-address*—E-mail address of the certificate holder.
 - ip-address** *ip-address*—IP address of the router.
 - ipv6-address** *ipv6-address*—IPv6 address of the router for the alternate subject.

scep-digest-algorithm (md5 | sha-1)—Hash algorithm digest, either MD5 or SHA-1; SHA-1 is the default.

scep-encryption-algorithm (des | des3)—Encryption algorithm, either DES or DES3; DES3 is the default.

subject *subject-distinguished-name*—Distinguished Name (DN) format that contains the domain component, common name, department, serial number, company name, state, and country in the following format: DC, CN, OU, O, SN, L, ST, C.

- **DC**—Domain component
- **CN**—Common name
- **OU**—Organizational unit name
- **O**—Organization name
- **SN**—Serial number of the device



NOTE: If you define SN in the subject field without the serial number, then the serial number is read directly from the device and added to the certificate signing request (CSR).

- **ST**—State
- **C**—Country

Required Privilege Level maintenance and security

Related Documentation

- [request security pki local-certificate enroll cmpv2 on page 1306](#)
- [show security pki local-certificate \(View\) on page 1430](#)
- [clear security pki local-certificate \(Device\) on page 1291](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

```
user@host> request security pki local-certificate enroll scep certificate-id r3-entrust-scep
ca-profile entrust domain-name router3.example.net subject
"CN=router3,OU=Engineering,O=example,C=US" challenge-password 123
```

Certificate enrollment has started. To view the status of your enrollment, check the public key infrastructure log (pkid) log file at /var/log/pkid. Please save the challenge-password for revoking this certificate in future. Note that this password is not stored on the router.

request security pki local-certificate export

Syntax	<code>request security pki local-certificate export</code>
Release Information	Command introduced in Junos OS Release 12.1.
Description	Export a generated self-signed certificate from the default location (var/db/certs/common/local) to a specific location within the device.
Options	<p>certificate id <i>certificate-id-name</i>—Name of the local digital certificate.</p> <p>filename <i>path/filename</i>—Target directory location and filename of the CA digital certificate.</p> <p>type (<i>der</i> <i>pem</i>)—Certificate format: DER (distinguished encoding rules) or PEM (privacy-enhanced mail).</p>
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none"> • Understanding Certificates and PKI on page 973
List of Sample Output	request security pki local-certificate export on page 1311
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki local-certificate export

```
user@host> request security pki local-certificate export filename /var/tmp/my-cert.pem
certificate-id nss-cert type pem
certificate exported successfully
```

request security pki local-certificate generate-self-signed (Security)

Syntax request security pki local-certificate generate-self-signed certificate-id
certificate-id-namedomain-name domain-name subject subject-distinguished-name
 <add-ca-constraint>
 <digest (sha1 | sha256)>
 <email *email-address*>
 <ip-address *ip-address*>

Release Information Command introduced in Junos OS Release 9.1. Support for **digest** option added in Junos OS Release 12.1X45-D10.

Description Manually generate a self-signed certificate for the given distinguished name.

Options **certificate-id** *certificate-id-name*—Name of the certificate and the public/private key pair.

domain-name *domain-name*—Fully qualified domain name (FQDN) provides the identity of the certificate owner for Internet Key Exchange (IKE) negotiations and provides an alternative to the subject name.

subject *subject-distinguished-name*—Distinguished name format contains the following information:

- **DC**—Domain component
- **CN**—Common name
- **OU**—Organizational unit name
- **O**—Organization name
- **L**—Locality
- **ST**—State
- **C**—Country

add-ca-constraint—(Optional) Specifies that the certificate can be used to sign other certificates.

digest—(Optional) Hash algorithm used to sign the certificate.

- **sha1**—SHA-1 digest (default)
- **sha256**—SHA-256 digest

Starting in Junos OS Release 18.1R3, the default encryption algorithm that is used for validating automatically and manually generated self-signed PKI certificates is Secure Hash Algorithm 256 (SHA-256). Prior to Junos OS Release 18.1R3, SHA-1 is used as default encryption algorithm.

email *email-address*—(Optional) E-mail address of the certificate holder.

Required Privilege Level maintenance and security

Related Documentation

- [clear security pki local-certificate \(Device\) on page 1291](#)
- [show security pki local-certificate \(View\) on page 1430](#)

List of Sample Output [request security pki local-certificate generate-self-signed certificate-id self-cert subject cn=abc domain-name example.net email mholmes@example.net on page 1313](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

```
request security pki local-certificate generate-self-signed certificate-id self-cert subject cn=abc domain-name example.net email mholmes@example.net
```

```
user@host> request security pki local-certificate generate-self-signed certificate-id self-cert
subject cn=abc domain-name example.net email mholmes@example.net
Self-signed certificate generated and loaded successfully
```

request security pki local-certificate load

Syntax `request security pki local-certificate load filename ssl_proxy_ca.crt key ssl_proxy_ca.key
certificate-id certificate id`

Release Information Command introduced in Junos OS Release 11.4.

Description Manually load a local digital certificate from a specified location.

Options **filename** — Filename that contains the certificate to load
key— File pathname that contains the private key/key-pair to loaded
certificate-id —Name of the certificate identifier



NOTE: Starting in Junos OS Release 19.1R1, a commit check is added to prevent user from adding ., /, %, and space in a certificate identifier while generating a local or remote certificates or a key pair.

Required Privilege Level maintenance and security

Related Documentation

- [show security pki local-certificate \(View\) on page 1430](#)
- [clear security pki local-certificate \(Device\) on page 1291](#)
- [request security pki local-certificate verify \(Security\) on page 1317](#)
- [Understanding Certificates and PKI on page 973](#)

List of Sample Output [request security pki local-certificate load on page 1314](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki local-certificate load

```
user@host> request security pki local-certificate load filename cert_name.crt key key_name.key  
certificate-id test
```

```
Local certificate cert_name.crt loaded successfully
```

request security pki local-certificate re-enroll cmpv2

Syntax request security pki local-certificate re-enroll cmpv2 certificate-id *certificate-id*
 <ca-profile-name *ca-profile*>
 <re-generate-keypair>

Release Information Command introduced in Junos OS Release 15.1X49-D60.

Description Manually reenroll an end-entity (EE) certificate with Certificate Management Protocol version 2 (CMPv2). This command allows the administrator to initiate renewal of the EE certificate using CMPv2 and can be used in conjunction with the **set security pki auto-re-enrollment cmpv2** automatic enrollment configuration.

Options **certificate-id** *certificate-id-name*—Name of the local digital certificate.

ca-profile-name *ca-profile-name*—(Optional) CA profile name.

re-generate-keypair—(Optional) Generate a PKI public/private key pair for the EE certificate.



NOTE: Key generation might take a few seconds.

Required Privilege Level maintenance and security

Related Documentation

- [request security pki local-certificate enroll cmpv2 on page 1306](#)

Output Fields This command produces no output.

request security pki local-certificate re-enroll scep

Syntax request security pki local-certificate re-enroll scep certificate-id *certificate-id*
 <ca-profile-name *ca-profile*>
 <challenge-password *password*>
 <re-generate-keypair>
 <scep-digest-algorithm (md5 | sha-1)>
 <scep-encryption-algorithm (des | des3)>

Release Information Command introduced in Junos OS Release 15.1X49-D60.

Description Manually reenroll an end-entity (EE) certificate with Simple Certificate Enrollment Protocol (SCEP). This command allows the administrator to initiate renewal of the EE certificate using SCEP and can be used in conjunction with the **set security pki auto-re-enrollment scep** automatic enrollment configuration.

Options **certificate-id** *certificate-id-name*—Name of the local digital certificate.

ca-profile-name *ca-profile-name*—(Optional) CA profile name.

challenge-password *password*—Password set by the administrator and normally obtained from the SCEP enrollment webpage of the CA. The password is 16 characters in length.

re-generate-keypair—(Optional) Generate a PKI public/private key pair for the EE certificate.



NOTE: Key generation might take a few seconds.

scep-digest-algorithm —(Optional) Hash algorithm digest, either MD5 or SHA-1; SHA-1 is the default.

scep-encryption-algorithm —(Optional) Encryption algorithm, either DES or DES3; DES3 is the default.

Required Privilege Level maintenance and security

Related Documentation • [request security pki local-certificate enroll scep on page 1308](#)

Output Fields This command produces no output.

request security pki local-certificate verify (Security)

Syntax	<code>request security pki local-certificate verify certificate-id <i>certificate-id-name</i></code>
Release Information	Command introduced in Junos OS Release 8.5.
Description	Verify the validity of the local digital certificate identifier.
Options	<code>certificate-id <i>certificate-id-name</i></code> — Name of the local digital certificate identifier.
Required Privilege Level	maintenance and security
Related Documentation	<ul style="list-style-type: none"> • request security pki local-certificate load on page 1314 • show security pki local-certificate (View) on page 1430 • clear security pki local-certificate (Device) on page 1291 • Understanding Certificates and PKI on page 973
List of Sample Output	request security pki local-certificate verify certificate-id bme1 (not downloaded) on page 1317 request security pki local-certificate verify certificate bme1 (downloaded) on page 1317
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

You receive the following response before the certificate revocation list (CRL) is downloaded:

request security pki local-certificate verify certificate-id bme1 (not downloaded)

```
user@host> request security pki local-certificate verify certificate-id bme1
Local certificate bme1: CRL verification in progress. Please check the PKId debug
logs for completion status
```

Sample Output

You receive the following response after the certificate revocation list (CRL) is downloaded:

request security pki local-certificate verify certificate bme1 (downloaded)

```
user@host> request security pki local-certificate verify certificate-id bme1
Local certificate bme1 verification success
```


request security pki verify-integrity-status

Syntax request security pki verify-integrity-status

Release Information Command introduced in Junos OS Release 11.2.



NOTE: Do not use this command for non-FIPS or Common Criteria releases. We recommend that you do not use this command for any Junos OS Release 15.1X49-D40 or later releases.

Description Verify the integrity of public key infrastructure (PKI) files. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices and vSRX instances.

Required Privilege Level maintenance

Related Documentation

List of Sample Output [request security pki verify-integrity-status on page 1319](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request security pki verify-integrity-status

```
user@host> request security pki verify-integrity-status
All PKI objects: verification success
```

show network-access address-assignment pool (View)

Syntax	<code>show network-access address-assignment pool <i>name</i></code>
Release Information	Command introduced in Junos OS Release 10.4.
Description	Display information summary about a specific pool.
Required Privilege Level	view
Output Fields	Table 104 on page 1320 lists the output fields for the show network-access address-assignment pool command. Output fields are listed in the approximate order in which they appear.

Table 104: show network-access address-assignment pool Output Fields

Field Name	Field Description
IP address	IP address assigned to a client.
Hardware address	MAC address of the client. For XAuth clients, the value is NA.
Host/User	For static IP address assignment, the user name and profile are displayed in the format <i>username@profile</i> . If the client is assigned an IP address from an address pool and a user name exists, the user name is displayed. For DHCP applications, if the host name is configured the host name is displayed; otherwise NA is displayed.
Type	Either XAuth or DHCP attributes are configured.

Sample Output

```
user@host> show network-access address-assignment pool xauth1
```

IP address	Hardware address	Host/User	Type
192.0.2.1	NA	jason@dvpn-auth	XAUTH
192.0.2.2	NA	jacky	XAUTH
192.0.2.3	00:00:5E:00:53:01	host1	DHCP
192.0.2.4	00:00:5E:00:53:02	NA	DHCP

show security dynamic-policies

Syntax	<code>show security dynamic-policies [detail] [from-zone zone] [scope-id id] [to-zone zone]</code>
Release Information	Command introduced in Junos OS Release 10.2.
Description	Display dynamic policies downloaded on the group member. This command is supported on SRX100, SRX110, SRX210, SRX220, SRX240, and SRX650 devices.
Options	<ul style="list-style-type: none"> • none—Display basic information about all policies installed on the group member. • detail—(Optional) Display a detailed view of all of the policies installed on the group member. • from-zone—(Optional) Display information about the policies installed on the group member for the specified source zone. • scope-id—(Optional) Display information about the policies installed on the group member for the specified policy identifier. • to-zone—(Optional) Display information about the policies installed on the group member for the specified destination zone.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>show security policies</i> • Group VPNv2 Overview on page 747
List of Sample Output	show security dynamic-policies on page 1323 show security dynamic-policies detail on page 1323 show security dynamic-policies from-zone Internal on page 1324 show security dynamic-policies scope-id 8 from-zone Internal on page 1324 show security dynamic-policies detail from-zone Internal on page 1325 show security dynamic-policies detail from-zone Internal to-zone Host on page 1325
Output Fields	Table 105 on page 1321 lists the output fields for the show security dynamic-policies command. Output fields are listed in the approximate order in which they appear.

Table 105: show security dynamic-policies Output Fields

Field Name	Field Description
Policy	Name of the applicable Policy.

Table 105: show security dynamic-policies Output Fields (continued)

Field Name	Field Description
State	<p>Status of the policy:</p> <ul style="list-style-type: none"> • enabled: The policy can be used in the policy lookup process, which determines access rights for a packet and the action taken in regard to it. • disabled: The policy cannot be used in the policy lookup process, and therefore it is not available for access control.
Index	An internal number associated with the policy.
Scope Policy	Policy identifier.
Sequence number	Number of the policy within a given context. For example, three policies that are applicable in a from-zoneA-to-zoneB context might be ordered with sequence numbers 1, 2, and 3. Also, in a from-zoneC-to-zoneD context, four policies might have sequence numbers 1, 2, 3, and 4.
Source addresses	<p>For standard display mode, the names of the source addresses for a policy. Address sets are resolved to their individual names. (In this case, only the names are given, not their IP addresses.)</p> <p>For detail display mode, the names and corresponding IP addresses of the source addresses for a policy. Address sets are resolved to their individual address name-IP address pairs.</p>
Destination addresses	Name of the destination address (or address set) as it was entered in the destination zone's address book. A packet's destination address must match this value for the policy to apply to it.
Application	<p>Name of a preconfigured or custom application whose type the packet matches, as specified at configuration time.</p> <ul style="list-style-type: none"> • IP protocol: The IP protocol used by the application—for example, TCP, UDP, ICMP. • ALG: If an ALG is associated with the session, the name of the ALG. Otherwise, 0. • Inactivity timeout: Elapse time without activity after which the application is terminated. • Source port range: The low-high source port range for the session application. • Destination port range: The low-high destination port range for the session application.
action-type	Must be permit.
Policy Type	Must be dynamic.
From zone	Name of the source zone.
To zone	Name of the destination zone.
Tunnel	Tunnel name, type (IPsec), and index number.

Sample Output

show security dynamic-policies

```
user@host> show security dynamic-policies

Policy: policy_forward-0001, State: enabled, Index: 1048580, Scope Policy: 4
  Sequence number: 1
  Source addresses:192.168.10.0/24
  Destination addresses:192.168.20.0/24
  Applications: Unknown
action-type: permit, tunnel:
Policy: policy_forward-0002, State: enabled, Index: 2097156, Scope Policy: 4
  Sequence number: 2
  Source addresses:192.168.10.0/24
  Destination addresses:192.168.20.0/24
  Applications: Unknown
action-type: permit, tunnel:
```

Sample Output

show security dynamic-policies detail

```
user@host> show security dynamic-policies detail

Policy: policy_forward-0001, action-type: permit, State: enabled, Index:
1048580,AI: disabled, Scope Policy: 4
  Policy Type: Dynamic
  Sequence number: 1
  From zone: Host, To zone: untrust
  Source addresses:192.168.10.0/24
  Destination addresses:192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [23-23]
  Tunnel: Test Tunnel, Type: IPSec, Index: 1001
Policy: policy_backward-0001, action-type: permit, State: enabled, Index:
1048582,AI: disabled, Scope Policy: 6
  Policy Type: Dynamic
  Sequence number: 1
  From zone: untrust, To zone: Host
  Source addresses:192.168.10.0/24
  Destination addresses:192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [80-80]
  Tunnel: Test Tunnel, Type: IPSec, Index: 1003
Policy: policy_internal-0001, action-type: permit, State: enabled, Index:
1048583,AI: disabled, Scope Policy: 7
  Policy Type: Dynamic
  Sequence number: 1
  From zone: Internal, To zone: Host
  Source addresses:192.168.1.0/24
  Destination addresses:192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [80-80]
```

```

Tunnel: Test Tunnel, Type: IPSec, Index: 1005
Policy: policy_external-0001, action-type: permit, State: enabled, Index:
1048584, AI: disabled, Scope Policy: 8
  Policy Type: Dynamic
  Sequence number: 1
  From zone: Internal, To zone: untrust
  Source addresses: 192.168.1.0/24
  Destination addresses: 192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [80-80]
Tunnel: Test Tunnel, Type: IPSec, Index: 1006
Policy: policy_forward-0002, action-type: permit, State: enabled, Index:
2097156, AI: disabled, Scope Policy: 4
  Policy Type: Dynamic
  Sequence number: 2
  From zone: Host, To zone: untrust
  Source addresses: 192.168.10.0/24
  Destination addresses: 192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [80-80]
Tunnel: Test Tunnel, Type: IPSec, Index: 1002
Policy: policy_backward-0002, action-type: permit, State: enabled, Index:
2097158, AI: disabled, Scope Policy: 6
  Policy Type: Dynamic
  Sequence number: 2
  From zone: untrust, To zone: Host
  Source addresses: 192.168.10.0/24
  Destination addresses: 192.168.20.0/24
  Application: Unknown
    IP protocol: 6, ALG: 0, Inactivity timeout: 0
    Source port range: [0-0]
    Destination port range: [23-23]
Tunnel: Test Tunnel, Type: IPSec, Index: 1004

```

Sample Output

show security dynamic-policies from-zone Internal

```

user@host> show security dynamic-policies from-zone Internal

Policy: policy_internal-0001, State: enabled, Index: 1048583, Scope Policy: 7
  Sequence number: 1
  Applications: Unknown
  action-type: permit, tunnel:
Policy: policy_external-0001, State: enabled, Index: 1048584, Scope Policy: 8
  Sequence number: 1
  Applications: Unknown
  action-type: permit, tunnel:

```

Sample Output

show security dynamic-policies scope-id 8 from-zone Internal

```

user@host> show security dynamic-policies scope-id 8 from-zone Internal

```



```
Policy: policy_external-0001, State: enabled, Index: 1048584, Scope Policy: 8
Sequence number: 1
Applications: Unknown
action-type: permit, tunnel:
```

Sample Output

show security dynamic-policies detail from-zone Internal

```
user@host> show security dynamic-policies detail from-zone Internal

Policy: policy_internal-0001, action-type: permit, State: enabled, Index:
1048583, AI: disabled, Scope Policy: 7
Policy Type: Dynamic
Sequence number: 1
From zone: Internal, To zone: Host
Source addresses: 192.168.1.0/24
Destination addresses: 192.168.20.0/24
Application: Unknown
IP protocol: 6, ALG: 0, Inactivity timeout: 0
Source port range: [0-0]
Destination port range: [80-80]
Tunnel: Test Tunnel, Type: IPSec, Index: 1005
Policy: policy_external-0001, action-type: permit, State: enabled, Index:
1048584, AI: disabled, Scope Policy: 8
Policy Type: Dynamic
Sequence number: 1
From zone: Internal, To zone: untrust
Source addresses: 192.168.1.0/24
Destination addresses: 192.168.20.0/24
Application: Unknown
IP protocol: 6, ALG: 0, Inactivity timeout: 0
Source port range: [0-0]
Destination port range: [80-80]
Tunnel: Test Tunnel, Type: IPSec, Index: 1006
```

Sample Output

show security dynamic-policies detail from-zone Internal to-zone Host

```
user@host> show security dynamic-policies detail from-zone Internal to-zone Host

Policy: policy_internal-0001, action-type: permit, State: enabled, Index:
1048583, AI: disabled, Scope Policy: 7
Policy Type: Dynamic
Sequence number: 1
From zone: Internal, To zone: Host
Source addresses: 192.168.1.0/24
Destination addresses: 192.168.20.0/24
Application: Unknown
IP protocol: 6, ALG: 0, Inactivity timeout: 0
Source port range: [0-0]
Destination port range: [80-80]
Tunnel: Test Tunnel, Type: IPSec, Index: 1005
```

show security dynamic-vpn users

Syntax	show security dynamic-vpn users
Release Information	Command introduced in Junos OS Release 10.0.
Description	Display all relevant user information. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show security dynamic-vpn users terse on page 1328 • clear security dynamic-vpn user on page 1275 • clear security dynamic-vpn all on page 1274 • Dynamic VPN Overview on page 896
Output Fields	Table 106 on page 1326 lists the output fields for the show security dynamic-vpn users command. Output fields are listed in the approximate order in which they appear.

Table 106: show security dynamic-vpn users Output Fields

Field Name	Field Description
User	Username.
User-groups	Remote IPsec VPN usergroups
Number of connections	Number of connections currently active.
Remote IP	IP address of the client.
IPsec VPN	Name of the IPsec VPN.
IKE gateway	Name of the IKE gateway.
IKE ID	IKE ID configured for the client.
Status	Status of the connection.

Sample Output

```
user@host> show security dynamic-vpn users
```

```
User: alice , User group: group-one , Number of connections: 1
Remote IP: 192.168.2.10
  IPSEC VPN: dyn_vpn2
  IKE gateway: gw2
  IKE ID   : alicegw2.example.net
  IKE Lifetime: 72000
  IPSEC Lifetime: 3600
  Status: CONNECTED
```

show security dynamic-vpn users terse

Syntax	show security dynamic-vpn users terse
Release Information	This command introduced in Junos OS Release 10.0.
Description	Display all relevant user information. This feature is supported on SRX300, SRX320, SRX340, SRX345, and SRX550HM devices.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show security dynamic-vpn users on page 1326 • clear security dynamic-vpn user on page 1275 • clear security dynamic-vpn all on page 1274 • Dynamic VPN Overview on page 896
Output Fields	Table 107 on page 1328 lists the output fields for the show security dynamic-vpn users terse command. Output fields are listed in the approximate order in which they appear.

Table 107: show security dynamic-vpn users terse Output Fields

Field Name	Field Description
User	Username.
User-groups	Remote IPSec VPN usergroups
Remote IP	IP address of the client.
IKE ID	IKE ID configured for the client.
Status	Status of the connection.
Client Config Name	Name of the client configuration.
Time Established	Time that the user connection was established.

Sample Output

```
user@host> show security dynamic-vpn users terse
```

User	User Groups	Remote IP	IKE ID	Status	IKE Lifetime	IPSEC Lifetime	Client Config	Time
------	-------------	-----------	--------	--------	--------------	----------------	---------------	------

Established

						Name	
alice	group-one	192.168.2.10	alicegw2.CONNECTED	72000	3600	group	Wed Aug 8
10:			example.				
			net				26:39
2012							

show security group-vpn member ike security-associations

Syntax	<code>show security group-vpn member ike security-associations [brief detail] [index <i>sa-index</i>] [<i>peer-ipaddress</i>]</code>
Release Information	Command introduced in Junos OS Release 10.2.
Description	Display IKE security associations (SAs) for group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> <code>none</code>—Display summary information about all IKE SAs for the group members. <code>brief</code>—(Optional) Display summary output. <code>detail</code>—(Optional) Display detailed output. <code>index <i>sa-index</i></code>—(Optional) Display detailed information about the specified SA identified by index number. To obtain a list of all SAs that includes their index numbers, use the command with no options. <code>peer-ipaddress</code>—(Optional) Display information about the SA with the specified peer.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear security group-vpn member ike security-associations on page 1277 Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn member ike security-associations on page 1332 show security group-vpn member ike security-associations detail on page 1332
Output Fields	Table 108 on page 1330 lists the output fields for the show security group-vpn member ike security-associations command. Output fields are listed in the approximate order in which they appear.

Table 108: show security group-vpn member ike security-associations Output Fields

Field Name	Field Description
Index	Index number of an SA. This number is an internally generated number you can use to display information about a single SA.
State	State of the IKE security associations: <ul style="list-style-type: none"> DOWN—SA has not been negotiated with the peer. UP—SA has been negotiated with the peer.

Table 108: show security group-vpn member ike security-associations Output Fields (continued)

Field Name	Field Description
Initiator cookie	Random number, called a cookie, which is sent to the remote node when the IKE negotiation is triggered.
Responder cookie	<p>Random number generated by the remote node and sent back to the initiator as a verification that the packets were received.</p> <p>A cookie is aimed at protecting the computing resources from attack without spending excessive CPU resources to determine the cookie's authenticity.</p>
Mode	<p>Negotiation method agreed on by the two IPsec endpoints, or peers, used to exchange information between themselves. Each exchange type determines the number of messages and the payload types that are contained in each message. The modes, or exchange types, are</p> <ul style="list-style-type: none"> • main—The exchange is done with six messages. This mode or exchange type encrypts the payload, protecting the identity of the neighbor. The authentication method used is displayed: preshared keys or certificate. • aggressive—The exchange is done with three messages. This mode or exchange type does not encrypt the payload, leaving the identity of the neighbor unprotected.
Remote Address	IP address of the destination peer with which the local peer communicates.
IKE Peer	IP address of the destination peer with which the local peer communicates.
Exchange type	<p>Negotiation method agreed on by the two IPsec endpoints, or peers, used to exchange information between themselves. Each exchange type determines the number of messages and the payload types that are contained in each message. The modes, or exchange types, are</p> <ul style="list-style-type: none"> • main—The exchange is done with six messages. This mode or exchange type encrypts the payload, protecting the identity of the neighbor. The authentication method used is displayed: preshared keys or certificate. • aggressive—The exchange is done with three messages. This mode or exchange type does not encrypt the payload, leaving the identity of the neighbor unprotected.
Authentication method	<p>Method the server uses to authenticate the source of IKE messages:</p> <ul style="list-style-type: none"> • pre-shared-keys—Preshared key for encryption and decryption that both participants must have before beginning tunnel negotiations.
Local	Address of the local peer.
Lifetime	Number of seconds remaining until the IKE SA expires.

Table 108: show security group-vpn member ike security-associations Output Fields (continued)

Field Name	Field Description
Algorithms	<p>Internet Key Exchange (IKE) algorithms used to encrypt and secure exchanges between the peers during the IPsec Phase 2 process:</p> <ul style="list-style-type: none"> • Authentication—Type of authentication algorithm used. <ul style="list-style-type: none"> • sha-256—Secure Hash Algorithm 256 authentication. • sha-384—Secure Hash Algorithm 384 authentication. • Encryption—Type of encryption algorithm used. <ul style="list-style-type: none"> • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption. • aes-192-cbc—AES192-bit encryption • aes-128-cbc—AES 128-bit encryption.
Traffic statistics	<ul style="list-style-type: none"> • Input bytes—Number of bytes received. • Output bytes—Number of bytes transmitted. • Input packets—Number of packets received. • Output packets—Number of packets transmitted.

Sample Output

show security group-vpn member ike security-associations

```
user@host> show security group-vpn member ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
4736345	UP	70611c65603d53da	6e0888777ad10f8d	Main	192.0.2.3

Sample Output

show security group-vpn member ike security-associations detail

```
user@host> show security group-vpn member ike security-associations detail
```

```

IKE peer 192.0.2.5, Index 5824842, Gateway Name: group1_2
Role: Initiator, State: UP
Initiator cookie: fc866556b8afe4cd, Responder cookie: 1238de6b8a89de44
Exchange type: Main, Authentication method: Pre-shared-keys
Local: 192.0.2.7:848, Remote: 192.0.2.5:848
Lifetime: Expires in 2 seconds
Peer ike-id: 192.0.2.5
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : 3des-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-2
Traffic statistics:
Input bytes :                2044
Output bytes :                900
Input packets:                7

```


Output packets:	7
Flags: IKE SA is created	

show security group-vpn member ipsec inactive-tunnels

Syntax	<code>show security group-vpn member ipsec inactive-tunnels <brief> <detail> <group-id group-id></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Show inactive Group VPNs. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>none—Display information for all groups.</p> <p>brief—(Optional) Display summary output.</p> <p>detail—(Optional) Display detailed output.</p> <p>group-id group-id—(Optional) Display information for the specified group identifier.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Group VPNv2 Overview on page 747
List of Sample Output	<p>show security group-vpn member ipsec inactive-tunnels on page 1335</p> <p>show security group-vpn member ipsec inactive-tunnels detail on page 1336</p>
Output Fields	Table 109 on page 1334 lists the output fields for the show security group-vpn member ipsec inactive-tunnels command. Output fields are listed in the approximate order in which they appear.

Table 109: show security group-vpn member ipsec inactive-tunnels Output Fields

Field Name	Field Description
Server	Server on which group member is registered.
Port	UDP port number.
Gid	Group identifier.
lsys	Logical system.

Table 109: show security group-vpn member ipsec inactive-tunnels Output Fields (continued)

Field Name	Field Description
Reason	Reason that the tunnel is inactive: <ul style="list-style-type: none"> • The tunnel was cleared through the CLI. • The hard lifetime has expired. • There are too many TEKs. • There was a configuration change. • There was an SA installation error. • The TEK is stale. • The tunnel was deleted from the server.
Virtual-system	Logical system name.
Group VPN Name	Name of the Group VPN.
Local Gateway	IP address of the local IKE gateway.
GDOI Server	IP address of the group server.
Group Id	Group identifier.
Recovery Probe	Status of the recovery probe, either enabled or disabled (default).
DF-bit	Fragmentation of IPsec traffic on the group member—clear (default), copy, or set.
Stats	Statistics for GDOI groupkey-pull and groupkey-push exchanges, server failovers, deletes received, number of times the maximum number of keys and policies were exceeded, and the number of unsupported algorithms received.
Down Reason	Reason that the tunnel is inactive: <ul style="list-style-type: none"> • The tunnel was cleared through the CLI. • The hard lifetime has expired. • There are too many TEKs. • There was a configuration change. • There was an SA installation error. • The TEK is stale. • The tunnel was deleted from the server. • The tunnel is not initiated.

Sample Output

`show security group-vpn member ipsec inactive-tunnels`

```
user@host> show security group-vpn member ipsec inactive-tunnels
```

```
Total inactive tunnels: 1
Server      Port  GId  lsys  Reason
192.168.1.50 848   1000 root  uninitiated
```

show security group-vpn member ipsec inactive-tunnels detail

```
user@host> show security group-vpn member ipsec inactive-tunnels detail
```

```
Virtual-system: root Group VPN Name: group1000
Local Gateway: 192.168.1.101, GDOI Server: 192.168.1.50
Group Id: 1000
Recovery Probe: Disabled
DF-bit: clear
Stats:
  Pull Succeeded           : 0
  Pull Failed              : 8841
  Pull Timeout             : 7996
  Pull Aborted             : 0
  Push Succeeded           : 0
  Push Failed              : 0
  Server Failover          : 0
  Delete Received          : 0
  Exceed Maximum Keys(4)   : 0
  Exceed Maximum Policies(10): 0
  Unsupported Algo         : 0
Down Reason: uninitiated
```

show security group-vpn member ipsec security-associations

Syntax	<code>show security group-vpn member ipsec security-associations [brief detail] [index sa-index]</code>
Release Information	Command introduced in Junos OS Release 10.2. Command introduced in Junos OS Release 18.2R1 for MX-series.
Description	Display group VPN security associations (SAs) for a group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> • none—Display information about all group VPN SAs for the group member. • brief—(Optional) Display summary output. • detail—(Optional) Display detailed output. • index sa-index—(Optional) Display detailed information about the specified SA identified by index number. To obtain a list of all SAs that includes their index numbers, use the command with no options.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear security group-vpn member ipsec security-associations on page 1278 • Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn member ipsec security-associations on page 1339 show security group-vpn member ipsec security-associations detail on page 1339
Output Fields	Table 110 on page 1337 lists the output fields for the show security group-vpn member ipsec security-associations command. Output fields are listed in the approximate order in which they appear.

Table 110: show security group-vpn member ipsec security-associations

Field Name	Field Description
Total active tunnels	Total number of active IPsec tunnels.
ID	Index number of the SA. You can use this number to get additional information about the SA.
Server	IP address of the group server (remote gateway).
Port	If Network Address Translation-Traversal (NAT-T) is used, this value is 4500. Otherwise it is the standard IKE port, 500.

Table 110: show security group-vpn member ipsec security-associations (continued)

Field Name	Field Description
Algorithm	<p>Cryptography used to secure exchanges between peers during the IKE Phase 2 negotiations includes</p> <ul style="list-style-type: none"> An authentication algorithm used to authenticate exchanges between the peers. Options are sha-256 or sha-384 An encryption algorithm used to encrypt data traffic. Options are aes-128, aes-192, and aes-256.
SPI	Security parameter index (SPI) identifier. An SA is uniquely identified by an SPI.
Life: sec/kb	The lifetime of the SA, after which it expires, expressed either in seconds or kilobytes.
Gid	Group identifier.
vsys or Virtual-system	The root system.
Local Gateway	Gateway address of the local system.
GDOI Server	IP address of the group server.
Local Identity	Identity of the local peer so that its partner destination gateway can communicate with it. The value is specified as an IPv4 address, fully qualified domain name, e-mail address, or distinguished name.
Remote Identity	IPv4 address of the destination peer gateway.
DF-bit	State of the don't fragment bit: set or cleared.
Forward-policy-mismatch	Enable the support for forwarding policy-mismatched packets
Policy name	Name of the applicable policy.
Direction	Direction of the security association; it can be inbound or outbound.
AUX-SPI	<p>Value of the auxiliary security parameter index.</p> <ul style="list-style-type: none"> When the value is AH or ESP, AUX-SPI is always 0. When the value is AH+ESP, AUX-SPI is always a positive integer.
Hard lifetime	<p>The hard lifetime specifies the lifetime of the SA.</p> <ul style="list-style-type: none"> Expires in seconds—Number of seconds left until the SA expires.
Lifesize Remaining	<p>The lifesize remaining specifies the usage limits in kilobytes. If there is no lifesize specified, it shows unlimited.</p> <ul style="list-style-type: none"> Expires in kilobytes—Number of kilobytes left until the SA expires.

Table 110: show security group-vpn member ipsec security-associations (continued)

Field Name	Field Description
Soft lifetime	<p>The soft lifetime informs the IPsec key management system that the SA is about to expire.</p> <p>Each lifetime of a security association has two display options, hard and soft, one of which must be present for a dynamic security association. This allows the key management system to negotiate a new SA before the hard lifetime expires.</p> <ul style="list-style-type: none"> • Expires in seconds—Number of seconds left until the SA expires.
Mode	<p>Mode of the security association:</p> <ul style="list-style-type: none"> • transport—Protects host-to-host connections. • tunnel—Protects connections between security gateways.
Protocol	Protocol supported. Transport mode supports Encapsulation Security Protocol (ESP).
Anti-replay service	State of the service that prevents packets from being replayed. It can be Enabled or Disabled .

Sample Output

show security group-vpn member ipsec security-associations

```
user@host> show security group-vpn member ipsec security-associations
```

```

Total active tunnels: 2
ID      Server          Port  Algorithm      SPI      Life:sec/kb  GId lsys
<>49157 192.168.1.53      848   ESP:3des/sha1  c0792f86  114/  unlim  2000 root
<>49156 192.168.1.53      848   ESP:aes-256/md5 7def169d  18/   unlim  2000 root
<>49156 192.168.1.53      848   ESP:aes-256/md5 86c48448  146/  unlim  2000 root

```

Sample Output

show security group-vpn member ipsec security-associations detail

```
user@host> show security group-vpn member ipsec security-associations detail
```

```

Virtual-system: root Group VPN Name: group2000
Local Gateway: 192.168.1.70, GDOI Server: 192.168.1.53
Group Id: 2000
Routing Instance: vr1
Recovery Probe: Enabled
DF-bit: clear
Forward-policy-mismatch:Enabled

Stats:
Pull Succeeded           : 3
Pull Failed              : 0
Pull Timeout             : 6
Pull Aborted             : 0
Push Succeeded           : 1773

```

```
Push Failed           : 0
Server Failover       : 0
Delete Received       : 0
Exceed Maximum Keys(4) : 0
Exceed Maximum Policies(10): 0
Unsupported Algo       : 0
Flags:
  Rekey Needed:      no

List of policies received from server:
Tunnel-id: 49157
  Source IP: ipv4_subnet(any:900,[0..7]=192.168.1.0/24)
  Destination IP: ipv4_subnet(any:901,[0..7]=192.168.1.0/24)

Direction: bi-directional, SPI: c0792f86
Protocol: ESP, Authentication: sha1, Encryption: 3des
Hard lifetime: Expires in 81 seconds, Activated
Lifesize Remaining: Unlimited
Soft lifetime: Expired
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled, Window size: 3000 milliseconds

Direction: bi-directional, SPI: a645b381
Protocol: ESP, Authentication: sha1, Encryption: 3des
Hard lifetime: Expires in 207 seconds, Activated in 51 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 117 seconds
Mode: Tunnel, Type: Group VPN, State: installed
Anti-replay service: D3P enabled, Window size: 3000 milliseconds
```


show security group-vpn member ipsec statistics

Syntax	<code>show security group-vpn member ipsec statistics <index <i>index</i>></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX. Command introduced in Junos OS Release 18.2R1 for MX-series.
Description	Show IPsec statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	none —Display information for all IPsec SAs. index <i>index</i> —(Optional) Display detailed information about the specified SA, identified by index number. To obtain a list of all SAs that includes their index numbers, use the command with no options.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn member ipsec statistics on page 1342
Output Fields	Table 111 on page 1341 lists the output fields for the show security group-vpn member ipsec statistics command. Output fields are listed in the approximate order in which they appear.

Table 111: show security group-vpn member ipsec statistics Output Fields

Field Name	Field Description
ESP Statistics	Numbers of encrypted and decrypted bytes and encrypted and decrypted packets.
AH Statistics	Numbers of input and output bytes and input and output packets.
Errors	Numbers of AH failures, replay errors, ESP authentication failures, ESP decryption failures, bad headers, and bad trailers.
D3P Statistics	Numbers of old timestamp packets, new timestamp packets, no timestamp packets, unexpected D3P header packets, invalid type packets, invalid length packets, and invalid next header packets.
Exclude Statistics	Numbers of created and invalidated sessions.
Dynamic Policy Statistics	Numbers of created and invalidated sessions.

Table 111: show security group-vpn member ipsec statistics Output Fields (continued)

Field Name	Field Description
Fail-Open Statistics	Numbers of created and invalidated sessions.
Fail-Close Statistics	Number of dropped packets.
Forward-policy-mismatch Statistics	Number of bypassed packets.

Sample Output

show security group-vpn member ipsec statistics

```

user@host> show security group-vpn member ipsec statistics

ESP Statistics:
  Encrypted bytes:      54712
  Decrypted bytes:      16800
  Encrypted packets:    381
  Decrypted packets:    200
AH Statistics:
  Input bytes:          0
  Output bytes:         0
  Input packets:        0
  Output packets:       0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
D3P Statistics:
  Old timestamp packets: 0
  New timestamp packets: 0
  No timestamp packets: 0
  Unexpected D3P header packets: 0
  Invalid type packets: 0
  Invalid length packets: 0
  Invalid next header packets: 0
Exclude Statistics:
  Created sessions: 0
  Invalidated sessions: 0
Dynamic Policy Statistics:
  Created sessions: 381
  Invalidated sessions: 0
Fail-Open Statistics:
  Created sessions: 0
  Invalidated sessions: 0
Fail-Close Statistics:
  Dropped packets: 0
Forward-policy-mismatch Statistics:
  Input Packets: 0
  Output packets: 0

```

show security group-vpn member kek security-associations

Syntax `show security group-vpn member kek security-associations [brief | detail | display xml] [index sa-index] [peer-ipaddress]`

Release Information Command introduced in Junos OS Release 10.2.

Description Display Group VPNv2 security associations (SAs) for a group member. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.



NOTE: Group VPNv2 is the name of the Group VPN technology on MX5, MX10, MX40, MX80, MX240, MX480, and MX960 routers. Group VPNv2 is different from the Group VPN technology implemented on SRX Security Gateways.

For more information about Group VPN on SRX Security Gateway devices, see [“Group VPNv2 Overview” on page 747](#).

- Options**
- **none**—Display information about all Group VPNv2 SAs for the group member.
 - **brief**—(Optional) Display summary output.
 - **detail**—(Optional) Display detailed output.
 - **display xml**—(Optional) Display xml.
 - **index sa-index**—(Optional) Display detailed information about the specified SA identified by index number. To obtain a list of all SAs that includes their index numbers, use the command with no options.
 - **peer-ipaddress**—(Optional) Display information about the SA with the specified peer.

Required Privilege Level view

Related Documentation

- [Group VPNv2 Overview on page 747](#)

List of Sample Output [show security group-vpn member kek security-associations on page 1345](#)
[show security group-vpn member kek security-associations detail on page 1345](#)
[show security group-vpn member kek security-associations detail | display xml on page 1346](#)

Output Fields [Table 112 on page 1344](#) lists the output fields for the **show security group-vpn member kek security-associations** command. Output fields are listed in the approximate order in which they appear.

Table 112: show security group-vpn member kek security-associations

Field Name	Field Description
Index	Index number of an SA. This number is an internally generated number you can use to display information about a single SA.
Remote Address	IP address of the destination peer with which the local peer communicates.
State	State of the KEK security associations: <ul style="list-style-type: none"> • DOWN—SA is not active. • UP—SA is active.
Initiator cookie	Random number, called a cookie, which is sent to the remote node when the IKE negotiation is triggered.
Responder cookie	Random number generated by the remote node and sent back to the initiator as a verification that the packets were received.
SPI	Security parameter index (SPI) identifier. An SA is uniquely identified by an SPI.
GroupID	Group identifier.
KEK Peer	IP address of the destination peer with which the local peer communicates.
Role	For the member, it is always responder.
State	State of the KEK security associations, which is always up.
Authentication method	RSA is the supported authentication method.
Local	Address of the local peer.
Remote	Address of the remote peer.
Lifetime	Number of seconds remaining until the IKE SA expires.
Algorithms	<p>Internet Key Exchange (IKE) algorithms used to encrypt and secure exchanges between the peers during the IPsec Phase 2 process:</p> <ul style="list-style-type: none"> • Sig-hash—Type of authentication algorithm used. <ul style="list-style-type: none"> • sha-256—Secure Hash Algorithm 256 (sha-256) authentication. • sha-384—Secure Hash Algorithm 394 (sha-384) authentication. • Sig key length (bits)—Size of signature key in bits. • Encryption—Type of encryption algorithm used. <ul style="list-style-type: none"> • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption. • aes-192-cbc—AES192-bit encryption • aes-128-cbc—AES 128-bit encryption. • 3des-cbc—3 Data Encryption Standard (DES) encryption. • des-cbc—DES encryption.

Table 112: show security group-vpn member kek security-associations (continued)

Field Name	Field Description
Traffic statistics	<ul style="list-style-type: none"> • Input bytes—Number of bytes received. • Output bytes—Number of bytes transmitted. • Input packets—Number of packets received. • Output packets—Number of packets transmitted.
Server Info Version	Identify the latest set of information maintained in the server.
Server Heartbeat Interval	Interval in seconds at which the server sends heartbeats to group members.
Member Heartbeat Threshold	The heartbeat threshold configured on the group member for the IPsec VPN. If this number of heartbeats is missed on the member, the member reregisters with the server.
Heartbeat Timeout Left	<p>Number of heartbeats until the heartbeat threshold is reached, at which time the member reregisters with the server.</p> <p>NOTE: When this number reaches 0, reregistration happens within 60 seconds.</p>
Server Activation Delay	Number of seconds before a group member can use a new key when the member reregisters with the server.
Server Multicast Group	Multicast IP address to which the server sends rekey messages.
Server Replay Window	Antireplay time window value in milliseconds. 0 means antireplay is disabled.
Group Key Push sequence number	Sequence number of the KEK SA groupkey-push message. This number is incremented with every groupkey-push message.

Sample Output

show security group-vpn member kek security-associations

```
user@host> show security group-vpn member kek security-associations
Index  Server Address  Life:sec  Initiator cookie  Responder cookie  GroupId
5824843 192.168.2.53    166      46871e26227f08f3 f0a463a4d5c3737b 1
```

Sample Output

show security group-vpn member kek security-associations detail

```
user@host> show security group-vpn member kek security-associations detail
Index 5824843, Group Id: 1
Group VPN Name: group1_2
Local Gateway: 192.168.2.170, GDOI Server: 192.168.2.53
Initiator cookie: 46871e26227f08f3, Responder cookie: f0a463a4d5c3737b
Lifetime: Expires in 155 seconds
Group Key Push Sequence number: 0

Algorithms:
```

```

Sig-hash          : hmac-md5-96
Encryption        : 3des-cbc
Traffic statistics:
Input bytes       : 0
Output bytes      : 0
Input packets     : 0
Output packets    : 0
Stats:
  Push received    : 0
  Delete received  : 0

```

show security group-vpn member kek security-associations detail | display xml

```
user@host> show security group-vpn member kek security-associations detail | display xml
```

```

<rpc-reply xmlns:junos="http://xml.example.net/junos/15.1/junos">
  <gvpn-kek-security-associations-information junos:style="detail">
    <kek-security-associations-block>
      <security-association-index>2987691</security-association-index>
      <group-id>400</group-id>
      <group-vpn-name>gvpn400</group-vpn-name>
      <local-address>192.168.1.100</local-address>
      <server-address>192.168.1.1</server-address>
      <initiator-cookie>510f854307a03675</initiator-cookie>
      <responder-cookie>690e5f121fba6de7</responder-cookie>
      <lifetime-remaining>Expires in 23729 seconds</lifetime-remaining>
      <push-sequence-number>364</push-sequence-number>
      <ike-security-associations>
        <ike-sa-algorithms>
          <ike-sa-authentication-algorithm>hmac-sha1-96</ike-sa-authentication-algorithm>
          <ike-sa-sig-key-length>2048</ike-sa-sig-key-length>
          <ike-sa-encryption-algorithm>aes128-cbc</ike-sa-encryption-algorithm>
        </ike-sa-algorithms>
        <ike-sa-traffic-statistics>
          <ike-sa-input-bytes>3012</ike-sa-input-bytes>
          <ike-sa-output-bytes>252</ike-sa-output-bytes>
          <ike-sa-input-packets>3</ike-sa-input-packets>
          <ike-sa-output-packets>3</ike-sa-output-packets>
        </ike-sa-traffic-statistics>
      </ike-security-associations>
      <gvpn-kek-security-association-statistics>
        <kek-security-association-statistics> Push received
      : 3</kek-security-association-statistics>
        <kek-security-association-statistics> Delete received
      : 0</kek-security-association-statistics>
      </gvpn-kek-security-association-statistics>
    </kek-security-associations-block>
  </gvpn-kek-security-associations-information>
</cli>
  <banner></banner>
</cli>
</rpc-reply>

```

show security group-vpn member policy

Syntax `show security group-vpn member policy <vpn vpn-name> <group-id group-id>`

Release Information Command introduced in Junos OS Release 15.1X49-D30 for vSRX.

Description Show Group VPN policies. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

Options **none**—Display information for all groups.

vpn vpn-name—(Optional) Display policy information for the specified group name.

group-id group-id—(Optional) Display policy information for the specified group identifier.

Required Privilege Level view

Related Documentation

- [Group VPNv2 Overview on page 747](#)

List of Sample Output [show security group-vpn member policy on page 1348](#)

Output Fields [Table 113 on page 1347](#) lists the output fields for the `show security group-vpn member policy` command. Output fields are listed in the approximate order in which they appear.

Table 113: show security group-vpn member policy Output Fields

Field Name	Field Description
Group VPN Name	Group name.
Group Id	Group identifier.
From-zone	From zone configured for the policy.
To-zone	To zone configured for the policy.
Tunnel-id	Tunnel identifier.
Policy type	Secure, fail-open, fail-close, or exclude.
Source	IP address, port, and protocol of the source traffic.
Destination	IP address, port, and protocol of the destination traffic.

Sample Output

show security group-vpn member policy

```
user@host> show security group-vpn member policy

Group VPN Name: group1000, Group Id: 1000
From-zone: trust_1, To-zone: untrust
  Tunnel-id: 63490, Policy type: Exclude
    Source      : IP <192.168.0.0 - 192.168.255.255>, Port <0 - 65535>, Protocol
<17>
    Destination : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <17>

  Tunnel-id: 49153, Policy type: Secure
    Source      : IP 192.168.0.0 - 192.168.255.255>, Port <0 - 65535>, Protocol
<0>
    Destination : IP <192.0.2.0 - 192.0.2.255>, Port <0 - 65535>, Protocol <0>

  Tunnel-id: 49152, Policy type: Secure
    Source      : IP <192.0.2.0 - 192.0.2.255>, Port <0 - 65535>, Protocol <1>
    Destination : IP <192.0.2.0 - 192.0.2.255>, Port <0 - 65535>, Protocol <1>

  Tunnel-id: 63491, Policy type: Fail-open (Inactivated)
    Source      : IP 192.168.0.0 - 192.168.255.255>, Port <0 - 65535>, Protocol
<17>
    Destination : IP <192.168.0.0 - 192.168.255.255>, Port <0 - 65535>, Protocol
<17>

  Tunnel-id: 63489, Policy type: Fail-close
    Source      : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
    Destination : IP <0.0.0.0 - 255.255.255.255>, Port <0 - 65535>, Protocol <0>
```


show security group-vpn server ike security-associations


Syntax	show security group-vpn server ike security-associations [brief detail] [group <i>group-name</i> group-id <i>group-id</i>] [index <i>sa-index</i>]
Release Information	Command introduced in Junos OS Release 10.2.
Description	Display IKE security associations (SAs). Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> • none—Display all IKE SAs for all groups. • brief—(Optional) Display summary output. • detail—(Optional) Display detailed level of output. • group—(Optional) Display IKE SAs for the specified group. • group-id—(Optional) Display IKE SAs for the specified group. <p>.....</p> <div>  <p>NOTE: An IKE SA can be used by a group member to register to multiple groups. When you specify the group or group-id options to list the IKE SAs for a specified group, all existing IKE SAs that could be used to register to the group are displayed.</p> <p>.....</p> </div> <ul style="list-style-type: none"> • index—(Optional) Display information for a particular SA based on the index number of the SA. To obtain the index number for a particular SA, display the list of existing SAs by using the command with no options.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show security group-vpn member ike security-associations on page 1330 • Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn server ike security-associations on page 1351 show security group-vpn server ike security-associations detail on page 1352
Output Fields	Table 114 on page 1350 lists the output fields for the show security group-vpn server ike security-associations command. Output fields are listed in the approximate order in which they appear.

Table 114: show security group-vpn server ike security-associations Output Fields

Field Name	Field Description
Index	Index number of an SA. This number is an internally generated number you can use to display information about a single SA.
Remote Address	IP address of the destination peer with which the local peer communicates.
State	State of the IKE security associations: <ul style="list-style-type: none"> • DOWN—SA has not been negotiated with the peer. • UP—SA has been negotiated with the peer.
Initiator cookie	Random number, called a cookie, which is sent to the remote node when the IKE negotiation is triggered.
Responder cookie	Random number generated by the remote node and sent back to the initiator as a verification that the packets were received. A cookie is aimed at protecting the computing resources from attack without spending excessive CPU resources to determine the cookie's authenticity.
Mode	Negotiation method agreed on by the two IPsec endpoints, or peers, used to exchange information between themselves. Each exchange type determines the number of messages and the payload types that are contained in each message. The modes, or exchange types, are <ul style="list-style-type: none"> • main—The exchange is done with six messages. This mode or exchange type encrypts the payload, protecting the identity of the neighbor. The authentication method used is displayed: preshared keys or certificate. • aggressive—The exchange is done with three messages. This mode or exchange type does not encrypt the payload, leaving the identity of the neighbor unprotected.
IKE Peer	IP address of the destination peer with which the local peer communicates.
Exchange type	Negotiation method agreed on by the two IPsec endpoints, or peers, used to exchange information between themselves. Each exchange type determines the number of messages and the payload types that are contained in each message. The modes, or exchange types, are <ul style="list-style-type: none"> • main—The exchange is done with six messages. This mode or exchange type encrypts the payload, protecting the identity of the neighbor. The authentication method used is displayed: preshared keys or certificate. • aggressive—The exchange is done with three messages. This mode or exchange type does not encrypt the payload, leaving the identity of the neighbor unprotected.
Authentication method	Method the server uses to authenticate the source of IKE messages: <ul style="list-style-type: none"> • pre-shared-keys—Preshared key for encryption and decryption that both participants must have before beginning tunnel negotiations. rsa-signatures —Digital signature, a certificate that confirms the identity of the certificate holder.
Local	Address of the local peer.

Table 114: show security group-vpn server ike security-associations Output Fields (continued)

Field Name	Field Description
Remote	Address of the remote peer.
Lifetime	Number of seconds remaining until the IKE SA expires.
Algorithms	<p>Internet Key Exchange (IKE) algorithms used to encrypt and secure exchanges between the peers during the IPsec Phase 2 process:</p> <ul style="list-style-type: none"> • Authentication—Type of authentication algorithm used. <ul style="list-style-type: none"> • sha-256—Secure Hash Algorithm 256 authentication. • sha-384—Secure Hash Algorithm 384 authentication.. • Encryption—Type of encryption algorithm used. <ul style="list-style-type: none"> • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption. • aes-192-cbc—AES192-bit encryption • aes-128-cbc—AES 128-bit encryption.
Traffic statistics	<ul style="list-style-type: none"> • Input bytes—Number of bytes received. • Output bytes—Number of bytes transmitted. • Input packets—Number of packets received. • Output packets—Number of packets transmitted.
IPSec security associations	<ul style="list-style-type: none"> • number created: The number of SAs created. • number deleted: The number of SAs deleted.
Phase 2 negotiations in progress	<p>Number of Phase 2 IKE negotiations in progress and status information:</p> <ul style="list-style-type: none"> • Negotiation type—Type of Phase 2 negotiation. Junos OS currently supports quick mode. • Message ID—Unique identifier for a Phase 2 negotiation. • Local identity—Identity of the local Phase 2 negotiation. The format is id-type-name (proto-name:port-number,[0..id-data-len] = iddata-presentation) • Remote identity—Identity of the remote Phase 2 negotiation. The format is id-type-name (proto-name:port-number,[0..id-data-len] = iddata-presentation) • Flags—Notification to the key management process of the status of the IKE negotiation: <ul style="list-style-type: none"> • caller notification sent—Caller program notified about the completion of the IKE negotiation. • waiting for done—Negotiation is done. The library is waiting for the remote end retransmission timers to expire. • waiting for remove—Negotiation has failed. The library is waiting for the remote end retransmission timers to expire before removing this negotiation. • waiting for policy manager—Negotiation is waiting for a response from the policy manager.

Sample Output

```
show security group-vpn server ike security-associations
```

```
user@host> show security group-vpn server ike security-associations
```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
738879	UP	0fa7c5fdbcb74669f	8c21f5d1b533010c	Aggressive	192.168.1.120

Sample Output

show security group-vpn server ike security-associations detail

```

user@host> show security group-vpn server ike security-associations detail
IKE peer 192.168.1.120, Index 738879, Gateway Name: gvpn
  Role: Responder, State: UP
  Initiator cookie: 0fa7c5fdbcb74669f, Responder cookie: 8c21f5d1b533010c
  Exchange type: Aggressive, Authentication method: Pre-shared-keys
  Local: 192.168.1.50:848, Remote: 192.168.1.120:848
  Lifetime: Expires in 3541 seconds
  Peer ike-id: test
  Xauth user-name: not available
  Xauth assigned IP: 0.0.0.0
  Algorithms:
    Authentication      : hmac-sha-256-128
    Encryption          : aes-256-cbc
    Pseudo random function: hmac-sha-256
    Diffie-Hellman group : DH-group-14
  Traffic statistics:
    Input bytes  :          600
    Output bytes :          932
    Input packets:           4
    Output packets:          3
  Flags: IKE SA is created
  IPSec security associations: 0 created, 0 deleted
  Phase 2 negotiations in progress: 0

Flags: IKE SA is created

```

show security group-vpn server ipsec security-associations

Syntax	<code>show security group-vpn server ipsec security-associations [brief detail] [group <i>group-name</i> group-id <i>group-id</i>]</code>
Release Information	Command introduced in Junos OS Release 10.2.
Description	Display IPsec security associations (SAs). Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> • none—Display all IPsec SAs for all groups. • brief—(Optional) Display summary output. • detail—(Optional) Display detailed level of output. • group—(Optional) Display IPsec SAs for the specified group. • group-id—(Optional) Display IPsec SAs for the specified group.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show security group-vpn member ipsec security-associations on page 1337 • Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn server ipsec security-associations on page 1354 show security group-vpn server ipsec security-associations detail on page 1354
Output Fields	Table 115 on page 1353 lists the output fields for the show security group-vpn server ipsec security-associations command. Output fields are listed in the approximate order in which they appear.

Table 115: show security group-vpn server ipsec security-associations

Field Name	Field Description
Group	Group name.
Group ID	Group identifier.
Total IPsec SAs	The total number of IPsec SAs for each group is shown.
IPsec SA	Name of the SA.
Protocol	Protocol supported. Transport mode supports Encapsulation Security Protocol (ESP).

Table 115: show security group-vpn server ipsec security-associations (continued)

Field Name	Field Description
Algorithm	<p>Cryptography used to secure exchanges between peers during the IKE Phase 2 negotiations includes</p> <ul style="list-style-type: none"> An authentication algorithm used to authenticate exchanges between the peers. Options are sha-256 and sha-384. An encryption algorithm used to encrypt data traffic. Options are aes-128-cbc, aes-192-cbc, or aes-256-cbc.
SPI	Security parameter index (SPI) identifier. An SA is uniquely identified by an SPI.
Lifetime	The lifetime of the SA, after which it expires, expressed in seconds.
Policy Name	Group policy associated with the IPsec SA. The source address, destination address, source port, destination port, and protocol defined for the policy are displayed.

Sample Output

show security group-vpn server ipsec security-associations

```

user@host> show security group-vpn server ipsec security-associations

Group: group200, Group Id: 200
Total IPsec SAs: 1

```

IPsec SA	Algorithm	SPI	Lifetime
sa1	ESP:aes-256/sha-256	55837dfe	17
sa1	ESP:aes-256/sha1-256	760088d	137

Sample Output

show security group-vpn server ipsec security-associations detail

```

user@host> show security group-vpn server ipsec security-associations detail

Group: group1, Group Id: 1
Total IPsec SAs: 10
IPsec SA: sa1
  Protocol: ESP, Authentication: sha-256, Encryption: aes-256
  Anti-replay: D3P enabled, window size 10 milliseconds
  SPI: e68c9525
  Lifetime: Expires in 66 seconds, Activated
  Policy Name: pol1
    Source: 192.168.1.0/24
    Destination: 192.168.1.0/24
    Source Port: 0
    Destination Port: 0
    Protocol: 0
IPsec SA: sa1
  Protocol: ESP, Authentication: sha-256, Encryption: aes-256
  Anti-replay: D3P enabled, window size 10 milliseconds
  SPI: 7ee14902
  Lifetime: Expires in 276 seconds, Activated in 36 seconds
  Rekey in 186 seconds
  Policy Name: pol1

```

```
Source: 192.168.1.0/24  
Destination: 192.168.1.0/24  
Source Port: 0  
Destination Port: 0  
Protocol: 0
```

show security group-vpn server kek security-associations

Syntax	<code>show security group-vpn server kek security-associations [brief detail] [group <i>group-name</i> group-id <i>group-id</i> index <i>sa-index</i>]</code>
Release Information	Command introduced in Junos OS Release 10.2.
Description	Display configured server-member communications. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<ul style="list-style-type: none"> none—Display server-member communications configured for all groups. brief—(Optional) Display summary output. detail—(Optional) Display detailed output. group—(Optional) Display server-member communications configured for the specified group. group-id—(Optional) Display server-member communications configured for the specified group. index—(Optional) Display information for a particular SA based on the index number of the SA. To obtain the index number for a particular SA, display the list of existing SAs by using the command with no options.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> show security group-vpn member kek security-associations on page 1343 Group VPNv2 Overview on page 747
List of Sample Output	show security group-vpn server kek security-associations on page 1358 show security group-vpn server kek security-associations detail on page 1358
Output Fields	Table 116 on page 1356 lists the output fields for the show security group-vpn server kek security-associations command. Output fields are listed in the approximate order in which they appear.

Table 116: show security group-vpn server kek security-associations Output Fields

Field Name	Field Description
Index	Index number of an SA. This number is an internally generated number you can use to display information about a single SA.

Table 116: show security group-vpn server kek security-associations Output Fields (continued)

Field Name	Field Description
Remote Address	Identifier of the remote/peer. Because there could be multiple members, the remote address always contains the IP address 0.0.0.0.
State	State of the KEK security associations: <ul style="list-style-type: none"> • DOWN—SA is not active. • UP—SA is active.
Initiator cookie	Random number generated by the server. This is used when the server needs to push data to a member, or a member needs to reply to the server.
Responder cookie	Random number generated by the server. This is used when the server needs to push data to a member, or a member needs to reply to the server.
Groupid	Group identifier.
KEK Peer	IP address of the destination peer with which the local peer communicates. For KEK SAs, it always contains 0.0.0.0 which means any IP address.
Role	For the server, it is always initiator.
Authentication method	RSA is the supported authentication method.
Local	Address of the local peer.
Remote	Address of the remote peer.
Lifetime	Number of seconds remaining until the IKE SA expires.
Algorithms	Internet Key Exchange (IKE) algorithms used to encrypt and secure exchanges between the peers during the Phase 2 process: <ul style="list-style-type: none"> • Sig-hash—Type of authentication algorithm used. <ul style="list-style-type: none"> • sha-256—Secure Hash Algorithm 256 authentication. • sha-384—Secure Hash Algorithm 384 authentication. • Encryption—Type of encryption algorithm used. <ul style="list-style-type: none"> • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption. • aes-192-cbc—AES 192-bit encryption • aes-128-cbc—AES 128-bit encryption.
Traffic statistics	<ul style="list-style-type: none"> • Input bytes—Number of bytes received. • Output bytes—Number of bytes transmitted. • Input packets—Number of packets received. • Output packets—Number of packets transmitted.
Server Info Version	Identify the latest set of information maintained in the server.
The following fields are the configured server-member-communication options:	

Table 116: show security group-vpn server kek security-associations Output Fields (continued)

Field Name	Field Description
Server Replay Window	Antireplay time in milliseconds. This is 0 if antireplay is disabled.
Retransmission Period	Number of seconds between a rekey transmission and the first retransmission when there is no reply from the member.
Number of Retransmissions	For unicast communications, the number of times the server retransmits rekey messages to a member when there is no reply.
Lifetime Seconds	Configured lifetime, in seconds, for the KEK.
Group Key Push sequence number	Sequence number of the KEK SA groupkey-push message. This number is incremented with every groupkey-push message.

Sample Output

show security group-vpn server kek security-associations

```
user@host> show security group-vpn server kek security-associations
Index   Life:sec  Initiator cookie  Responder cookie  GroupId
739031  18995    7e17278bf0a65975 0616de443d1beb77 200
```

Sample Output

show security group-vpn server kek security-associations detail

```
user@host> show security group-vpn server kek security-associations detail
Index 738879, Group Name: GROUP_ID-0001, Group Id: 1
Initiator cookie: 114e4a214891e42f, Responder cookie: 4b2848d14372e5bd
Authentication method: RSA
Lifetime: Expires in 4186 seconds, Activated
Rekey in 3614 seconds
  Algorithms:
    Sig-hash      : sha256
    Encryption    : aes256-cbc
  Traffic statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets : 0
    Output packets: 0
  Server Member Communication: Unicast
  Retransmission Period: 10, Number of Retransmissions: 2
  Group Key Push sequence number: 0

PUSH negotiations in progress: 0
```

show security group-vpn server registered-members

Syntax `show security group-vpn server registered-members <group-group-name> <group-id group-id> <detail>`

Release Information Command introduced in Junos OS Release 10.2.

Description Display currently registered group members. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.

- Options**
- **none**—Display all group members for all groups.
 - **brief**—(Optional) Display summary output.
 - **detail**—(Optional) Display detailed output.
 - **group**—(Optional) Display group members for the specified group.
 - **group-id**—(Optional) Display group members for the specified group.

Required Privilege Level view

- Related Documentation**
- [clear security group-vpn server on page 1281](#)
 - [Group VPNv2 Overview on page 747](#)

List of Sample Output [show security group-vpn server registered-members on page 1360](#)
[show security group-vpn server registered-members detail on page 1360](#)

Output Fields [Table 117 on page 1359](#) lists the output fields for the **show security group-vpn server registered-members** command. Output fields are listed in the approximate order in which they appear.

Table 117: show security group—vpn server registered-members Output Fields

Field Name	Field Description
Group	Group name.
Group Id	Group identifier.
Member Gateway	IP address of the gateway for the group member.
Member IP	IP address of the group member.
Last Update	The last time that members registered or sent acknowledgements to the server.

Table 117: show security group—vpn server registered-members Output Fields (continued)

Field Name	Field Description
Vsys	The root system.

Sample Output

show security group-vpn server registered-members

```

user@host> show security group-vpn server registered-members

Group: group200, Group Id: 200
  Total number of registered members: 1
  Member Gateway      Member IP      Last Update
Vsys
  gvpn_simpleman      192.168.1.100  Fri Dec 20 2013 07:27:33
root

```

Sample Output

show security group-vpn server registered-members detail

```

user@host> show security group-vpn server registered-members detail

Group: group1, Group Id: 1
  Total number of registered members: 1

Member gateway: gateway_group1_1, Member IP: 192.168.1.2, Vsys: root
Last Update: Fri May 16 2014 03:37:17
Stats:
  Pull Succeeded      : 321
  Pull Failed         : 0
  Push Sent           : 0
  Push Acknowledged   : 0
  Push Unacknowledged : 0

```

show security group-vpn server server-cluster

Syntax	<code>show security group-vpn server server-cluster <brief> <detail> <group group-name> <group-id group-id> <peer-gateway gateway-name></code>
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Show information about servers in the Group VPNv2 server cluster. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>none—Display Group VPNv2 server cluster information for all groups.</p> <p>brief—(Optional) Display summary output.</p> <p>detail—(Optional) Display detailed output, including information about exchanges with peer servers in the cluster.</p> <p>group group-name—(Optional) Display Group VPNv2 server cluster information for the specified group name.</p> <p>group-id group-id—(Optional) Display Group VPNv2 server cluster information for the specified group identifier.</p> <p>peer-gateway gateway-name—(Optional) Display Group VPNv2 server cluster information for the specified peer.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747 • Understanding Group VPNv2 Server Clusters on page 795
List of Sample Output	<p>show security group-vpn server server-cluster on page 1362</p> <p>show security group-vpn server server-cluster detail on page 1362</p>
Output Fields	Table 118 on page 1361 lists the output fields for the show security group-vpn server server-cluster command. Output fields are listed in the approximate order in which they appear.

Table 118: show security group-vpn server server-cluster Output Fields

Field Name	Field Description
Group	Group name.
Group Id	Group identifier.

Table 118: show security group-vpn server server-cluster Output Fields (continued)

Field Name	Field Description
Role	Role of this server in the Group VPNv2 server cluster.
Version Number	32-bit version number included in cluster-update exchanges and DPD probes to support anti-replay. The first cluster-update message sent from the root-server has version number 1. Subsequent cluster-update messages increment the version number by one. (Retransmit messages do not increment the version number.) Upon receipt of a cluster-update message, the sub-server validates the received version number. The received version number must be greater than the version number in the last received message, otherwise the message is discarded. The sub-server responds to a cluster-update message with an ACK message that contains the same version number as the received message. Upon receipt of the ACK message, the root-server checks that the version number is the same as in the message it sent. If the version number is valid, the exchange is considered successful. If the version number is not valid, the original message is retransmitted or the exchange is considered failed.
Peer Gateway	Name of the peer server in the Group VPNv2 server cluster.
Peer IP	IP address of the remote peer server in the Group VPNv2 server cluster.
Role	Role of the peer server in the Group VPNv2 server cluster.
Status	Status of the peer server in the Group VPNv2 server cluster.

Sample Output

show security group-vpn server server-cluster

```

user@host> show security group-vpn server server-cluster
Group: group200, Group Id: 200
Role: Root-server, Version Number: 1,
  Peer Gateway      Peer IP      Role
  Status
  sub_server1      192.168.1.112  Sub-server
Active
  sub_server2      192.168.1.113  Sub-server
Active

```

show security group-vpn server server-cluster detail

```

user@host> show security group-vpn server server-cluster detail
GGroup: group200, Group Id: 200
Role: Root-server, Version Number: 1,

Peer gateway: sub_server1,
Peer IP: 192.168.1.112, Local IP: 192.168.1.111, VR: vr1,
Role: Sub-server, Status: Active,
CLUSTER-INIT send:      0
CLUSTER-INIT rcv:      1
CLUSTER-INIT success:   1

```

```

CLUSTER-INIT fail:          0
CLUSTER-INIT dup:           0
CLUSTER-INIT abort:         0
CLUSTER-INIT timeout:       0
CLUSTER-UPDATE send:        1
CLUSTER-UPDATE recv:        0
CLUSTER-UPDATE success:     1
CLUSTER-UPDATE fail:        0
CLUSTER-UPDATE abort:       0
CLUSTER-UPDATE timeout:     0
CLUSTER-UPDATE pending:     0
CLUSTER-UPDATE max retry reached: 0
DPD send:                   5
DPD send fail:              0
DPD ACK recv:               5
DPD ACK invalid seqno:      0
IPsec SA policy mismatch:   0
IPsec SA proposal mismatch: 0
KEK SA proposal mismatch:   0

Peer gateway: sub_server2,
  Peer IP: 192.168.1.113, Local IP: 192.168.1.111, VR: default,
  Role: Sub-server, Status: Active,
  CLUSTER-INIT send:        0
  CLUSTER-INIT recv:        1
  CLUSTER-INIT success:     1
  CLUSTER-INIT fail:        0
  CLUSTER-INIT dup:         0
  CLUSTER-INIT abort:       0
  CLUSTER-INIT timeout:     0
  CLUSTER-UPDATE send:      1
  CLUSTER-UPDATE recv:      0
  CLUSTER-UPDATE success:   1
  CLUSTER-UPDATE fail:      0
  CLUSTER-UPDATE abort:     0
  CLUSTER-UPDATE timeout:   0
  CLUSTER-UPDATE pending:   0
  CLUSTER-UPDATE max retry reached: 0
  DPD send:                 6
  DPD send fail:            0
  DPD ACK recv:             6
  DPD ACK invalid seqno:    0
  IPsec SA policy mismatch: 0
  IPsec SA proposal mismatch: 0
  KEK SA proposal mismatch: 0

```

show security group-vpn server statistics

Syntax	show security group-vpn server statistics <group <i>group-name</i> > <group-id <i>group-id</i> >
Release Information	Command introduced in Junos OS Release 15.1X49-D30 for vSRX.
Description	Show Group VPNv2 server statistics. Group VPNv2 is supported on SRX300, SRX320, SRX340, SRX345, SRX550HM, SRX1500, SRX4100, and SRX4200 devices and vSRX instances.
Options	<p>none—Display Group VPNv2 server statistics for all groups.</p> <p>group <i>group-name</i>—(Optional) Display Group VPNv2 server statistics for the specified group name.</p> <p>group-id <i>group-id</i>—(Optional) Display Group VPNv2 server statistics for the specified group identifier.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • Group VPNv2 Overview on page 747 • Understanding Group VPNv2 Server Clusters on page 795
List of Sample Output	show security group-vpn server statistics on page 1364
Output Fields	Table 119 on page 1364 lists the output fields for the show security group-vpn server statistics command. Output fields are listed in the approximate order in which they appear.

Table 119: show security group-vpn server statistics Output Fields

Field Name	Field Description
Group	Group name.
Group Id	Group identifier.
Stats	Server events and number of occurrences.

Sample Output

show security group-vpn server statistics

```
user@host> show security group-vpn server statistics
Group: group1, Group Id: 1
Stats:
```


Pull Succeeded	: 321
Pull Failed	: 0
Pull Exceed Member Threshold	: 0
Push Sent	: 0
Push Acknowledged	: 0
Push Unacknowledged	: 0

show security ike active-peer

Syntax

```
show security ike active-peer
<peer-address>
<aaa-username username>
<brief | detail>
<debug>
<fpc slot-number pic slot-number>
<ike-id IKE-ID>
<kmd-instance (all | kmd-instance-name)>
<pic slot-number fpc slot-number>
<port port-number peer-address>
```

Release Information Command introduced in Junos OS Release 10.4. Support to display dead peer detection (DPD) statistics added in Junos OS Release 12.3X48-D10.

Description Display the list of connected active users with details about the peer addresses and ports they are using.

Options **none**—Display standard information about connected active users.

peer-address—(Optional) Display details about the user with the specified peer address.

aaa-username username—(Optional) Display information about the user with the specified authentication, authorization, and accounting (AAA) username.

brief—(Optional) Display standard information about all users. (Default)

detail—(Optional) Display detailed information about all users.

debug—(Optional) Display debug information about all users.

fpc slot-number pic slot-number—(Optional) Display information about users on the specified Flexible PIC Concentrator (FPC) slot and PIC slot.

ike-id IKE-ID—(Optional) Display information about the user with the specified IKE ID.

kmd-instance (all | kmd-instance-name)—(Optional) Display information about users in the key management process (KMD) identified by FPC *slot-number* and PIC *slot-number*.

- **all**—All KMD instances running on the Services Processing Unit (SPU).
- **kmd-instance-name**—Name of the KMD instance running on the SPU.

pic slot-number fpc slot-number—(Optional) Display information about users on the specified PIC slot and FPC slot.

port port-number peer-address—(Optional) Display information about users on the specified port for the specified peer address.

Required Privilege Level view

Related Documentation

- [show security ike security-associations on page 1371](#)
- [show security ipsec security-associations on page 1393](#)

List of Sample Output [show security ike active-peer on page 1367](#)
[show security ike active-peer detail on page 1368](#)

Output Fields [Table 120 on page 1367](#) lists the output fields for the **show security ike active-peer** command. Output fields are listed in the approximate order in which they appear.

Table 120: show security ike active-peer Output Fields

Field Name	Field Description	Level of Output
Remote Address	IP address of the peer.	brief
Port	Port used by the peer.	All levels
Peer IKE-ID	IKE ID used by the peer.	All levels
AAA username	Username of the peer.	All levels
Assigned IP	IP address assigned to the peer.	brief
Assigned network attributes	Network attributes assigned to the peer can include the IP address and netmask, and DNS and WINS server addresses.	detail
Previous Peer address	IP address previously assigned to the peer.	detail
Active IKE SA indexes	Index number of the SA associated with the peer. This number is an internally generated number.	detail
IKE SA negotiated	Number of IKE SAs negotiated.	detail
IPSec tunnels active	Number of IPsec tunnels active.	detail
IPSec Tunnel IDs	IDs of the active IPsec tunnels.	detail
DPD Config Info	DPD configuration values.	detail
DPD Statistics	Information about DPD operations.	detail

Sample Output

show security ike active-peer

```
user@host> show security ike active-peer
```

Remote Address	Port	Peer IKE-ID	AAA username	Assigned IP
192.168.6.136	8034	user1tac@650a	user1	192.168.80.225

show security ike active-peer detail

```
user@host> show security ike active-peer detail
```

```
Peer address: 192.168.0.6, Port: 500,
Peer IKE-ID: C=US, ST=California, L=Sunnyvale, O=example, OU=engineering,
CN=SPOKE9061
```

```
AAA username: not available
```

```
Assigned network attributes:
```

```
IP Address: 0.0.0.0 , netmask : 0.0.0.0
```

```
DNS Address : 0.0.0.0 , DNS2 Address : 0.0.0.0
```

```
WINS Address : 0.0.0.0 , WINS2 Address : 0.0.0.0
```

```
Previous Peer address : 0.0.0.0, Port : 0
```

```
Active IKE SA indexes : 75203629
```

```
IKE SA negotiated : 1
```

```
IPSec tunnels active : 1, IPSec Tunnel IDs : 68157442
```

```
DPD Config Info : Mode: always-send Interval: 60 Threshold: 5
plsa_index:75203629
```

```
DPD Statistics : DPD-flags: REMOTE_ACCESS
```

```
DPD Statistics : DPD TTL : 0 DPD seq-no
: 0
```

```
DPD Statistics : DPD Req Sent : 0 DPD Resp Rcvd
: 0
```

show security ike debug-status

Syntax	<code>show security ike debug-status</code>
Release Information	Command introduced in Junos OS Release 11.4R3.
Description	Display debug status for currently enabled Internet Key Exchange (IKE) tracing.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • request security ike debug-disable on page 1292 • request security ike debug-enable on page 1293
List of Sample Output	show security ike debug-status on page 1369
Output Fields	Table 121 on page 1369 lists the output fields for the <code>show security ike debug-status</code> command. Output fields are listed in the approximate order in which they appear.

Table 121: show security ike debug-status Output Fields

Field Name	Field Description
Enabled/Disabled	Status of the IKE per-tunnel tracing.
flag	Trace operation; the default is all.
level	Level of logging; the default is 7.
Local IP	Local IP address of the VPN tunnel endpoint.
Remote IP	Remote IP address of the VPN tunnel endpoint.

Sample Output

show security ike debug-status

```
user@host> show security ike debug-status
Enabled
flag: all
level: 7
Local IP: 192.0.2.1, Remote IP: 203.0.113.2
```

show security ike pre-shared-key

Syntax `show security ike pre-shared key`
 `<master-key master-key >`
 `<user-id user-id >`

Release Information Command introduced in Junos OS Release 8.5.

Description Display the Internet Key Exchange (IKE) preshared key used by the Virtual Private network (VPN) gateway to authenticate the remote access user.

- Options**
- `master-key master-key` —(Optional) Master preshared key.
 - `user-id user-id` —(Optional) IKE user ID value.

Required Privilege Level view

Related Documentation

- [pre-shared-key \(Security IKE Policy\) on page 1198](#)

List of Sample Output [show security ike pre-shared-key on page 1370](#)

Sample Output

show security ike pre-shared-key

```
user@host> show security ike pre-shared-key user-id a@example.net master-key example
Preshared Key:3b33ec3631a561ec5a710f5d02f208033b108bb4
```

show security ike security-associations

Syntax `show security ike security-associations`
`<peer-address>`
`<brief | detail>`
`<family (inet | inet6)>`
`<fpc slot-number>`
`<index SA-index-number>`
`<kmd-instance (all | kmd-instance-name)>`
`<pic slot-number>`
`<sa-type shortcut >`

Release Information Command introduced in Junos OS Release 8.5. Support for the **fpc**, **pic**, and **kmd-instance** options added in Junos OS Release 9.3. Support for the **family** option added in Junos OS Release 11.1. Support for Auto Discovery VPN added in Junos OS Release 12.3X48-D10. Support for IKEv2 reauthentication added in Junos OS Release 15.1X49-D60. Support for IKEv2 fragmentation added in Junos OS Release 15.1X49-D80.

Description Display information about Internet Key Exchange security associations (IKE SAs).

- Options**
- **none**—Display standard information about existing IKE SAs, including index numbers.
 - **peer-address**—(Optional) Display details about a particular SA based on the IPv4 or IPv6 address of the destination peer. This option and **index** provide the same level of output.
 - **brief**—(Optional) Display standard information about all existing IKE SAs. (Default)
 - **detail**—(Optional) Display detailed information about all existing IKE SAs.
 - **family**—(Optional) Display IKE SAs by family. This option is used to filter the output.
 - **inet**—IPv4 address family.
 - **inet6**—IPv6 address family.
 - **fpc slot-number**—(Optional) Display information about existing IKE SAs in this Flexible PIC Concentrator (FPC) slot. This option is used to filter the output.



NOTE: In a chassis cluster, when you execute the CLI command `show security ike security-associations pic <slot-number> fpc <slot-number>` in operational mode, only the primary node information about the existing IPsec SAs in the specified Flexible PIC Concentrator (FPC) slot and PIC slot is displayed.

- **index SA-index-number**—(Optional) Display information for a particular SA based on the index number of the SA. For a particular SA, display the list of existing SAs by using the command with no options. This option and **peer-address** provide the same level of output.

- **kmd-instance** —(Optional) Display information about existing IKE SAs in the key management process (in this case, it is KMD) identified by FPC *slot-number* and PIC *slot-number*. This option is used to filter the output.
 - **all**—All KMD instances running on the Services Processing Unit (SPU).
 - **kmd-instance-name**—Name of the KMD instance running on the SPU.
- **pic slot-number** —(Optional) Display information about existing IKE SAs in this PIC slot. This option is used to filter the output.
- **sa-type**—(Optional for ADVPN) Type of SA. **shortcut** is the only option for this release.

Required Privilege Level view

Related Documentation [• Example: Configuring a Route-Based VPN Tunnel in a User Logical Systems](#)

List of Sample Output [show security ike security-associations \(IPv4\) on page 1375](#)
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[show security ike security-associations detail \(SRX300, SRX320, SRX340, SRX345, and SRX550HM Devices\) on page 1375](#)
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[show security ike security-associations family inet6 on page 1376](#)
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[show security ike security-associations fpc 6 pic 1 kmd-instance all \(SRX Series Devices\) on page 1378](#)
[show security ike security-associations detail \(ADVPN Suggester, Static Tunnel\) on page 1379](#)
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[show security ike security-associations detail \(IKEv2 Reauthentication\) on page 1380](#)
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Output Fields [Table 122 on page 1372](#) lists the output fields for the **show security ike security-associations** command. Output fields are listed in the approximate order in which they appear.

Table 122: show security ike security-associations Output Fields

Field Name	Field Description
IKE Peer or Remote Address	IP address of the destination peer with which the local peer communicates.

Table 122: show security ike security-associations Output Fields (continued)

Field Name	Field Description
Index	Index number of an SA. This number is an internally generated number you can use to display information about a single SA.
Gateway Name	Name of the IKE gateway.
Location	<ul style="list-style-type: none"> • FPC—Flexible PIC Concentrator (FPC) slot number. • PIC—PIC slot number. • KMD-Instance—The name of the KMD instance running on the SPU, identified by FPC <i>slot-number</i> and PIC <i>slot-number</i>. Currently, 4 KMD instances are running on each SPU, and any particular IKE negotiation is carried out by a single KMD instance.
Role	Part played in the IKE session. The device triggering the IKE negotiation is the initiator, and the device accepting the first IKE exchange packets is the responder.
State	State of the IKE SAs: <ul style="list-style-type: none"> • DOWN—SA has not been negotiated with the peer. • UP—SA has been negotiated with the peer.
Initiator cookie	Random number, called a cookie, which is sent to the remote node when the IKE negotiation is triggered.
Responder cookie	Random number generated by the remote node and sent back to the initiator as a verification that the packets were received. A cookie is aimed at protecting the computing resources from attack without spending excessive CPU resources to determine the cookie's authenticity.
Exchange type	Negotiation method agreed on by the two IPsec endpoints, or peers, used to exchange information between one another. Each exchange type or mode determines the number of messages and the payload types that are contained in each message. The modes are: <ul style="list-style-type: none"> • main—The exchange is done with six messages. This mode encrypts the payload, protecting the identity of the neighbor. • aggressive—The exchange is done with three messages. This mode does not encrypt the payload, leaving the identity of the neighbor unprotected. <p>NOTE: IKEv2 protocol does not use the mode configuration for negotiation. Therefore, the mode displays the version number of the security association.</p>
Authentication method	Method used to authenticate the source of IKE messages, which can be either Pre-shared-keys or digital certificates, such as DSA-signatures , ECDSA-signatures-256 , ECDSA-signatures-384 , or RSA-signatures .
Local	Address of the local peer.
Remote	Address of the remote peer.
Lifetime	Number of seconds remaining until the IKE SA expires.

Table 122: show security ike security-associations Output Fields (continued)

Field Name	Field Description
Reauth Lifetime	When enabled, number of seconds remaining until reauthentication triggers a new IKEv2 SA negotiation.
IKE Fragmentation	<p>Enabled means that both the IKEv2 initiator and responder support message fragmentation and have negotiated the support during the IKE_SA_INIT message exchange.</p> <p>Size shows the maximum size of an IKEv2 message before it is fragmented.</p>
Algorithms	<p>IKE algorithms used to encrypt and secure exchanges between the peers during the IPsec Phase 2 process:</p> <ul style="list-style-type: none"> • Authentication—Type of authentication algorithm used: <ul style="list-style-type: none"> • sha1—Secure Hash Algorithm 1 authentication. • md5—MD5 authentication. • Encryption—Type of encryption algorithm used: <ul style="list-style-type: none"> • aes-256-cbc—Advanced Encryption Standard (AES) 256-bit encryption. • aes-192-cbc—AES 192-bit encryption. • aes-128-cbc—AES 128-bit encryption. • 3des-cbc—3 Data Encryption Standard (DES) encryption. • des-cbc—DES encryption.
Diffie-Hellman group	Specifies the IKE Diffie-Hellman group.
Traffic statistics	<ul style="list-style-type: none"> • Input bytes—Number of bytes received. • Output bytes—Number of bytes transmitted. • Input packets—Number of packets received. • Output packets—Number of packets transmitted. • Input fragmented packets—Number of IKEv2 fragmented packets received. • Output fragmented packets—Number of IKEv2 fragmented packets transmitted.
Flags	<p>Notification to the key management process of the status of the IKE negotiation:</p> <ul style="list-style-type: none"> • caller notification sent—Caller program notified about the completion of the IKE negotiation. • waiting for done—Negotiation is done. The library is waiting for the remote end retransmission timers to expire. • waiting for remove—Negotiation has failed. The library is waiting for the remote end retransmission timers to expire before removing this negotiation. • waiting for policy manager—Negotiation is waiting for a response from the policy manager.
IPsec security associations	<ul style="list-style-type: none"> • number created: The number of SAs created. • number deleted: The number of SAs deleted.

Table 122: show security ike security-associations Output Fields (continued)

Field Name	Field Description
Phase 2 negotiations in progress	<p>Number of Phase 2 IKE negotiations in progress and status information:</p> <ul style="list-style-type: none"> • Negotiation type—Type of Phase 2 negotiation. Junos OS currently supports quick mode. • Message ID—Unique identifier for a Phase 2 negotiation. • Local identity—Identity of the local Phase 2 negotiation. The format is <i>id-type-name (proto-name:port-number,[0..id-data-len] = iddata-presentation)</i>. • Remote identity—Identity of the remote Phase 2 negotiation. The format is <i>id-type-name (proto-name:port-number,[0..id-data-len] = iddata-presentation)</i>. • Flags—Notification to the key management process of the status of the IKE negotiation: <ul style="list-style-type: none"> • caller notification sent—Caller program notified about the completion of the IKE negotiation. • waiting for done—Negotiation is done. The library is waiting for the remote end retransmission timers to expire. • waiting for remove—Negotiation has failed. The library is waiting for the remote end retransmission timers to expire before removing this negotiation. • waiting for policy manager—Negotiation is waiting for a response from the policy manager.

Sample Output

show security ike security-associations (IPv4)

```
user@host> show security ike security-associations
Index Remote Address State Initiator cookie      Responder cookie Mode
8 192.168.1.2 UP 3a895f8a9f620198 9040753e66d700bb Main
Index Remote Address State fInitiator cookie Responder cookie Mode
9 192.168.1.3 UP 5ba96hfa9f65067 70890755b65b80b Main
```

show security ike security-associations (IPv6)

```
user@host> show security ike security-associations
Index State Initiator cookie Responder cookie Mode Remote Address
5 UP e48efd6a444853cf 0d09c59aafb720be Aggressive 2001:db8::1112
```

show security ike security-associations detail (SRX300, SRX320, SRX340, SRX345, and SRX550HM Devices)

```
user@host> show security ike security-associations detail
IKE peer 192.168.134.245, Index 2577565, Gateway Name: tropic
Role: Initiator, State: UP
Initiator cookie: b869b3424513340a, Responder cookie: 4cb3488cb19397c3
Exchange type: Main, Authentication method: Pre-shared-keys Trusted CA group:
xyz_ca_grp
Local: 192.168.134.241:500, Remote: 192.168.134.245:500
Lifetime: Expires in 169 seconds
Peer ike-id: 192.168.134.245
AAA assigned IP: 0.0.0.0
Algorithms:
```

```

Authentication      : hmac-sha1-96
Encryption          : aes128-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes  :          1012
Output bytes :          1196
Input packets:           4
Output packets:          5
Flags: IKE SA is created
IPSec security associations: 1 created, 0 deleted
Phase 2 negotiations in progress: 0

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 192.168.134.241:500, Remote: 192.168.134.245:500
Local identity: 192.168.134.241
Remote identity: 192.168.134.245
Flags: IKE SA is created

```

show security ike security-associations detail (SRX5400, SRX5600, and SRX5800 Devices)

```
user@host> show security ike security-associations detail
```

```

IKE peer 192.168.2, Index 914039858, Gateway Name: tropic
Location: FPC 3, PIC 1, KMD-Instance 3
Role: Initiator, State: UP
Initiator cookie: 219a697652bdde37, Responder cookie: b49c30b229d36bcd
Exchange type: Aggressive, Authentication method: Pre-shared-keys Trusted CA
group: xyz_ca_grp
Local: 192.168.1.1:500, Remote: 192.168.1.2:500
Lifetime: Expires in 26297 seconds
Peer ike-id: 192.168.1.2
AAA user-name: not available
AAA assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : 3des-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes  :          0
Output bytes :          0
Input packets:           0
Output packets:          0
IPSec security associations: 0 created, 0 deleted
Phase 2 negotiations in progress: 1

```

show security ike security-associations family inet6

```
user@host> show security ike security-associations family inet6
```

```

IKE peer 2001:db8:1212::1112, Index 5, Gateway Name: tropic
Role: Initiator, State: UP
Initiator cookie: e48efd6a444853cf, Responder cookie: 0d09c59aafb720be
Exchange type: Aggressive, Authentication method: Pre-shared-keys
Local: 2001:db8:1212::1111:500, Remote: 2001:db8:1212::1112:500
Lifetime: Expires in 19518 seconds
Peer ike-id: not valid
AAA assigned IP: 0.0.0.0

```

```

Algorithms:
Authentication      : sha1
Encryption          : 3des-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes   :      1568
Output bytes  :      2748
Input packets :         6
Output packets:        23
Flags: Caller notification sent
IPSec security associations: 5 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 2900338624
Local: 2001:db8:1212::1111:500, Remote: 2001:db8:1212::1112:500
Local identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Flags: Caller notification sent, Waiting for done

```

show security ike security-associations index 222075191 detail

```

user@host> show security ike security-associations index 222075191 detail
node0:
-
IKE peer 192.168.1.2, Index 222075191, Gateway Name: ZTH_HUB_GW
Location: FPC 0, PIC 3, KMD-Instance 2
Auto Discovery VPN:
Type: Static, Local Capability: Suggester, Peer Capability: Partner
Suggester Shortcut Suggestions Statistics:
Suggestions sent      :      2
Suggestions accepted:      4
Suggestions declined:      1
Role: Responder, State: UP
Initiator cookie: 7b996b4c310d2424, Responder cookie: 5724c5882a212157
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.168.1.1:500, Remote: 192.168.1.2:500
Lifetime: Expires in 828 seconds
Peer ike-id: C=US, DC=example, ST=CA, L=Sunnyvale, O=example, OU=engineering,
CN=csvk36-d
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : aes256-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
Input bytes   :      20474
Output bytes  :      21091
Input packets :        237
Output packets:        237
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 192.168.1.1:500, Remote: 192.168.1.2:500
Local identity: C=US, DC=example, ST=CA, L=Sunnyvale, O=example,
OU=engineering, CN=host1

```

```

Remote identity: C=US, DC=example, ST=CA, L=Sunnyvale, O=example,
OU=engineering, CN=host2
Flags: IKE SA is created

```

show security ike security-associations index 788674 detail

```

user@host> show security ike security-associations index 788674 detail
IKE peer 192.168.1.1, Index 788674, Gateway Name: ZTH_SPOKE_GW
Auto Discovery VPN:
Type: Static, Local Capability: Partner, Peer Capability: Suggester
Partner Shortcut Suggestions Statistics:
  Suggestions received:    2
  Suggestions accepted:    2
  Suggestions declined:    0
Role: Initiator, State: UP
Initiator cookie: 7b996b4c310d2424, Responder cookie: 5724c5882a212157
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.168.1.2:500, Remote: 192.168.1.1:500
Lifetime: Expires in 734 seconds
Peer ike-id: C=US, DC=example, ST=CA, L=Sunnyvale, O=example, OU=engineering,
CN=test
Xauth user-name: not available
Xauth assigned IP: 0.0.0.0
Algorithms:
  Authentication          : hmac-sha1-96
  Encryption              : aes256-cbc
  Pseudo random function: hmac-sha1
  Diffie-Hellman group    : DH-group-5
Traffic statistics:
  Input bytes  :          22535
  Output bytes :          21918
  Input packets:           256
  Output packets:          256
IPSec security associations: 2 created, 0 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Initiator, Message ID: 0
Local: 192.168.1.2:500, Remote: 192.168.1.1:500
Local identity: C=US, DC=example, ST=CA, L=Sunnyvale, O=example,
OU=engineering, CN=host1
Remote identity: C=US, DC=example, ST=CA, L=Sunnyvale, O=example,
OU=engineering, CN=host2
Flags: IKE SA is created

```

show security ike security-associations 192.168.1.2

```

user@host> show security ike security-associations 192.168.1.2

```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
8	UP	3a895f8a9f620198	9040753e66d700bb	Main	192.168.1.2

show security ike security-associations fpc 6 pic 1 kmd-instance all (SRX Series Devices)

```

user@host> show security ike security-associations fpc 6 pic 1 kmd-instance all

```

Index	Remote Address	State	Initiator cookie	Responder cookie	Mode
1728053250	192.168.1.2	UP	fc959afd1070d10b	bdeb7e8c1ea99483	Main

show security ike security-associations detail (ADVPN Suggester, Static Tunnel)

```

user@host> show security ike security-associations detail
IKE peer 192.168.0.105, Index 13563297, Gateway Name: zth_hub_gw
Location: FPC 0, PIC 0, KMD-Instance 1
Auto Discovery VPN:
Type: Static, Local Capability: Suggester, Peer Capability: Partner
Suggester Shortcut Suggestions Statistics:
  Suggestions sent      : 12
  Suggestion response accepted: 12
  Suggestion response declined: 0
Role: Responder, State: UP
Initiator cookie: 4d3f4e4b2e75d727, Responder cookie: 81ab914e13cecd21
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.168.0.154:500, Remote: 192.168.0.105:500
Lifetime: Expires in 26429 seconds
Peer ike-id: DC=example, CN=host02, L=Sunnyvale, ST=CA, C=US

```

show security ike security-associations detail (ADVPN Partner, Static Tunnel)

```

user@host> show security ike security-associations detail
IKE peer 192.168.0.154, Index 4980720, Gateway Name: zth_spoke_gw
Location: FPC 0, PIC 0, KMD-Instance 1
Auto Discovery VPN:
Type: Static, Local Capability: Partner, Peer Capability: Suggester
Partner Shortcut Suggestions Statistics:
  Suggestions received: 12
  Suggestions accepted: 12
  Suggestions declined: 0
Role: Initiator, State: UP
Initiator cookie: 4d3f4e4b2e75d727, Responder cookie: 81ab914e13cecd21
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.168.0.105:500, Remote: 192.168.0.154:500
Lifetime: Expires in 26252 seconds
Peer ike-id: DC=example, CN=host01, OU=SBU, O=example, L=Sunnyvale, ST=CA, C=US

```

show security ike security-associations detail (ADVPN Partner, Shortcut)

```

user@host> show security ike security-associations detail
IKE peer 192.168.0.106, Index 4980737, Gateway Name:
GW-ADVPN-GT-ADVPN-zth_spoke_vpn-268173323
Location: FPC 0, PIC 0, KMD-Instance 1
Auto Discovery VPN:
Type: Shortcut, Local Capability: Partner, Peer Capability: Partner
Role: Responder, State: UP
Initiator cookie: e1ed0c655929debc, Responder cookie: 437de6ed784ba63e
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 192.168.0.105:500, Remote: 192.168.0.106:500
Lifetime: Expires in 28796 seconds
Peer ike-id: DC=example, CN=paulyd, L=Sunnyvale, ST=CA, C=US

```

show security ike security-associations sa-type shortcut (ADVPN)

```

user@host> show security ike security-associations sa-type shortcut

```

Index	State	Initiator cookie	Responder cookie	Mode	Remote Address
4980742	UP	vb56fbe694eae5b6	064dbccbf3b2aab	IKEv2	192.168.0.106

show security ike security-associations sa-type shortcut detail (ADVPN)

```
user@host> show security ike security-associations sa-type shortcut detail
```

```
IKE peer 192.168.0.106, Index 4980742, Gateway Name:
GW-ADVPN-GT-ADVPN-zth_spoke_vpn-268173327
Location: FPC 0, PIC 0, KMD-Instance 1
Auto Discovery VPN:
Type: Shortcut, Local Role: Partner, Peer Role: Partner
Role: Responder, State: UP
```

show security ike security-associations detail (IKEv2 Reauthentication)

```
user@host> show security ike security-associations detail
```

```
IKE peer 10.1.2.11, Index 6009224, Gateway Name: GW
Role: Responder, State: UP
Initiator cookie: 2c74d14c798a9d70, Responder cookie: 83cbb49bfbc80cb
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 10.1.1.11:500, Remote: 10.1.2.11:500
Lifetime: Expires in 173 seconds
Reauth Lifetime: Expires in 600 seconds
Peer ike-id: vsrx@example.net
AAA assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : aes128-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-2
Traffic statistics:
Input bytes  :          1782
Output bytes :          1743
Input packets:           2
```

show security ike security-associations detail (IKEv2 Fragmentation)

```
user@host> show security ike security-associations detail
```

```
IKE peer 172.24.23.157, Index 11883008, Gateway Name: routebased_s2s_gw-552_1
Role: Responder, State: UP
Initiator cookie: f3255e720f162e3a, Responder cookie: 17555e3ff7451841
Exchange type: Main, Authentication method: Pre-shared-keys Trusted CA group:
xyz_ca_grp
Local: 192.168.254.1:500, Remote: 172.24.23.157:500
Lifetime: Expires in 530 seconds
Reauth Lifetime: Disabled
IKE Fragmentation: Enabled, Size: 576
Peer ike-id: 172.24.23.157
AAA assigned IP: 0.0.0.0
Algorithms:
Authentication      : hmac-sha1-96
Encryption          : 3des-cbc
Pseudo random function: hmac-sha1
Diffie-Hellman group : DH-group-5
Traffic statistics:
```



```
Input bytes :          1004
Output bytes :          756
Input packets:           6
Output packets:          4
Input fragmented packets: 3
Output fragmented packets: 3
IPSec security associations: 1 created, 1 deleted
Phase 2 negotiations in progress: 1

Negotiation type: Quick mode, Role: Responder, Message ID: 0
Local: 192.168.254.1:500, Remote: 172.24.23.157:500
Local identity: 192.168.254.1
Remote identity: 172.24.23.157
Flags: IKE SA is created
```

show security ike tunnel-map

Syntax	<code>show security ike tunnel-map (<brief summary>) <fpc slot-number> <kmd-instance (all kmd-instance-name)> <pic slot-number></code>
Release Information	Command introduced in Junos OS Release 12.1X44-D10.
Description	Display the tunnel mapping on different Services Processing Units (SPUs) for site-to-site and manual VPNs. You can insert an SPC on a device in a chassis cluster without disrupting traffic on the existing VPN tunnels. After inserting the SPC, you can view the tunnel mapping using this command. This feature is supported only on SRX5400, SRX5600, and SRX5800 devices and vSRX instances.
Options	<p>brief—Display standard information about all existing IKE SAs. This is the default.</p> <p>fpc slot-number—Display information about existing IKE SAs in the specified Flexible PIC Concentrator (FPC) slot.</p> <p>kmd-instance (all kmd-instance-name)—(Optional) Display information about existing IKE SAs in the key management process (KMD) identified by FPC <i>slot-number</i> and PIC <i>slot-number</i>. This option is used to filter the output. You can specify one of the following options:</p> <ul style="list-style-type: none"> all—All KMD instances running on the Services Processing Unit (SPU). kmd-instance-name—Name of the KMD instance running on the SPU. <p>pic slot-number—Display information about existing IKE SAs in the specified PIC slot.</p> <p>summary—Display the tunnel-mapping load on each SPU. The load is the number of times an SPU has been chosen as an anchor SPU. For site-to-site VPNs, the load should be equal to the number of gateways mapped to an SPU.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Understanding VPN Support for Inserting Services Processing Cards on page 52
List of Sample Output	show security ike tunnel-map on page 1383 show security ike tunnel-map brief on page 1383 show security ike tunnel-map fpc 1 pic 0 on page 1383 show security ike tunnel-map kmd-instance kmd1 on page 1384 show security ike tunnel-map kmd-instance all on page 1384 show security ike tunnel-map summary on page 1384

Output Fields Table 123 on page 1383 lists the output fields for the **show security ike tunnel-map** command. Output fields are listed in the approximate order in which they appear.

Table 123: show security ike tunnel-map Output Fields

Field Name	Field Description
Gateway ID	Gateway identifier. This is a nondeterministic number that is constant as long as the configuration is present. This number does not appear in any other outputs.
Gateway Name	Name of the IKE gateway.
FPC	FPC slot number.
PIC	PIC slot number.
IKED Instance	IKE process instance identifier.
SPU Load	Number of times an SPU has been chosen as an anchor SPU.

Sample Output

show security ike tunnel-map

```
user@host> show security ike tunnel-map
```

Gateway ID	Gateway Name	FPC	PIC	IKED Instance
2	ike_gw1	4	0	1
3	ike_gw2	7	0	1
4	ike_gw3	7	0	2
5	ike_gw4	4	0	2

show security ike tunnel-map brief

```
user@host> show security ike tunnel-map brief
```

Gateway ID	Gateway Name	FPC	PIC	IKED Instance
2	gw-01	1	0	1
3	LAN_1	1	0	2
4	LAN_2	1	0	1
5	LAN_3	1	0	2
6	LAN_4	1	0	1

show security ike tunnel-map fpc 1 pic 0

```
user@host> run show security ike tunnel-map fpc 1 pic 0
```

Gateway ID	Gateway Name	FPC	PIC	IKED Instance
2	gw-01	1	0	1
3	LAN_1	1	0	2
4	LAN_2	1	0	1
5	LAN_3	1	0	2
6	LAN_4	1	0	1

show security ike tunnel-map kmd-instance kmd1

```
user@host> show security ike tunnel-map kmd-instance kmd1
```

Gateway	ID	Gateway Name	FPC	PIC	IKED	Instance
2		gw-01	1	0		1
4		LAN_2	1	0		1
6		LAN_4	1	0		1

show security ike tunnel-map kmd-instance all

```
user@host> show security ike tunnel-map kmd-instance all
```

Gateway	ID	Gateway Name	FPC	PIC	IKED	Instance
2		gw-01	1	0		1
3		LAN_1	1	0		2
4		LAN_2	1	0		1
5		LAN_3	1	0		2
6		LAN_4	1	0		1

show security ike tunnel-map summary

```
user@host> show security ike tunnel-map summary
```

FPC	PIC	SPU	Load
1	0		5

show security ipsec control-plane-security-associations

Syntax	show security ipsec control-plane-security-associations <brief detail> <sa-name <i>sa-name</i> >
Release Information	Command introduced in Junos OS Release 12.1X46-D20.
Description	Display information about manual IPsec security associations (SAs) applied to OSPF or OSPFv3 interfaces or virtual links.
Options	<ul style="list-style-type: none"> brief detail—(Optional) Display the specified level of output. sa-name <i>sa-name</i>—Name of the manual SA.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 62
List of Sample Output	show security ipsec control-plane-security-associations on page 1385 show security ipsec control-plane-security-associations sa-name on page 1386 show security ipsec control-plane-security-associations detail on page 1386
Output Fields	Table 124 on page 1385 lists the output fields for the show security ipsec control-plane-security-associations command. Output fields are listed in the approximate order in which they appear.

Table 124: show security ipsec control-plane-security-associations Output Fields

Field Name	Field Description
Name	Name of the SA.
Algorithm	IPsec protocol followed by encryption algorithm and authentication algorithm.
SPI	SPI value.
Total active security-associations	Total number of active manual SAs for application to OSPF or OSPFv3 interfaces or virtual links.

Sample Output

show security ipsec control-plane-security-associations

```
user@host> show security ipsec control-plane-security-associations
```

```

Name      Algorithm      SPI
test_sa   ESP:3des/md5      3e8
test_sa   ESP:3des/md5      3e8
test_sa2  ESP:3des/sha1     7d1
test_sa2  ESP:3des/sha1     7d1
Total active security-associations: 2

```

show security ipsec control-plane-security-associations sa-name

```
user@host> show security ipsec control-plane-security-associations sa-name test_sa
```

```

Name      Algorithm      SPI
test_sa   ESP:3des/md5      3e8
test_sa   ESP:3des/md5      3e8
Total active security-associations: 1

```

show security ipsec control-plane-security-associations detail

```
user@host> show security ipsec control-plane-security-associations detail
```

```

Direction: inbound, SA Name: test_sa,
Protocol: ESP:, Authentication: md5
SPI: 3e8, AUX-SPI: 0,
Mode: transport, Type: manual,
ID: 1,

Direction: outbound, SA Name: test_sa,
Protocol: ESP:, Authentication: md5
SPI: 3e8, AUX-SPI: 0,
Mode: transport, Type: manual,
ID: 2,

Direction: inbound, SA Name: test_sa2,
Protocol: ESP:, Authentication: sha1
SPI: 7d1, AUX-SPI: 0,
Mode: transport, Type: manual,
ID: 3,

Direction: outbound, SA Name: test_sa2,
Protocol: ESP:, Authentication: sha1
SPI: 7d1, AUX-SPI: 0,
Mode: transport, Type: manual,
ID: 4,

```

show security ipsec inactive-tunnels

Syntax `show security ipsec inactive-tunnels`
`brief | detail`
`family (inet | inet6)`
`fpc slot-number`
`index index-number`
`kmd-instance (all | kmd-instance-name)`
`pic slot-number`
`sa-type shortcut`
`vpn-name vpn-name`

Release Information Command introduced in Junos OS Release 11.4R3. Support for Auto Discovery VPN added in Junos OS Release 12.3X48-D10.

Description Display security information about the inactive tunnel.

- Options**
- **none**—Display information about all inactive tunnels.
 - **brief | detail**—(Optional) Display the specified level of output.
 - **family**—(Optional) Display the inactive tunnel by family. This option is used to filter the output.
 - **inet**—IPv4 address family.
 - **inet6**—IPv6 address family.
 - **fpc slot-number**—(Optional) Display information about inactive tunnels in the Flexible PIC Concentrator (FPC) slot.
 - **index index-number**—(Optional) Display detailed information about the specified inactive tunnel identified by this index number. For a list of all inactive tunnels with their index numbers, use the command with no options.
 - **kmd-instance** —(Optional) Display information about inactive tunnels in the key management process (in this case, it is KMD) identified by FPC *slot-number* and PIC *slot-number*.
 - **all**—All KMD instances running on the Services Processing Unit (SPU).
 - **kmd-instance-name**—Name of the KMD instance running on the SPU.
 - **pic slot-number**—Display information about inactive tunnels in the PIC slot.
 - **sa-type**—(Optional for ADVPN) Type of SA. **shortcut** is the only option for this release.
 - **vpn-name vpn-name**—(Optional) Name of the VPN.



NOTE: The *fpc slot-number*, *kmd-instance (all | kmd-instance-name)*, and *pic slot-number* parameters apply to SRX5600 and SRX5800 devices only.

Required Privilege Level view

Related Documentation • [show security ipsec security-associations on page 1393](#)

List of Sample Output [show security ipsec inactive-tunnels on page 1389](#)
[show security ipsec inactive-tunnels index 131073 on page 1389](#)
[show security ipsec inactive-tunnels sa-type shortcut on page 1389](#)

Output Fields [Table 125 on page 1388](#) lists the output fields for the **show security ipsec inactive-tunnels** command. Output fields are listed in the approximate order in which they appear.

Table 125: show security ipsec inactive-tunnels Output Fields

Field Name	Field Description
Total inactive tunnels	Total number of inactive IPsec tunnels.
Total inactive tunnels which establish immediately	Total number of inactive IPsec tunnels that can establish a session immediately.
ID	Identification number of the inactive tunnel. You can use this number to get more information about the inactive tunnel.
Gateway	IP address of the remote gateway.
Port	If Network Address Translation (NAT) is used, this value is 4500. Otherwise, it is the standard IKE port, 500.
Def-Del#	Number of deferred deletions of a dial-up IPsec VPN.
Virtual system	Virtual system to which the VPN belongs.
VPN name	Name of the IPsec VPN.
Local gateway	Gateway address of the local system.
Remote gateway	Gateway address of the remote system.
Local identity	Identity of the local peer so that its partner destination gateway can communicate with it. The value is specified as an IP address, fully qualified domain name, e-mail address, or distinguished name (DN).
Remote identity	IP address of the destination peer gateway.
Version	Version of IKE.
DF-bit	State of the don't fragment bit: set or clear .
Bind-interface	The tunnel interface to which the route-based VPN is bound.

Table 125: show security ipsec inactive-tunnels Output Fields (continued)

Field Name	Field Description
Policy-name	Name of the applicable policy.
Tunnel Down Reason	Reason for which the tunnel is inactive.
Tunnel events	Tunnel event and the number of times the event has occurred. See <i>Tunnel Events</i> for descriptions of tunnel events and the action you can take.

Sample Output

show security ipsec inactive-tunnels

```

user@host> show security ipsec inactive-tunnels
Total inactive tunnels: 1
Total inactive tunnels with establish immediately: 0
ID      Gateway      Port Tunnel down reason
131073  192.168.1.2  500   Phase1 proposal mismatch detected

```

show security ipsec inactive-tunnels index 131073

```

user@host> show security ipsec inactive-tunnels index 131073
ID: 131073 Virtual-system: root, VPN Name: vpn1
Local Gateway: 192.168.1.100, Remote Gateway: 192.168.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.0
Port: 500, Nego#: 2, Fail#: 0, Def-Del#: 0 Flag: 600a29
Tunnel events:
  Wed Jul 16 2014 06:18:02 +0800: User cleared IPSec SA from CLI (1 times)
  Wed Jul 16 2014 06:17:58 +0800: IPSec SA negotiation successfully completed
(1 times)
  Wed Jul 16 2014 06:17:54 +0800: User cleared IPSec SA from CLI (1 times)
  Wed Jul 16 2014 06:16:58 +0800: IPSec SA negotiation successfully completed
(1 times)
  Wed Jul 16 2014 06:16:58 +0800: Bind interface's address received. Information
updated (1 times)
  Wed Jul 16 2014 06:16:58 +0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Wed Jul 16 2014 06:16:58 +0800: External interface's address received.
Information updated (1 times)
  Wed Jul 16 2014 06:16:58 +0800: Bind interface's zone received. Information
updated (1 times)
  Wed Jul 16 2014 06:16:58 +0800: IKE SA negotiation successfully completed (1
times)

```

show security ipsec inactive-tunnels sa-type shortcut

```

user@host> show security ipsec inactive-tunnels sa-type shortcut
Total inactive tunnels: 1
Total inactive tunnels with establish immediately: 0

```

ID	Port	Nego#	Fail#	Flag	Gateway	Tunnel Down Reason
268173322	500	0	0	40608aa9	192.168.0.105	Cleared via CLI

show security ipsec next-hop-tunnels

Syntax `show security ipsec next-hop-tunnels {
family (inet | inet6);
index;
interface-name;
}`

Release Information Command introduced in Junos OS Release 8.5.
The **family inet6** option is introduced in Junos OS Release 18.1R1.

Description Display security information about the secure tunnel interface.

Options **family**—Display IPsec next-hop-tunnel entries by family.

index—Index of security association.

Range:

- 1 through 4294967295

inet—Displays IPv4 protocol parameters.

inet6 —Displays IPv6 protocol parameters.

interface-name—Name of the secure tunnel logical interface.

Required Privilege Level view

Related Documentation • [show security ipsec security-associations on page 1393](#)

List of Sample Output [show security ipsec next-hop-tunnels family inet on page 1392](#)
[show security ipsec next-hop-tunnels family inet6 on page 1392](#)

Output Fields [Table 126 on page 1391](#) lists the output fields for the **show security ipsec next-hop-tunnels** command. Output fields are listed in the approximate order in which they appear.

Table 126: show security ipsec next-hop-tunnels Output Fields

Field Name	Field Description
Next-hop gateway	IP address of the next gateway.
Interface	Name of the secure tunnel logical interface.
IPsec VPN name	Name of the IPsec VPN tunnel.

Table 126: show security ipsec next-hop-tunnels Output Fields (continued)

Field Name	Field Description
Flag	<ul style="list-style-type: none"> Static—IP address manually configured. Auto—IP address obtained from the remote peer automatically.

Sample Output

show security ipsec next-hop-tunnels family inet

```
user@host> show security ipsec next-hop-tunnels inet
```

Next-hop gateway	interface	IPsec VPN name	Flag
192.168.1.2	st0.0	autokey	Static
192.168.1.3	st0.0	pbd-4-6	Auto

show security ipsec next-hop-tunnels family inet6

```
user@host> show security ipsec next-hop-tunnels family inet6
```

Next-hop gateway	interface	IPSec VPN name	Flag
2001:db8::2	st0.1	IPSEC_VPNA_1	Auto
2001:db8::3	st0.1	IPSEC_VPNA_1	Auto
2001:fe80::5668:ad10:fcd8:59db	st0.1	IPSEC_VPNA_1	Auto
2001:fe80::5668:ad10:fcd8:5aa5	st0.1	IPSEC_VPNA_1	Auto

show security ipsec security-associations

Syntax show security ipsec security-associations
 <brief | detail>
 <family (inet | inet6)>
 <fpc slot-number pic slot-number>
 <index SA-index-number>
 <kmd-instance (all | kmd-instance-name)>
 <pic slot-number fpc slot-number>
 <sa-type shortcut>
 <traffic-selector traffic-selector-name>
 <vpn-name vpn-name>

Release Information Command introduced in Junos OS Release 8.5. Support for the **family** option added in Junos OS Release 11.1. Support for the **vpn-name** option added in Junos OS Release 11.4R3. Support for the **traffic-selector** option and traffic selector field added in Junos OS Release 12.1X46-D10. Support for Auto Discovery VPN (ADVPN) added in Junos OS Release 12.3X48-D10. Support for IPsec datapath verification added in Junos OS Release 15.1X49-D70. Support for thread anchorship added in Junos OS Release 17.4R1. Starting in Junos OS Release 18.2R2 the **show security ipsec security-associations detail** command output will include thread anchorship information for the security associations (SAs).

Description Display information about the IPsec security associations (SAs).

Options **none**—Display information about all SAs.

brief | detail—(Optional) Display the specified level of output. The default is **brief**.

family—(Optional) Display SAs by family. This option is used to filter the output.

- **inet**—IPv4 address family.
- **inet6**—IPv6 address family.

fpc slot-number pic slot-number—(Optional) Display information about existing IPsec SAs in the specified Flexible PIC Concentrator (FPC) slot and PIC slot.



NOTE: In a chassis cluster, when you execute the CLI command **show security ipsec security-associations pic <slot-number> fpc <slot-number>** in operational mode, only the primary node information about the existing IPsec SAs in the specified Flexible PIC Concentrator (FPC) slot and PIC slot is displayed.

index *SA-index-number*—(Optional) Display detailed information about the specified SA identified by this index number. To obtain a list of all SAs that includes their index numbers, use the command with no options.

kmd-instance—(Optional) Display information about existing IPsec SAs in the key management process (in this case, it is KMD) identified by the FPC *slot-number* and PIC *slot-number*.

- **all**—All KMD instances running on the Services Processing Unit (SPU).
- ***kmd-instance-name***—Name of the KMD instance running on the SPU.

pic *slot-number* fpc *slot-number*—(Optional) Display information about existing IPsec SAs in the specified PIC slot and FPC slot.

sa-type—(Optional for ADVPN) Display information for the specified type of SA. **shortcut** is the only option for this release.

traffic-selector *traffic-selector-name*—(Optional) Display information about the specified traffic selector.

vpn-name *vpn-name*—(Optional) Display information about the specified VPN.

**Required Privilege
Level**

view

**Related
Documentation**

- [clear security ipsec security-associations on page 1287](#)
- *Example: Configuring a Route-Based VPN Tunnel in a User Logical Systems*

List of Sample Output

[show security ipsec security-associations \(IPv4\) on page 1398](#)
[show security ipsec security-associations \(IPv6\) on page 1400](#)
[show security ipsec security-associations index 511672 on page 1400](#)
[show security ipsec security-associations index 131073 detail on page 1401](#)
[show security ipsec sa detail on page 1402](#)
[show security ipsec sa detail on page 1403](#)
[show security ipsec security-associations brief on page 1403](#)
[show security ipsec security-associations detail on page 1404](#)
[show security ipsec security-associations family inet6 on page 1405](#)
[show security ipsec security-associations fpc 6 pic 1 kmd-instance all \(SRX Series Devices\) on page 1405](#)
[show security ipsec security-associations detail \(ADVPN Suggester, Static Tunnel\) on page 1405](#)
[show security ipsec security-associations detail \(ADVPN Partner, Static Tunnel\) on page 1406](#)
[show security ipsec security-associations sa-type shortcut \(ADVPN\) on page 1407](#)
[show security ipsec security-associations sa-type shortcut detail \(ADVPN\) on page 1407](#)
[show security ipsec security-associations family inet detail on page 1408](#)
[show security ipsec security-associations detail \(SRX4600\) on page 1409](#)

Output Fields Table 127 on page 1395 lists the output fields for the **show security ipsec security-associations** command. Output fields are listed in the approximate order in which they appear.

Table 127: show security ipsec security-associations

Field Name	Field Description	Level of Output
Total active tunnels	Total number of active IPsec tunnels.	brief
ID	Index number of the SA. You can use this number to get additional information about the SA.	All levels
Algorithm	<p>Cryptography used to secure exchanges between peers during the IKE negotiations includes:</p> <ul style="list-style-type: none"> • An authentication algorithm used to authenticate exchanges between the peers. • An encryption algorithm used to encrypt data traffic. 	brief
SPI	Security parameter index (SPI) identifier. An SA is uniquely identified by an SPI. Each entry includes the name of the VPN, the remote gateway address, the SPIs for each direction, the encryption and authentication algorithms, and keys. The peer gateways each have two SAs, one resulting from each of the two phases of negotiation: IKE and IPsec.	brief
Life: sec/kb	The lifetime of the SA, after which it expires, expressed either in seconds or kilobytes.	brief
Mon	The Mon field refers to VPN monitoring status. If VPN monitoring is enabled, then this field displays U (up) or D (down). A hyphen (-) means VPN monitoring is not enabled for this SA. A V means that IPsec datapath verification is in progress.	brief
Isys	The root system.	brief
Port	If Network Address Translation (NAT) is used, this value is 4500. Otherwise, it is the standard IKE port, 500.	All levels
Gateway	IP address of the remote gateway.	brief
Virtual-system	Name of the logical system.	detail
VPN name	IPsec name for VPN.	detail

Table 127: show security ipsec security-associations (continued)

Field Name	Field Description	Level of Output
State	State has two options, Installed and Not Installed . <ul style="list-style-type: none"> Installed—The SA is installed in the SA database. Not Installed—The SA is not installed in the SA database. For transport mode, the value of State is always Installed .	detail
Local gateway	Gateway address of the local system.	detail
Remote gateway	Gateway address of the remote system.	detail
Traffic selector	Name of the traffic selector.	detail
Local identity	Identity of the local peer so that its partner destination gateway can communicate with it. The value is specified as an IP address, fully qualified domain name, e-mail address, or distinguished name (DN).	detail
Remote identity	IP address of the destination peer gateway.	detail
Version	IKE version, either IKEv1 or IKEv2 .	detail
DF-bit	State of the don't fragment bit: set or cleared .	detail
Location	FPC —Flexible PIC Concentrator (FPC) slot number. PIC —PIC slot number. KMD-Instance —The name of the KMD instance running on the SPU, identified by <i>FPC slot-number</i> and <i>PIC slot-number</i> . Currently, 4 KMD instances running on each SPU, and any particular IPsec negotiation is carried out by a single KMD instance.	detail
Tunnel events	Tunnel event and the number of times the event has occurred. See <i>Tunnel Events</i> for descriptions of tunnel events and the action you can take.	detail
Anchorship	Anchor thread ID for the SA (for SRX4600 Series devices with the detail option).	
Direction	Direction of the SA; it can be inbound or outbound.	detail

Table 127: show security ipsec security-associations (continued)

Field Name	Field Description	Level of Output
AUX-SPI	<p>Value of the auxiliary security parameter index(SPI).</p> <ul style="list-style-type: none"> When the value is AH or ESP, AUX-SPI is always 0. When the value is AH+ESP, AUX-SPI is always a positive integer. 	detail
Mode	<p>Mode of the SA:</p> <ul style="list-style-type: none"> transport—Protects host-to-host connections. tunnel—Protects connections between security gateways. 	detail
Type	<p>Type of the SA:</p> <ul style="list-style-type: none"> manual—Security parameters require no negotiation. They are static and are configured by the user. dynamic—Security parameters are negotiated by the IKE protocol. Dynamic SAs are not supported in transport mode. 	detail
State	<p>State of the SA:</p> <ul style="list-style-type: none"> Installed—The SA is installed in the SA database. Not Installed—The SA is not installed in the SA database. <p>For transport mode, the value of State is always Installed.</p>	detail
Protocol	<p>Protocol supported.</p> <ul style="list-style-type: none"> Transport mode supports Encapsulation Security Protocol (ESP) and Authentication Header (AH). Tunnel mode supports ESP and AH. 	detail
Authentication	Type of authentication used.	detail
Encryption	Type of encryption used.	detail
Soft lifetime	<p>The soft lifetime informs the IPsec key management system that the SA is about to expire.</p> <p>Each lifetime of an SA has two display options, hard and soft, one of which must be present for a dynamic SA. This allows the key management system to negotiate a new SA before the hard lifetime expires.</p> <ul style="list-style-type: none"> Expires in seconds—Number of seconds left until the SA expires. 	detail

Table 127: show security ipsec security-associations (continued)

Field Name	Field Description	Level of Output
Hard lifetime	The hard lifetime specifies the lifetime of the SA. <ul style="list-style-type: none"> Expires in seconds—Number of seconds left until the SA expires. 	detail
Lifesize Remaining	The lifesize remaining specifies the usage limits in kilobytes. If there is no lifesize specified, it shows unlimited. <ul style="list-style-type: none"> Expires in kilobytes—Number of kilobytes left until the SA expires. 	detail
Anti-replay service	State of the service that prevents packets from being replayed. It can be Enabled or Disabled .	detail
Replay window size	Size of the antireplay service window, which is 64 bits.	detail
Bind-interface	The tunnel interface to which the route-based VPN is bound.	detail
Copy-Outer-DSCP	Indicates if the system copies the outer DSCP value from the IP header to the inner IP header.	detail
tunnel-establishment	Indicates how the IKE is activated.	detail

Sample Output

For brevity, the show command outputs does not display all the values of the configuration. Only a subset of the configuration is displayed. Rest of the configuration on the system has been replaced with ellipses (...).

show security ipsec security-associations (IPv4)

```
user@host> show security ipsec security-associations
```

```
Total active tunnels: 14743 Total Ipsec sas: 14743
ID      Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<511672 ESP:aes-cbc-128/sha1 0x071b8cd2    -    root 500  21.0.45.152
>503327 ESP:aes-cbc-128/sha1 0x69d364dd 1584/ unlim - root 500 21.0.12.255

<503327 ESP:aes-cbc-128/sha1 0x0a577f2d 1584/ unlim - root 500 21.0.12.255
>512896 ESP:aes-cbc-128/sha1 0xd2f51c81 1669/ unlim - root 500 21.0.50.96

<512896 ESP:aes-cbc-128/sha1 0x071b8d9e 1669/ unlim - root 500 21.0.50.96
>513881 ESP:aes-cbc-128/sha1 0x95955834 1696/ unlim - root 500 21.0.54.57

<513881 ESP:aes-cbc-128/sha1 0x0a57860c 1696/ unlim - root 500 21.0.54.57
>505835 ESP:aes-cbc-128/sha1 0xf827b5c6 1598/ unlim - root 500 21.0.22.204
```

```
<505835 ESP:aes-cbc-128/sha1 0x0f43bf3f 1598/ unlim - root 500 21.0.22.204
>506531 ESP:aes-cbc-128/sha1 0x01694572 1602/ unlim - root 500 21.0.25.131
<506531 ESP:aes-cbc-128/sha1 0x0a578143 1602/ unlim - root 500 21.0.25.131
>512802 ESP:aes-cbc-128/sha1 0xdc292de4 1668/ unlim - root 500 21.0.50.1
<512802 ESP:aes-cbc-128/sha1 0x0a578558 1668/ unlim - root 500 21.0.50.1
>512413 ESP:aes-cbc-128/sha1 0xbe2c52d5 1660/ unlim - root 500 21.0.48.125
<512413 ESP:aes-cbc-128/sha1 0x1129580c 1660/ unlim - root 500 21.0.48.125
>505075 ESP:aes-cbc-128/sha1 0x2aae6647 1593/ unlim - root 500 21.0.19.213
<505075 ESP:aes-cbc-128/sha1 0x02dc5c50 1593/ unlim - root 500 21.0.19.213
>514055 ESP:aes-cbc-128/sha1 0x2b8adfcf 1704/ unlim - root 500 21.0.54.238
<514055 ESP:aes-cbc-128/sha1 0x0f43c49a 1704/ unlim - root 500 21.0.54.238
>508898 ESP:aes-cbc-128/sha1 0xbcced4d6 1619/ unlim - root 500 21.0.34.194
<508898 ESP:aes-cbc-128/sha1 0x1492035a 1619/ unlim - root 500 21.0.34.194
>505328 ESP:aes-cbc-128/sha1 0x2a8d2b36 1594/ unlim - root 500 21.0.20.208
<505328 ESP:aes-cbc-128/sha1 0x14920107 1594/ unlim - root 500 21.0.20.208
>500815 ESP:aes-cbc-128/sha1 0xdd86c89a 1573/ unlim - root 500 21.0.3.47
<500815 ESP:aes-cbc-128/sha1 0x1129507f 1573/ unlim - root 500 21.0.3.47
>503758 ESP:aes-cbc-128/sha1 0x64cc490e 1586/ unlim - root 500 21.0.14.172
<503758 ESP:aes-cbc-128/sha1 0x14920001 1586/ unlim - root 500 21.0.14.172
>504004 ESP:aes-cbc-128/sha1 0xde0b63ee 1587/ unlim - root 500 21.0.15.164
<504004 ESP:aes-cbc-128/sha1 0x071b87d4 1587/ unlim - root 500 21.0.15.164
>508816 ESP:aes-cbc-128/sha1 0x2703b7a5 1618/ unlim - root 500 21.0.34.112
<508816 ESP:aes-cbc-128/sha1 0x071b8af6 1618/ unlim - root 500 21.0.34.112
>511341 ESP:aes-cbc-128/sha1 0x828f3330 1644/ unlim - root 500 21.0.44.77
<511341 ESP:aes-cbc-128/sha1 0x02dc6064 1644/ unlim - root 500 21.0.44.77
>500456 ESP:aes-cbc-128/sha1 0xa6f1515d 1572/ unlim - root 500 21.0.1.200
<500456 ESP:aes-cbc-128/sha1 0x1491fddb 1572/ unlim - root 500 21.0.1.200
>512506 ESP:aes-cbc-128/sha1 0x4108f3a3 1662/ unlim - root 500 21.0.48.218
<512506 ESP:aes-cbc-128/sha1 0x071b8d5d 1662/ unlim - root 500 21.0.48.218
>504657 ESP:aes-cbc-128/sha1 0x27a6b8b3 1591/ unlim - root 500 21.0.18.41
```

```

<504657 ESP:aes-cbc-128/sha1 0x112952fe 1591/ unlim - root 500 21.0.18.41
>506755 ESP:aes-cbc-128/sha1 0xc0afcff0 1604/ unlim - root 500 21.0.26.100
<506755 ESP:aes-cbc-128/sha1 0x149201f5 1604/ unlim - root 500 21.0.26.100
>508023 ESP:aes-cbc-128/sha1 0xa1a90af8 1612/ unlim - root 500 21.0.31.87
<508023 ESP:aes-cbc-128/sha1 0x02dc5e3b 1612/ unlim - root 500 21.0.31.87
>509190 ESP:aes-cbc-128/sha1 0xee52074d 1621/ unlim - root 500 21.0.35.230
<509190 ESP:aes-cbc-128/sha1 0x0f43c16e 1621/ unlim - root 500 21.0.35.230
>505051 ESP:aes-cbc-128/sha1 0x24130b1c 1593/ unlim - root 500 21.0.19.188
<505051 ESP:aes-cbc-128/sha1 0x149200d9 1593/ unlim - root 500 21.0.19.188
>513214 ESP:aes-cbc-128/sha1 0x2c4752d1 1676/ unlim - root 500 21.0.51.158
<513214 ESP:aes-cbc-128/sha1 0x071b8dd3 1676/ unlim - root 500 21.0.51.158
>510808 ESP:aes-cbc-128/sha1 0x4acd94d3 1637/ unlim - root 500 21.0.42.56
<510808 ESP:aes-cbc-128/sha1 0x071b8c42 1637/ unlim - root 500 21.0.42.56

```

show security ipsec security-associations (IPv6)

```
user@host> show security ipsec security-associations
```

```

Total active tunnels: 1
ID      Algorithm      SPI      Life:sec/kb  Mon  vsys Port  Gateway
131074  ESP:aes256/sha256 14caf1d9 3597/ unlim  -   root 500    2001:db8::1112
131074  ESP:aes256/sha256 9a4db486 3597/ unlim  -   root 500    2001:db8::1112

```

show security ipsec security-associations index 511672

```
user@host> show security ipsec security-associations index 511672
```

```

ID: 511672 Virtual-system: root, VPN Name: ipsec_vpn
Local Gateway: 20.0.0.1, Remote Gateway: 21.0.45.152
Traffic Selector Name: ts
Local Identity: ipv4(191.45.151.0-191.45.151.255)
Remote Identity: ipv4(40.45.151.0-40.45.151.255)
Version: IKEv2
DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.0, Policy-name:
IPSEC_POL
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0
Multi-sa, Configured SAs# 0, Negotiated SAs#: 0
Location: FPC 0, PIC 1, KMD-Instance 0
Anchorship: Thread 10
Direction: inbound, SPI: 0x835b8b42, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1639 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1257 seconds

```

```

Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 0x071b8cd2, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1639 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1257 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec security-associations index 131073 detail

```
user@host> show security ipsec security-associations index 131073 detail
```

```

ID: 131073 Virtual-system: root, VPN Name: IPSEC_VPN1
Local Gateway: 4.0.0.1, Remote Gateway: 5.0.0.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1
Port: 500, Nego#: 18, Fail#: 0, Def-Del#: 0 Flag: 0x600a39
Multi-sa, Configured SAs# 9, Negotiated SAs#: 9
Tunnel events:
  Mon Apr 23 2018 22:20:54 -0700: IPSec SA negotiation successfully completed
(1 times)
  Mon Apr 23 2018 22:20:54 -0700: IKE SA negotiation successfully completed (2
times)
  Mon Apr 23 2018 22:20:18 -0700: User cleared IKE SA from CLI, corresponding
IPSec SAs cleared (1 times)
  Mon Apr 23 2018 22:19:55 -0700: IPSec SA negotiation successfully completed
(2 times)
  Mon Apr 23 2018 22:19:23 -0700: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
  Mon Apr 23 2018 22:19:23 -0700: Bind-interface's zone received. Information
updated (1 times)
  Mon Apr 23 2018 22:19:23 -0700: External interface's zone received. Information
updated (1 times)
Direction: inbound, SPI: 2d8e710b, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1930 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1563 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
Multi-sa FC Name: default
Direction: outbound, SPI: 5f3a3239, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1930 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1563 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
Multi-sa FC Name: default
Direction: inbound, SPI: 5d227e19, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1930 seconds

```

```

Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1551 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
Multi-sa FC Name: best-effort
Direction: outbound, SPI: 5490da, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 1930 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1551 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes-256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
...

```

Starting with Junos OS Release 18.2R1, the CLI **show security ipsec security-associations index index-number detail** output displays all the child SA details including forwarding class name.

show security ipsec sa detail

```

user@host> show security ipsec sa detail
ID: 500201 Virtual-system: root, VPN Name: IPSEC_VPN
Local Gateway: 2.0.0.1, Remote Gateway: 2.0.0.2
Local Identity: ipv4(0.0.0.0-255.255.255.255)
Remote Identity: ipv4(0.0.0.0-255.255.255.255)
Version: IKEv1
DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1, Policy-name:
IPSEC_POL
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0
Multi-sa, Configured SAs# 0, Negotiated SAs#: 0
Location: FPC 0, PIC 1, KMD-Instance 0
Anchorship: Thread 1
Distribution-Profile: default-profile
Direction: inbound, SPI: 0x0a25c960, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 91 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 44 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
tunnel-establishment: establish-tunnels-responder-only-no-rekey
Direction: outbound, SPI: 0x43e34ad3, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 91 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 44 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
tunnel-establishment: establish-tunnels-responder-only
...

```

show security ipsec sa detail

```
user@host> show security ipsec sa detail
```

```
ID: 500201 Virtual-system: root, VPN Name: IPSEC_VPN
Local Gateway: 2.0.0.1, Remote Gateway: 2.0.0.2
Local Identity: ipv4(0.0.0.0-255.255.255.255)
Remote Identity: ipv4(0.0.0.0-255.255.255.255)
Version: IKEv1
DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1, Policy-name:
IPSEC_POL
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0
Multi-sa, Configured SAs# 0, Negotiated SAs#: 0
Location: FPC 0, PIC 1, KMD-Instance 0
Anchorship: Thread 1
Distribution-Profile: default-profile
Direction: inbound, SPI: 0x0a25c960, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 91 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 44 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
tunnel-establishment: establish-tunnels-responder-only-no-rekey
Direction: outbound, SPI: 0x43e34ad3, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 91 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 44 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Anti-replay service: counter-based enabled, Replay window size: 64
tunnel-establishment: establish-tunnels-responder-only-no-rekey
...
```

Starting with Junos OS Release 19.1R1, a new field **tunnel-establishment** in the output of the CLI **show security ipsec sa detail** displays the option configured under **ipsec vpn establish-tunnels** hierarchy.

show security ipsec security-associations brief

```
user@host> show security ipsec security-associations brief
```

```
Total active tunnels: 2      Total Ipsec sas: 18
ID   Algorithm      SPI      Life:sec/kb Mon lsys Port Gateway
<131073 ESP:aes256/sha256 89e5098 1569/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 fcee9d54 1569/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 f3117676 1609/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 6050109f 1609/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 e01f54b1 1613/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 29a05dd6 1613/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 606c90f6 1616/ unlim - root 500 5.0.0.1
```

```

>131073 ESP:aes256/sha256 9b5b059d 1619/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 b8116d6d 1619/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 b7ed6bfd 1619/ unlim - root 500 5.0.0.1
<131073 ESP:aes256/sha256 4f5ce754 1619/ unlim - root 500 5.0.0.1
>131073 ESP:aes256/sha256 af8984b6 1619/ unlim - root 500 5.0.0.1
...

```

show security ipsec security-associations detail

```
user@host> show security ipsec security-associations detail
```

```

ID: 500006 Virtual-system: root, VPN Name: HUB_VPN
  Local Gateway: 2.0.0.1, Remote Gateway: 7.0.0.6
  Traffic Selector Name: HUB_VPN_TS4
  Local Identity: ipv4(92.0.5.0-92.0.5.255)
  Remote Identity: ipv4(91.0.5.0-91.0.5.255)
  Version: IKEv2
  DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1, Policy-name:
IPSEC_POL
  Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0
  Multi-sa, Configured SAs# 0, Negotiated SAs#: 0
  Location: FPC 0, PIC 1, KMD-Instance 0
  Anchorship: Thread 4
  Direction: inbound, SPI: 0xcd53aad7, AUX-SPI: 0
                    , VPN Monitoring: -
    Hard lifetime: Expires in 2665 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 2021 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
    Anti-replay service: counter-based enabled, Replay window size: 64
  Direction: outbound, SPI: 0x0970d113, AUX-SPI: 0
                    , VPN Monitoring: -
    Hard lifetime: Expires in 2665 seconds
    Lifesize Remaining: Unlimited
    Soft lifetime: Expires in 2021 seconds
    Mode: Tunnel(0 0), Type: dynamic, State: installed
    Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
    Anti-replay service: counter-based enabled, Replay window size: 64

ID: 500012 Virtual-system: root, VPN Name: HUB_VPN
  Local Gateway: 2.0.0.1, Remote Gateway: 7.0.0.6
  Traffic Selector Name: HUB_VPN_TS6
  Local Identity: ipv4(82.0.5.0-82.0.5.255)
  Remote Identity: ipv4(81.0.5.0-81.0.5.255)
  Version: IKEv2
  DF-bit: clear, Copy-Outer-DSCP Disabled, Bind-interface: st0.1, Policy-name:
IPSEC_POL
  Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0
  Multi-sa, Configured SAs# 0, Negotiated SAs#: 0
  Location: FPC 0, PIC 1, KMD-Instance 0
  Anchorship: Thread 8
  Direction: inbound, SPI: 0x8fa57316, AUX-SPI: 0
                    , VPN Monitoring: -
    Hard lifetime: Expires in 2665 seconds

```



```

Lifetimes Remaining: Unlimited
Soft lifetime: Expires in 2043 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 0xeec2c1c5, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 2665 seconds
Lifetimes Remaining: Unlimited
Soft lifetime: Expires in 2043 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: aes-cbc (128 bits)
Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec security-associations family inet6

```
user@host> show security ipsec security-associations family inet6
```

```

Virtual-system: root
Local Gateway: 2001:db8:1212::1111, Remote Gateway: 2001:db8:1212::1112
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
DF-bit: clear
Direction: inbound, SPI: 14caf1d9, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3440 seconds
Lifetimes Remaining: Unlimited
Soft lifetime: Expires in 2813 seconds
Mode: tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

Direction: outbound, SPI: 9a4db486, AUX-SPI: 0
, VPN Monitoring: -
Hard lifetime: Expires in 3440 seconds
Lifetimes Remaining: Unlimited
Soft lifetime: Expires in 2813 seconds
Mode: tunnel, Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc
Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec security-associations fpc 6 pic 1 kmd-instance all (SRX Series Devices)

```
user@host> show security ipsec security-associations fpc 6 pic 1 kmd-instance all
```

```

Total active tunnels: 1

```

ID	Gateway	Port	Algorithm	SPI	Life:sec/kb	Mon	vsys
<2	192.168.1.2	500	ESP:aes256/sha256	67a7d25d	28280/unlim	-	0
>2	192.168.1.2	500	ESP:aes256/sha256	a23cbcdc	28280/unlim	-	0

show security ipsec security-associations detail (ADVPN Suggester, Static Tunnel)

```
user@host> show security ipsec security-associations detail
```

```

ID: 70516737 Virtual-system: root, VPN Name: ZTH_HUB_VPN
Local Gateway: 192.168.1.1, Remote Gateway: 192.168.1.2

```

```

Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear
Bind-interface: st0.1

Port: 500, Nego#: 5, Fail#: 0, Def-Del#: 0 Flag: 0x608a29
Tunnel events:
Tue Nov 03 2015 01:24:27 -0800: IPsec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:24:27 -0800: IKE SA negotiation successfully completed (4
times)
Tue Nov 03 2015 01:23:38 -0800: User cleared IPsec SA from CLI (1 times)
Tue Nov 03 2015 01:21:32 -0800: IPsec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:21:31 -0800: IPsec SA delete payload received from peer,
corresponding IPsec SAs cleared (1 times)
Tue Nov 03 2015 01:21:27 -0800: IPsec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:21:13 -0800: Tunnel configuration changed. Corresponding
IKE/IPsec SAs are deleted (1 times)
Tue Nov 03 2015 01:19:27 -0800: IPsec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:19:27 -0800: Tunnel is ready. Waiting for trigger event or
peer to trigger negotiation (1 times)
Location: FPC 0, PIC 3, KMD-Instance 2
Direction: inbound, SPI: 43de5d65, AUX-SPI: 0
Hard lifetime: Expires in 1335 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 996 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled

, Replay window size: 64
Location: FPC 0, PIC 3, KMD-Instance 2
Direction: outbound, SPI: 5b6e157c, AUX-SPI: 0
Hard lifetime: Expires in 1335 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 996 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled

, Replay window size: 64

```

show security ipsec security-associations detail (ADVPN Partner, Static Tunnel)

```

user@host> show security ipsec security-associations detail

ID: 67108872 Virtual-system: root, VPN Name: ZTH_SPOKE_VPN
Local Gateway: 192.168.1.2, Remote Gateway: 192.168.1.1
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x8608a29
Tunnel events:

```

```

Tue Nov 03 2015 01:24:26 -0800: IPSec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:24:26 -0800: IKE SA negotiation successfully completed (4
times)
Tue Nov 03 2015 01:23:37 -0800: IPSec SA delete payload received from peer,
corresponding IPSec SAs cleared (1 times)
Tue Nov 03 2015 01:21:31 -0800: IPSec SA negotiation successfully completed (1
times)
Tue Nov 03 2015 01:21:31 -0800: Tunnel is ready. Waiting for trigger event or
peer to trigger negotiation (1 times)
Tue Nov 03 2015 01:18:26 -0800: Key pair not found for configured local
certificate. Negotiation failed (1 times)
Tue Nov 03 2015 01:18:13 -0800: CA certificate for configured local certificate
not found. Negotiation not initiated/successful (1 times)
Direction: inbound, SPI: 5b6e157c, AUX-SPI: 0
Hard lifetime: Expires in 941 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 556 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: 43de5d65, AUX-SPI: 0
Hard lifetime: Expires in 941 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 556 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec security-associations sa-type shortcut (ADVPN)

```

user@host> show security ipsec security-associations sa-type shortcut

Total active tunnels: 1
ID          Algorithm      SPI      Life:sec/kb  Mon lsys Port  Gateway
<268173318 ESP:aes256/sha256 6f164ee0 3580/ unlim - root 500 192.168.0.111
>268173318 ESP:aes256/sha256 e6f29cb0 3580/ unlim - root 500 192.168.0.111

```

show security ipsec security-associations sa-type shortcut detail (ADVPN)

```

user@host> show security ipsec security-associations sa-type shortcut detail

node0:
-----
ID: 67108874 Virtual-system: root, VPN Name: ZTH_SPOKE_VPN
Local Gateway: 192.168.1.2, Remote Gateway: 192.168.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Auto Discovery VPN:
  Type: Shortcut, Shortcut Role: Initiator
Version: IKEv2
DF-bit: clear, Bind-interface: st0.1
Port: 4500, Nego#: 0, Fail#: 0, Def-Del#: 0 Flag: 0x40608a29
Tunnel events:
  Tue Nov 03 2015 01:47:26 -0800: IPSec SA negotiation successfully completed
(1 times)

```

```

Tue Nov 03 2015 01:47:26 -0800: Tunnel is ready. Waiting for trigger event
or peer to trigger negotiation (1 times)
Tue Nov 03 2015 01:47:26 -0800: IKE SA negotiation successfully completed (1
times)
Direction: inbound, SPI: b7a5518, AUX-SPI: 0
Hard lifetime: Expires in 1766 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1381 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled, Replay window size: 64
Direction: outbound, SPI: b7e0268, AUX-SPI: 0
Hard lifetime: Expires in 1766 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1381 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec security-associations family inet detail

```

user@host> show security ipsec security-associations family inet detail
ID: 131073 Virtual-system: root, VPN Name: ike-vpn
Local Gateway: 192.168.1.1, Remote Gateway: 192.168.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv1
DF-bit: clear
, Copy-Outer-DSCP Enabled
Bind-interface: st0.99

Port: 500, Nego#: 116, Fail#: 0, Def-Del#: 0 Flag: 0x600a29
Tunnel events:
Fri Oct 30 2015 15:47:21 -0700: IPsec SA rekey successfully completed (115
times)
Fri Oct 30 2015 11:38:35 -0700: IKE SA negotiation successfully completed (12
times)
Mon Oct 26 2015 16:41:07 -0700: IPsec SA negotiation successfully completed (1
times)
Mon Oct 26 2015 16:40:56 -0700: Tunnel is ready. Waiting for trigger event or
peer to trigger negotiation (1 times)
Mon Oct 26 2015 16:40:56 -0700: External interface's address received.
Information updated (1 times)
Location: FPC 0, PIC 1, KMD-Instance 1
Direction: inbound, SPI: 81b9fc17, AUX-SPI: 0
Hard lifetime: Expires in 1713 seconds
Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1090 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled

, Replay window size: 64
Location: FPC 0, PIC 1, KMD-Instance 1
Direction: outbound, SPI: 727f629d, AUX-SPI: 0
Hard lifetime: Expires in 1713 seconds

```

```

Lifesize Remaining: Unlimited
Soft lifetime: Expires in 1090 seconds
Mode: Tunnel(0 0), Type: dynamic, State: installed
Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

Anti-replay service: counter-based enabled

, Replay window size: 64

```

show security ipsec security-associations detail (SRX4600)

```

user@host> show security ipsec security-associations detail
ID: 131073 Virtual-system: root, VPN Name: ike-vpn
Local Gateway: 62.1.1.3, Remote Gateway: 62.1.1.2
Local Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Remote Identity: ipv4_subnet(any:0,[0..7]=0.0.0.0/0)
Version: IKEv2
DF-bit: clear, Bind-interface: st0.0
Port: 500, Nego#: 25, Fail#: 0, Def-Del#: 0 Flag: 0x600a29
Tunnel events:
  Fri Jan 12 2007 07:50:10 -0800: IPSec SA rekey successfully completed (23
times)
Location: FPC 0, PIC 0, KMD-Instance 0
Anchorship: Thread 6
Direction: inbound, SPI: 812c9c01, AUX-SPI: 0
  Hard lifetime: Expires in 2224 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 1598 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

  Anti-replay service: counter-based enabled, Replay window size: 64
Location: FPC 0, PIC 0, KMD-Instance 0
Anchorship: Thread 7
Direction: outbound, SPI: c4de0972, AUX-SPI: 0
  Hard lifetime: Expires in 2224 seconds
  Lifesize Remaining: Unlimited
  Soft lifetime: Expires in 1598 seconds
  Mode: Tunnel(0 0), Type: dynamic, State: installed
  Protocol: ESP, Authentication: hmac-sha-256, Encryption: aes256-cbc (256 bits)

  Anti-replay service: counter-based enabled, Replay window size: 64

```

show security ipsec statistics

Syntax	<pre>show security ipsec statistics <fpc slot-number> <index SA-index-number> <kmd-instance kmd-instance-name> <pic slot-number></pre>
Release Information	Command introduced in Junos OS Release 8.5. fpc and pic options added in Junos OS Release 9.3. kmd-instance option added in Junos OS Release 10.4.
Description	Display standard IPsec statistics.
Options	<ul style="list-style-type: none"> • none—Display statistics about all IPsec security associations (SAs). • fpc slot-number—Specific to SRX Series devices. Display statistics about existing IPsec SAs in this Flexible PIC Concentrator (FPC) slot. This option is used to filter the output. • index SA-index-number—(Optional) Display statistics for the SA with this index number. • kmd-instance kmd-instance-name—Specific to SRX Series devices. Display information about existing IKE SAs in the key management process (the daemon, which in this case is KMD) identified by FPC <i>slot-number</i> and PIC <i>slot-number</i>. This option is used to filter the output. <ul style="list-style-type: none"> • all—All KMD instances running on the Services Processing Unit (SPU). • kmd-instance-name—Name of the KMD instance running on the SPU. • pic slot-number—Specific to SRX Series devices. Display statistics about existing IPsec SAs in this PIC slot. This option is used to filter the output.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear security ipsec statistics on page 1288
List of Sample Output	show security ipsec statistics on page 1411 show security ipsec statistics index 131073 on page 1412 show security ipsec statistics fpc 6 pic 1 (SRX Series devices) on page 1412
Output Fields	Table 128 on page 1411 lists the output fields for the show security ipsec statistics command. Output fields are listed in the approximate order in which they appear.

Table 128: show security ipsec statistics Output Fields

Field Name	Field Description
Virtual-system	The root system.
ESP Statistics	<ul style="list-style-type: none"> • Encrypted bytes—Total number of bytes encrypted by the local system across the IPsec tunnel. • Decrypted bytes—Total number of bytes decrypted by the local system across the IPsec tunnel. • Encrypted packets—Total number of packets encrypted by the local system across the IPsec tunnel. • Decrypted packets—Total number of packets decrypted by the local system across the IPsec tunnel.
AH Statistics	<ul style="list-style-type: none"> • Input bytes—Total number of bytes received by the local system across the IPsec tunnel. • Output bytes—Total number of bytes transmitted by the local system across the IPsec tunnel. • Input packets—Total number of packets received by the local system across the IPsec tunnel. • Output packets—Total number of packets transmitted by the local system across the IPsec tunnel.
Errors	<ul style="list-style-type: none"> • AH authentication failures—Total number of authentication header (AH) failures. An AH failure occurs when there is a mismatch of the authentication header in a packet transmitted across an IPsec tunnel. • Replay errors—Total number of replay errors. A replay error is generated when a duplicate packet is received within the replay window. • ESP authentication failures—Total number of Encapsulation Security Payload (ESP) failures. An ESP failure occurs when there is an authentication mismatch in ESP packets. • ESP decryption failures—total number of ESP decryption errors. • Bad headers—Total number of invalid headers detected. • Bad trailers—Total number of invalid trailers detected.

Sample Output

show security ipsec statistics

```

user@host> show security ipsec statistics

Virtual-system: Root
ESP Statistics:
  Encrypted bytes:          0
  Decrypted bytes:         0
  Encrypted packets:       0
  Decrypted packets:       0
AH Statistics:
  Input bytes:             0
  Output bytes:            0
  Input packets:           0
  Output packets:          0
Errors:
  AH authentication failures: 0, Replay errors: 0

```

```
ESP authentication failures: 0, ESP decryption failures: 0
Bad headers: 0, Bad trailers: 0
```

Sample Output

show security ipsec statistics index 131073

```
user@host> show security ipsec statistics index 131073
```

```
ESP Statistics:
  Encrypted bytes:      952
  Decrypted bytes:      588
  Encrypted packets:    7
  Decrypted packets:    7
AH Statistics:
  Input bytes:          0
  Output bytes:         0
  Input packets:        0
  Output packets:       0
Errors:
  AH authentication failures: 0, Replay errors: 0
  ESP authentication failures: 0, ESP decryption failures: 0
  Bad headers: 0, Bad trailers: 0
FC Name      Encrypted Pkts  Decrypted Pkts  Encrypted bytes  Decrypted bytes
best-effort  7                7                952              588

custom_q1    0                0                0                0
custom_q2    0                0                0                0
network-control 0                0                0                0
custom_q4    0                0                0                0
custom_q5    0                0                0                0
custom_q6    0                0                0                0
custom_q7    0                0                0                0
default      0                0                0                0
```

Starting with Junos OS Release 18.2R1, the CLI **show security ipsec statistics index 131073** *index-number* output displays statistics for each forwarding class name.

Sample Output

show security ipsec statistics fpc 6 pic 1 (SRX Series devices)

```
user@host> show security ipsec statistics fpc 6 pic 1
```

```
ESP Statistics:
  Encrypted bytes:      536408
  Decrypted bytes:      696696
  Encrypted packets:    1246
  Decrypted packets:    888
AH Statistics:
```



```
Input bytes:          0
Output bytes:         0
Input packets:        0
Output packets:       0
Errors:
AH authentication failures: 0, Replay errors: 0
ESP authentication failures: 0, ESP decryption failures: 0
Bad headers: 0, Bad trailers: 0
```

show security ipsec traffic-selector

Syntax	<pre>show security ipsec traffic-selector interface-name <i>interface-name</i> <brief detail> <destination-address <i>address</i>> <fpc slot-number pic slot-number> <kmd-instance (all <i>kmd-instance-name</i>)> <pic slot-number fpc slot-number> <source-address <i>address</i>></pre>
Release Information	Command introduced in Junos OS Release 12.3X48-D10.
Description	Display information about the traffic selectors that have been negotiated between the initiator and responder.
Options	<p>interface-name <i>interface-name</i>—Name of the secure tunnel logical interface.</p> <p>brief detail—(Optional) Display the specified level of output. The default is brief.</p> <p>destination-address <i>address</i>—(Optional) Destination IP address.</p> <p>fpc slot-number pic slot-number—(Optional) Display information about existing traffic selectors on the specified Flexible PIC Concentrator (FPC) slot and PIC slot.</p> <p>kmd-instance—(Optional) Display information about existing traffic selectors in the key management process (in this case, it is KMD) identified by FPC slot-number and PIC slot-number. This option is used to filter the output.</p> <ul style="list-style-type: none"> all—All KMD instances running on the Services Processing Unit (SPU). kmd-instance-name—Name of the KMD instance running on the SPU. <p>pic slot-number fpc slot-number—(Optional) Display information about existing traffic selectors on the specified PIC slot and FPC slot.</p> <p>source-address <i>address</i>—(Optional) Source IP address.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> IPsec VPN Overview on page 31
List of Sample Output	show security ipsec traffic-selector interface-name st0.1 detail on page 1415
Output Fields	Table 129 on page 1415 lists the output fields for the show security ipsec traffic-selector command. Output fields are listed in the approximate order in which they appear.

Table 129: show security ipsec traffic-selector Output Fields

Field Name	Field Description	Level of Output
Tunnel-id	Tunnel ID.	All levels
Interface	Secure tunnel (st0) interface for the traffic selector.	All levels
IKE-ID	Peer IKE ID for the negotiated traffic selector.	All levels
Source IP	Source IP address for the negotiated traffic selector.	All levels
Destination IP	Destination IP address for the negotiated traffic selector.	All levels

Sample Output

show security ipsec traffic-selector interface-name st0.1 detail

```

user@host> show security ipsec traffic-selector interface-name st0.1 detail

Tunnel ID: 6920601, Interface: st0.1
IKE-ID: DC=Common_component, CN=enodeA, OU=Dept, O=Company, L=City, ST=CA, C=US
Source IP: ipv4 (192.0.2.0-192.0.2.255)
Destination IP: ipv4 (198.51.100.0-198.51.100.255)

Tunnel ID: 77594626, Interface: st0.1
IKE-ID: DC=Common_component, CN=enodeB, OU=Det, O=Company, L=City, ST=CA, C=US
Source IP: ipv4 (192.0.2.0-192.0.2.255)
Destination IP: ipv4 (203.0.113.0-203.0.113.255)

```

show security ipsec tunnel-distribution

Syntax	<code>show security ipsec tunnel-distribution</code> <code><brief summary></code>
Release Information	Command introduced in Junos OS Release 17.4R1 for SRX4600 devices. Command introduced in Junos OS Release 18.2R2 for SRX5400, SRX5600, and SRX5800 devices.
Description	<p>Display the number of IPsec VPN tunnels that are anchored in each thread. An IPsec tunnel session is assigned an anchor thread, based on the load during the tunnel session installation. When a new tunnel session is created, the least loaded thread is chosen to anchor the new tunnel. When the tunnel is deleted, the anchor mapping is removed from the control plane.</p> <p>Tunnel distribution across different Services Processing Unit (SPU) or equivalent is based on the number of tunnels and not on throughput in each tunnel. Tunnels anchored in a SPU are not transferred to a different SPU or equivalent during SPU failure.</p>
Options	<p>none—Display thread information about all active tunnels.</p> <p>brief—(Optional) Display thread information about all active tunnels. (Default)</p> <p>summary—(Optional) Display the number of tunnels anchored to each thread.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> show security ipsec security-associations on page 1393
List of Sample Output	show security ipsec tunnel-distribution on page 1417 show security ipsec tunnel-distribution summary on page 1417 show security ipsec tunnel-distribution fpc 0 pic 0 on page 1417 show security ipsec tunnel-distribution fpc 0 pic 1 on page 1418 show security ipsec tunnel-distribution summary fpc 0 pic 0 on page 1418 show security ipsec tunnel-distribution summary fpc 0 pic 1 on page 1418
Output Fields	Table 130 on page 1416 lists the output fields for the show security ipsec tunnel-distribution command. Output fields are listed in the approximate order in which they appear.

Table 130: show security ipsec tunnel-distribution Output Fields

Field Name	Field Description	Level of Output
Tunnel-ID	VPN tunnel identifier.	brief
Thread-ID	Thread identifier.	All levels

Table 130: show security ipsec tunnel-distribution Output Fields (continued)

Field Name	Field Description	Level of Output
Number of Tunnels	The number of tunnels anchored to the thread.	summary

Sample Output

show security ipsec tunnel-distribution

```
user@host> show security ipsec tunnel-distribution
```

Tunnel-ID	FPC	PIC	Thread-ID
500006	0	1	4
500012	0	1	8
500009	0	1	6
500002	0	1	1
500005	0	1	3
500001	0	0	15
500008	0	1	5
500010	0	0	18
500004	0	0	16
500003	0	1	2
500011	0	1	7
500007	0	0	17

show security ipsec tunnel-distribution summary

```
user@host> show security ipsec tunnel-distribution summary
```

Number of Tunnels	FPC	PIC	Thread-ID
1	0	0	15
1	0	0	16
1	0	0	17
1	0	0	18
1	0	1	1
1	0	1	2
1	0	1	3
1	0	1	4
1	0	1	5
1	0	1	6
1	0	1	7
1	0	1	8

show security ipsec tunnel-distribution fpc 0 pic 0

```
user@host> show security ipsec tunnel-distribution fpc 0 pic 0
```

Tunnel-ID	FPC	PIC	Thread-ID
500001	0	0	15
500010	0	0	18
500004	0	0	16
500007	0	0	17

show security ipsec tunnel-distribution fpc 0 pic 1

```
user@host> show security ipsec tunnel-distribution fpc 0 pic 1
```

Tunnel-ID	FPC	PIC	Thread-ID
500006	0	1	4
500012	0	1	8
500009	0	1	6
500002	0	1	1
500005	0	1	3
500008	0	1	5
500003	0	1	2
500011	0	1	7

show security ipsec tunnel-distribution summary fpc 0 pic 0

```
user@host> show security ipsec tunnel-distribution summary fpc 0 pic 0
```

Number of Tunnels	FPC	PIC	Thread-ID
1	0	0	15
1	0	0	16
1	0	0	17
1	0	0	18
0	0	0	19
0	0	0	20
0	0	0	21
0	0	0	22
0	0	0	23
0	0	0	24
0	0	0	25
0	0	0	26
0	0	0	27

show security ipsec tunnel-distribution summary fpc 0 pic 1

```
user@host> show security ipsec tunnel-distribution summary fpc 0 pic 1
```

Number of Tunnels	FPC	PIC	Thread-ID
1	0	1	1
1	0	1	2
1	0	1	3
1	0	1	4
1	0	1	5
1	0	1	6
1	0	1	7
1	0	1	8
0	0	1	9
0	0	1	10
0	0	1	11
0	0	1	12
0	0	1	13
0	0	1	15
0	0	1	16
0	0	1	17
0	0	1	18
0	0	1	19
0	0	1	20

0	0	1	21
0	0	1	22
0	0	1	23
0	0	1	24
0	0	1	25
0	0	1	26
0	0	1	27

show security ipsec tunnel-events-statistics

Syntax `show security ipsec tunnel-events-statistics`

Release Information Command introduced in Junos OS Release 12.3X48-D10.
Starting with Junos OS Release 15.1X49-D120, you can configure the CLI option **reject-duplicate-connection** at the `[edit security ike gateway gateway-name dynamic]` hierarchy level to retain an existing tunnel session and reject negotiation requests for a new tunnel with the same IKE ID. By default, an existing tunnel is tear down when a new tunnel with the same IKE ID is established. The **reject-duplicate-connection** option is only supported when **ike-user-type group-ike-id** or **ike-user-type shared-ike-id** is configured for the IKE gateway; the **aaa access-profile *profile-name*** configuration is not supported with this option.



NOTE: Use the CLI option **reject-duplicate-connection** only when you are certain that reestablishment of a new tunnel with the same IKE ID should be rejected.

Description Show tunnel event statistics.

Required Privilege Level view

Related Documentation • [clear security ipsec tunnel-events-statistics](#)

List of Sample Output [show security ipsec tunnel-events statistics on page 1420](#)

Sample Output

`show security ipsec tunnel-events statistics`

```
user@host> show security ipsec tunnel-events statistics
IPSec SA delete payload received from peer           : 153
Configuration change triggered clearing of IPSec SA   : 1
Peer's remote IKE-ID validation failed during negotiation : 2
Phase1 proposal mismatch detected                     : 2
Phase2 proposal mismatch detected                     : 2
Peer proposed traffic-selectors are not in configured range : 8576
Negotiation failed as peer did not respond           : 4
IKE SA negotiation successfully completed              : 19
IPSec SA negotiation successfully completed           : 154
PKI validation failed: Peer's CA not configured in trusted-CA-group in IKE policy : 1
Tunnel is ready. Waiting for trigger event or peer to trigger negotiation : 1
```


show security pki ca-certificate (View)

Syntax `show security pki ca-certificate
<brief | detail>
<ca-profile ca-profile-name >`

Release Information Command modified in Junos OS Release 8.5. Subject string output field added in Junos OS Release 12.1X44-D10. Policy identifier output field added in Junos OS Release 12.3X48-D10.

Description Display information about the certificate authority (CA) public key infrastructure (PKI) digital certificates configured on the device.



NOTE: The FIPS image does not permit the use of MD5 fingerprints. Therefore, MD5 fingerprints are not included when a certificate is displayed using this command. The SHA-1 fingerprint that is currently displayed is retained in the FIPS image. The Simple Certificate Enrollment Protocol (SCEP) is disabled in the FIPS image.

- Options**
- **none**—Display basic information about all configured CA certificates.
 - **brief | detail**—(Optional) Display the specified level of output.
 - **ca-profile *ca-profile-name***— (Optional) Display information about only the specified CA certificate.

Required Privilege Level view

- Related Documentation**
- [ca-profile \(Security PKI\)](#)
 - [request security pki ca-certificate verify \(Security\)](#)

List of Sample Output [show security pki ca-certificate ca-profile RootCA brief on page 1423](#)
[show security pki ca-certificate ca-profile RootCA detail on page 1423](#)
[show security pki ca-certificate ca-profile ca-tmp detail on page 1423](#)

Output Fields [Table 131 on page 1421](#) lists the output fields for the **show security pki ca-certificate** command. Output fields are listed in the approximate order in which they appear.

Table 131: show security pki ca-certificate Output Fields

Field Name	Field Description
Certificate identifier	Name of the digital certificate.

Table 131: show security pki ca-certificate Output Fields (continued)

Field Name	Field Description
Certificate version	Revision number of the digital certificate.
Serial number	Unique serial number of the digital certificate.
Issuer	<p>Authority that issued the digital certificate, including details of the authority organized using the distinguished name format. Possible subfields are:</p> <ul style="list-style-type: none"> • Organization—Organization of origin. • Organizational unit—Department within an organization. • Country—Country of origin. • Locality—Locality of origin. • Common name—Name of the authority.
Subject	<p>Details of the digital certificate holder organized using the distinguished name format. Possible subfields are:</p> <ul style="list-style-type: none"> • Organization—Organization of origin. • Organizational unit—Department within an organization. • Country—Country of origin. • Locality—Locality of origin. • Common name—Name of the authority. <p>If the certificate contains multiple subfield entries, all entries are displayed.</p>
Subject string	Subject field as it appears in the certificate.
Validity	<p>Time period when the digital certificate is valid. Values are:</p> <ul style="list-style-type: none"> • Not before—Start time when the digital certificate becomes valid. • Not after—End time when the digital certificate becomes invalid.
Public key algorithm	Encryption algorithm used with the private key, such as rsaEncryption(1024 bits) .
Signature algorithm	Encryption algorithm that the CA used to sign the digital certificate, such as sha1WithRSAEncryption .
Certificate Policy	Policy Identifier —One or more policy object identifiers (OIDs).
Use for key	Use of the public key, such as Certificate signing , CRL signing , Digital signature , or Data encipherment .
Fingerprint	Secure Hash Algorithm (SHA1) and Message Digest 5 (MD5) hashes used to identify the digital certificate.
Distribution CRL	Distinguished name information and the URL for the certificate revocation list (CRL) server.

Sample Output

show security pki ca-certificate ca-profile RootCA brief

```
user@host> show security pki ca-certificate ca-profile RootCA brief
Certificate identifier: RootCA
Issued to: RootCA, Issued by: C = US, O = example, CN = RootCA
Validity:
  Not before: 05- 3-2012 07:15
  Not after: 05- 2-2017 07:15
Public key algorithm: rsaEncryption(1024 bits)
```

Sample Output

show security pki ca-certificate ca-profile RootCA detail

```
user@host> show security pki ca-certificate ca-profile RootCA detail
Certificate identifier: RootCA
Certificate version: 3
Serial number: 0712dc31
Issuer:
  Organization: example, Country: US, Common name: RootCA
Subject:
  Organization: example, Country: US, Common name: RootCA
Subject string:
  C=US, O=example, CN=RootCA
Validity:
  Not before: 05- 3-2012 07:15
  Not after: 05- 2-2017 07:15
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:ac:b0:c0:11:ac:0c:34:37:04:97:65:c2:b1
ae:7e:68:e0:fa:37:23:a1:f0:eb:4d:eb:03:89:c9:d9:0d:34:f3:66
91:97:8c:e9:9c:d4:b5:55:8d:c1:e2:8b:95:08:9d:29:f8:ab:ac:ff
ae:af:f7:bc:4b:33:f2:eb:b9:e6:13:6d:18:d7:64:a7:85:78:99:41
4e:b4:fa:bc:3e:1b:5c:26:25:89:03:af:e9:c6:e9:9e:7b:74:1a:1a
5b:b4:2a:48:78:57:68:e2:5c:0b:71:71:78:ac:a2:23:5f:ca:d2:4a
38:4c:35:5a:20:cc:44:39:96:26:20:43:bd:75:fd:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Use for key: CRL signing, Certificate signing, Key encipherment,
Digital signature
Fingerprint:
  eb:2a:2a:eb:d3:c7:cb:62:65:2e:6a:76:56:b8:af:88:51:8a:30:c9 (sha1)
  cd:43:ae:a4:b2:11:9e:cf:1a:47:fd:7f:0c:ce:d9:fd (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started
```

Sample Output

show security pki ca-certificate ca-profile ca-tmp detail

```
user@host> show security pki ca-certificate ca-profile ca-tmp detail
Certificate identifier: ca-tmp
Certificate version: 3
Serial number: 00000047
Issuer:
```

```
Organization: Example,
Organizational unit: DoD, Organizational unit: Testing, Country: US,
Common name: Trust Anchor
Subject:
Organization: Example,
Organizational unit: Dod, Organizational unit: Testing, Country: US,
Common name: CA1-PP.01.03
Subject string:
C=US, O=Example, OU=Example, OU=Testing, CN=CA1-PP.01.03
Validity:
Not before: 01- 1-1998 12:01 UTC
Not after: 01- 1-2048 12:01 UTC
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:cb:fd:78:0c:be:87:ac:cd:c0:33:66:a3:18
9e:fd:40:b7:9b:bc:dc:66:ff:08:45:f7:7e:fe:8e:d6:32:f8:5b:75
db:76:f0:4d:21:9a:6e:4f:04:21:4c:7e:08:a1:f9:3d:ac:8b:90:76
44:7b:c4:e9:9b:93:80:2a:64:83:6e:6a:cd:d8:d4:23:dd:ce:cb:3b
b5:ea:da:2b:40:8d:ad:a9:4d:97:58:cf:60:af:82:94:30:47:b7:7d
88:c3:76:c0:97:b4:6a:59:7e:f7:86:5d:d8:1f:af:fb:72:f1:b8:5c
2a:35:1e:a7:9e:14:51:d4:19:ae:c7:5c:65:ea:f5:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Certificate Policy:
Policy Identifier = 2.16.840.1.101.3.1.48.2
Use for key: CRL signing, Certificate signing
Fingerprint:
e0:b3:2f:2e:a1:c5:ee:ad:af:dd:96:85:f6:78:24:c5:89:ed:39:40 (sha1)
f3:47:6e:55:bc:9d:80:39:5a:40:70:8b:10:0e:93:c5 (md5)
```

show security pki certificate-request (View)

Syntax	show security pki certificate-request <brief detail> <certificate-id <i>certificate-id-name</i> >
Release Information	Command modified in Junos OS Release 8.5.
Description	Display information about manually generated local digital certificate requests that are stored on the device.
Options	<ul style="list-style-type: none"> • none—Display basic information about all local digital certificate requests. • brief detail—(Optional) Display the specified level of output. • certificate-id <i>certificate-id-name</i> —(Optional) Display information about only the specified local digital certificate requests.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear security pki key-pair (Local Certificate) on page 1290
List of Sample Output	show security pki certificate-request certificate-id user brief on page 1426 show security pki certificate-request certificate-id user detail on page 1426
Output Fields	Table 132 on page 1425 lists the output fields for the show security pki certificate-request command. Output fields are listed in the approximate order in which they appear.

Table 132: show security pki certificate-request Output Fields

Field Name	Field Description
Certificate identifier	Name of the digital certificate.
Certificate version	Revision number of the digital certificate.
Issued to	Device that was issued the digital certificate.
Subject	<p>Details of the digital certificate holder organized using the distinguished name format. Possible subfields are:</p> <ul style="list-style-type: none"> • Organization—Organization of origin. • Organizational unit—Department within an organization. • Country—Country of origin. • Locality—Locality of origin. • Common name—Name of the authority.

Table 132: show security pki certificate-request Output Fields (continued)

Field Name	Field Description
Alternate subject	Domain name or IP address of the device related to the digital certificate.
Public key algorithm	Encryption algorithm used with the private key, such as <code>rsaEncryption(1024 bits)</code> .
Public key verification status	Public key verification status: Failed or Passed . The detail output also provides the verification hash.
Fingerprint	Secure Hash Algorithm (SHA1) and Message Digest 5 (MD5) hashes used to identify the digital certificate.
Use for key	Use of the public key, such as Certificate signing , CRL signing , Digital signature , or Data encipherment .

Sample Output

show security pki certificate-request certificate-id user brief

```
user@host> show security pki certificate-request certificate-id hassan brief
```

```
Certificate identifier: user
  Issued to: user@example.net
  Public key algorithm: rsaEncryption(1024 bits)
```

Sample Output

show security pki certificate-request certificate-id user detail

```
user@host> show security pki certificate-request certificate-id hassan detail
```

```
Certificate identifier: user
Certificate version: 3
Subject:
  Organization: example, Organizational unit: example, Country: IN,
  Common name: user1
Alternate subject: 192.168.72.124
Public key algorithm: rsaEncryption(1024 bits)
Public key verification status: Passed
  c7:a4:fb:e7:8c:4f:31:e7:eb:01:d8:32:65:21:f2:eb:6f:7d:49:1a:c3:9b
  63:47:e2:4f:f6:db:f6:c8:75:dd:e6:ec:0b:35:0a:62:32:45:6b:35:1f:65
  c9:66:b7:40:b2:f9:2a:ab:5b:60:f7:c7:73:36:da:68:25:fc:40:4b:12:3c
  d5:c8:c6:66:f6:10:1e:86:67:a8:95:9b:7f:1c:ae:a7:55:b0:28:95:a7:9a
  a2:24:28:e4:5a:b2:a9:06:7a:69:37:20:15:e1:b6:66:eb:22:b5:b6:77:f6
  65:88:b0:94:2b:91:4b:99:78:4a:e3:56:cc:14:45:d7:97:fd
Fingerprint:
  8f:22:1a:f2:9f:27:b0:21:6c:da:46:64:31:34:1f:68:42:5a:39:e0 (sha1)
  09:15:11:aa:ea:f9:5a:b5:70:d7:0b:8e:be:a6:d3:cb (md5)
Use for key: Digital signature
```

show security pki crt (View)

Syntax `show security pki crt
< brief | detail >
<ca-profile ca-profile-name >`

Release Information Command modified in Junos OS Release 8.5.

Description Display information about the certificate revocation lists (CRLs) configured on the device.

- Options**
- **none**—Display basic information about all CRLs.
 - **brief | detail**—(Optional) Display the specified level of output.
 - **ca-profile *ca-profile-name***— (Optional) Display information about only the specified CA profile.

Required Privilege Level view

Related Documentation

- [crl \(Security\) on page 1104](#)

List of Sample Output [show security pki crt ca-profile ca2 on page 1428](#)
[show security pki crt ca-profile ca2 brief on page 1428](#)
[show security pki crt ca-profile ca2 detail on page 1428](#)

Output Fields [Table 133 on page 1427](#) lists the output fields for the **show security pki crt** command. Output fields are listed in the approximate order in which they appear.

Table 133: show security pki crt Output Fields

Field Name	Field Description
CA profile	Name of the configured CA profile.
CRL version	Revision number of the certificate revocation list.
CRL issuer	Authority that issued the digital certificate, including details of the authority organized using the distinguished name format. Possible subfields are: <ul style="list-style-type: none"> • emailAddress—Mail address of the issuing authority. • C—Country of origin. • ST—State of origin. • L—Locality of origin. • O—Organization of origin. • OU—Department within an organization. • CN—Name of the authority.

Table 133: show security pki crl Output Fields (continued)

Field Name	Field Description
Effective date	Date and time the certificate revocation list becomes valid.
Next update	Date and time the routing platform will download the latest version of the certificate revocation list.
Revocation List	<p>List of digital certificates that have been revoked before their expiration date. Values are:</p> <ul style="list-style-type: none"> • Serial number—Unique serial number of the digital certificate. • Revocation date—Date and time that the digital certificate was revoked.

Sample Output

show security pki crl ca-profile ca2

```

user@host> show security pki crl ca-profile ca2
CA profile: ca2
CRL version: V00000001
CRL issuer: emailAddress = user@example.net, C = US, ST = ca, L = sunnyvale, O
= , OU = SPG QA, CN = 2000-spg-example-net
Effective date: 04-26-2007 18:47
Next update: 05- 4-2007 07:07

```

Sample Output

show security pki crl ca-profile ca2 brief

```

user@host> show security pki crl ca-profile ca2 brief
CA profile: ca2
CRL version: V00000001
CRL issuer: emailAddress = user@example.net, C = US, ST = ca, L = sunnyvale, O
= example networks, OU = SPG QA, CN = 2000-spg-example-net
Effective date: 04-26-2007 18:47
Next update: 05- 4-2007 07:07

```

Sample Output

show security pki crl ca-profile ca2 detail

```

user@host> show security pki crl ca-profile ca2 detail
CA profile: ca2
CRL version: V00000001
CRL issuer: emailAddress = user@example.net, C = US, ST = ca, L = sunnyvale, O
= example, OU = SPG QA, CN = 2000-spg-example-net
Effective date: 04-26-2007 18:47
Next update: 05- 4-2007 07:07
Revocation List:
  Serial number      Revocation date
  174e639900000000506 03-16-2007 23:09
  174ef3f3000000000507 03-16-2007 23:09

```


17529cd6000000000508	03-16-2007 23:09
1763ac26000000000509	03-16-2007 23:09
21904e5700000000050a	03-16-2007 23:09
2191cf7900000000050b	03-16-2007 23:09
21f10eb600000000050c	03-16-2007 23:09
2253ca2a00000000050f	03-16-2007 23:09
2478939b000000000515	03-16-2007 23:09
24f35004000000000516	03-16-2007 23:09
277ddfa8000000000517	03-16-2007 23:09
277e97bd000000000518	03-16-2007 23:09
27846a76000000000519	03-16-2007 23:09
2785176f00000000051a	03-16-2007 23:09

show security pki local-certificate (View)

Syntax	<pre>show security pki local-certificate < brief detail > < certificate-id <i>certificate-id-name</i> > <system-generated></pre>
Release Information	Command modified in Junos OS Release 9.1. Subject string output field added in Junos OS Release 12.1X44-D10.
Description	Display information about the local digital certificates, corresponding public keys, and the automatically generated self-signed certificate configured on the device.
Options	<ul style="list-style-type: none"> • none—Display basic information about all configured local digital certificates, corresponding public keys, and the automatically generated self-signed certificate. • brief detail—(Optional) Display the specified level of output. • certificate-id <i>certificate-id-name</i> —(Optional) Display information about only the specified local digital certificates and corresponding public keys. • system-generated—Display information about the automatically generated self-signed certificate.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear security pki local-certificate (Device) on page 1291 • request security pki local-certificate generate-self-signed (Security) on page 1312
List of Sample Output	show security pki local-certificate certificate-id hello on page 1432 show security pki local-certificate certificate-id hello detail on page 1432 show security pki local-certificate system-generated on page 1433 show security pki local-certificate system-generated detail on page 1433 show security pki local-certificate certificate-id mycert - (local certificate enrolled online using SCEP) on page 1434 show security pki local-certificate certificate-id mycert detail - (local certificate enrolled online using SCEP) on page 1434 show security pki local-certificate detail on page 1435
Output Fields	Table 134 on page 1431 lists the output fields for the show security pki local-certificate command. Output fields are listed in the approximate order in which they appear.

Table 134: *show security pki local-certificate Output Fields*

Field Name	Field Description
Certificate identifier	Name of the digital certificate.
Certificate version	Revision number of the digital certificate.
Serial number	Unique serial number of the digital certificate.
Issued to	Device that was issued the digital certificate.
Issued by	Authority that issued the digital certificate.
Issuer	<p>Authority that issued the digital certificate, including details of the authority organized using the distinguished name format. Possible subfields are:</p> <ul style="list-style-type: none"> • Organization—Organization of origin. • Organizational unit—Department within an organization. • Country—Country of origin. • Locality—Locality of origin. • Common name—Name of the authority.
Subject	<p>Details of the digital certificate holder organized using the distinguished name format. Possible subfields are:</p> <ul style="list-style-type: none"> • Organization—Organization of origin. • Organizational unit—Department within an organization. • Country—Country of origin. • Locality—Locality of origin. • Common name—Name of the authority. • Serial number—Serial number of the device. <p>If the certificate contains multiple subfield entries, all entries are displayed.</p>
Subject string	Subject field as it appears in the certificate.
Alternate subject	Domain name or IP address of the device related to the digital certificate.
Validity	<p>Time period when the digital certificate is valid. Values are:</p> <ul style="list-style-type: none"> • Not before—Start time when the digital certificate becomes valid. • Not after—End time when the digital certificate becomes invalid.
Public key algorithm	Encryption algorithm used with the private key, such as rsaEncryption(1024 bits) .
Public key verification status	Public key verification status: Failed or Passed . The detail output also provides the verification hash.
Signature algorithm	Encryption algorithm that the CA used to sign the digital certificate, such as sha1WithRSAEncryption .

Table 134: show security pki local-certificate Output Fields (continued)

Field Name	Field Description
Fingerprint	Secure Hash Algorithm (SHA1) and Message Digest 5 (MD5) hashes used to identify the digital certificate.
Distribution CRL	Distinguished name information and URL for the certificate revocation list (CRL) server.
Use for key	Use of the public key, such as Certificate signing, CRL signing, Digital signature, or Data encipherment.

Sample Output

show security pki local-certificate certificate-id hello

```

user@host> show security pki local-certificate certificate-id hello

Certificate identifier: hello
Issued to: cn1, Issued by: DC = local, DC = demo, CN = domain-example-WIN-CA
Validity:
  Not before: 08- 8-2012 17:02
  Not after: 08- 8-2014 17:02
Public key algorithm: rsaEncryption(1024 bits)

```

Sample Output

show security pki local-certificate certificate-id hello detail

```

user@host> show security pki local-certificate certificate-id hello detail

Certificate identifier: hello
Certificate version: 3
Serial number: 61ba9da000000000d72e
Issuer:
  Common name: Example-CA,
  Domain component: local, Domain component: demo
Subject:
  Organization: o1, Organization: o2,
  Organizational unit: ou1, Organizational unit: ou2, Country: US, State: CA,
  Locality: Sunnyvale, Common name: cn1, Common name: cn2,
  Domain component: dc1, Domain component: dc2
Subject string:
  C=Example, DC=dc1, DC=dc2, ST=CA, L=Sunnyvale, O=o1, O=o2, OU=ou1, OU=ou2,
CN=cn1, CN=cn2
Alternate subject: "user@example.net", user.example.net, 192.0.2.1
Validity:
  Not before: 08- 8-2012 17:02
  Not after: 08- 8-2014 17:02
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:b4:14:01:d5:4f:79:87:d5:bb:e6:5e:c1:14
97:da:b4:40:ad:1a:77:3e:ec:2e:68:8e:e4:93:a3:fe:7c:0b:58:af
e1:20:27:82:ca:8d:6f:f0:97:d1:ad:fe:df:6c:cb:3c:b0:4f:cc:dd
ac:d8:69:3f:3c:59:b5:2a:c6:83:e8:b3:94:5e:0a:2d:cd:e2:b0:15
3e:97:a7:8a:4e:fb:59:f7:20:4c:ba:a8:80:3e:ba:be:69:ef:2b:32
e4:1a:1c:24:53:1b:d5:c3:aa:d4:25:73:96:76:ea:49:d4:da:7e:3e
0c:c6:6b:22:43:cb:04:84:0d:25:33:07:6b:49:41:02:03:01:00:01

```

```

Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  ldap:///Example-CA,CN=cn-win,CN=CDP,CN=Public%20Key
%20Services,CN=Services,CN=Configuration,DC=demo,DC=local?certificateRevocationList?base?
objectClass=cRLDistributionPoint
  http://example.example.net/CertEnroll/Example-CA.crl
Use for key: Key encipherment, Digital signature, 1.3.6.1.5.5.8.2.2,
1.3.6.1.5.5.8.2.2
Fingerprint:
  76:a8:5f:65:b4:bf:bd:10:d8:56:82:65:ff:0d:04:3a:a5:e9:41:dd (sha1)
  8f:99:a4:15:98:10:4b:b6:1a:3d:81:13:93:2a:ac:e7 (md5)
Auto-re-enrollment:
  Status: Disabled
  Next trigger time: Timer not started

```

Sample Output

show security pki local-certificate system-generated

```

user@host> show security pki local-certificate system-generated

Certificate identifier: system-generated
  Issued to: JN10B9390AGB, Issued by: CN = JN10B9390AGB, CN = system generated,
CN = self-signed
  Validity:
    Not before: 10-30-2009 23:02
    Not after: 10-29-2014 23:02
  Public key algorithm: rsaEncryption(1024 bits)

```

Sample Output

show security pki local-certificate system-generated detail

```

user@host> show security pki local-certificate system-generated detail

Certificate identifier: system-generated
  Certificate version: 3
  Serial number: e90d42ebd14ef954b3e48c2eed5b30fb
  Issuer:
    Common name: JN10B9390AGB, Common name: system generated, Common name:
self-signed
  Subject:
    Common name: JN10B9390AGB, Common name: system generated, Common name:
self-signed
  Subject string:
    CN=JN10B9390AGB, CN=system generated, CN=self-signed
  Validity:
    Not before: 10-30-2009 23:02
    Not after: 10-29-2014 23:02
  Public key algorithm: rsaEncryption(1024 bits)
    30:81:89:02:81:81:00:cb:c8:3f:e6:d3:e5:ca:9d:dc:2d:e9:ca:c7
    5f:b1:f5:3a:f0:1c:a7:55:43:0f:ef:fd:1c:fe:29:09:d5:37:d0:fa
    d6:ee:bc:b8:3f:58:d4:31:fb:96:4f:4f:cc:a9:1a:8f:2e:1b:50:6f
    2b:88:34:74:b2:6d:ad:94:b5:dd:3d:80:87:56:d0:42:50:4d:ac:d7
    8c:21:06:2d:07:1e:f4:d0:c7:85:2e:25:60:ad:1b:b5:b2:d2:1d:c8
    79:67:8c:56:06:04:75:6e:be:4e:99:b8:07:e6:9a:11:fe:b5:ec:c0
    1e:68:da:47:99:1b:b2:c8:07:ab:cd:6e:fe:c1:fd:02:03:01:00:01
  Signature algorithm: sha1WithRSAEncryption
  Fingerprint:

```

```

be:1f:21:13:71:cd:9d:de:7a:41:d7:4c:52:8d:3e:d6:ba:db:75:96 (sha1)
ba:fc:90:4b:5f:a8:66:a3:b9:64:89:9f:e2:45:b5:84 (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started

```

Sample Output

show security pki local-certificate certificate-id mycert - (local certificate enrolled online using SCEP)

```

user@host> show security pki local-certificate certificate-id mycert

Certificate identifier: mycert
Issued to: bubba, Issued by: DC = local, DC = demo, CN = domain-example-WIN-CA

Validity:
  Not before: 11-15-2012 18:58
  Not after: 11-15-2014 18:58
Public key algorithm: rsaEncryption(1024 bits)

```

Sample Output

show security pki local-certificate certificate-id mycert detail - (local certificate enrolled online using SCEP)

```

user@host> show security pki local-certificate certificate-id mycert detail

Certificate identifier: mycert
Certificate version: 3
Serial number: 1f00b50a000000013ad2
Issuer:
  Common name: Example-CA,
  Domain component: local, Domain component: demo
Subject:
  Organization: example, Organizational unit: SSD, Country: US,
  Common name: host1, Serial number: SRX240-11152012
Subject string:
  serialNumber=SRX240-11152012, C=US, O=example, OU=SSD, CN=host1
Alternate subject: "user@example.net", user.example.net, 192.0.2.1
Validity:
  Not before: 11-15-2012 18:58
  Not after: 11-15-2014 18:58
Public key algorithm: rsaEncryption(1024 bits)
30:81:89:02:81:81:00:e3:e5:ae:c0:82:af:db:94:01:2f:56:46:50
7d:3d:0b:0c:f0:1f:1d:7d:c3:aa:d4:4c:a0:cd:23:8b:3f:47:05:ee
7b:65:42:a0:dc:c4:ac:a7:b6:a6:9f:5c:ea:d8:22:b0:bf:03:75:09
be:fa:77:cb:d6:67:19:e6:80:fa:a5:7c:93:af:96:66:9f:cc:45:d5
eb:ab:c1:f0:32:a6:d9:27:1b:80:bb:57:ec:31:a2:e0:2b:e1:42:c0
92:8a:9b:ed:a6:d2:ec:7c:84:5a:8a:d9:96:a7:7e:40:c3:80:0e:f4
d6:a2:5d:78:93:3b:7d:d5:8a:f5:de:fb:bc:0d:6d:02:03:01:00:01
Signature algorithm: sha1WithRSAEncryption
Distribution CRL:
  ldap:///Example-CA,CN=cn-win,CN=CDP,CN=Public%20Key%20Services,
  CN=Services,CN=Configuration,DC=demo,DC=local?certificateRevocationList?
  base?objectClass=cRLDistributionPoint
  http://example.example.net/CertEnroll/Example-CA.crl
Use for key: Key encipherment, Digital signature, 1.3.6.1.5.5.8.2.2,
1.3.6.1.5.5.8.2.2
Fingerprint:
  1f:2f:a9:22:a8:d5:a9:36:cc:c4:bd:81:59:9d:9c:58:bb:40:15:72 (sha1)

```

```

51:27:e4:d5:29:90:f7:85:9e:67:84:a1:75:d1:5b:16 (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started

```

Sample Output

show security pki local-certificate detail

```

user@host>show security pki local-certificate detail

Certificate identifier: local_moji
Certificate version: 3
Serial number: ded993b455335621
Issuer:
  Organization: Juniper, Country: US, State: CA, Locality: Sunnyvale, Common
name: openssl_root1
Subject:
  Organization: Juniper, Organizational unit: QA, Country: US, State: CA,
Locality: Sunnyvale, Common name: local_moji, Common name: test@juniper.net
Subject string:
  C=US, ST=CA, L=Sunnyvale, O=Juniper, CN=local_moji, CN=test@juniper.net, OU=QA

Alternate subject: email empty, juniper.net, 10.0.0.1, ipv6 empty
Validity:
  Not before: 03- 3-2018 10:11 UTC
  Not after: 03- 3-2019 10:11 UTC
Public key algorithm: rsaEncryption(4096 bits)
30:82:02:0a:02:82:02:01:00:e4:a7:9e:e1:a4:89:28:43:89:a5:65
59:e8:f6:9c:84:5b:1d:b6:52:f6:33:07:0a:a5:5d:4a:2e:e0:aa:84
68:a8:67:6b:b5:82:a4:df:ba:d2:ac:88:a1:bb:55:e7:f7:bf:9a:e7
56:1c:c0:77:f1:4b:43:af:95:60:0d:0d:e4:6e:4a:be:f0:14:36:55
53:1a:05:7d:bc:c4:ae:76:04:a6:e8:2e:27:58:52:b0:1c:8c:f9:b9
27:51:de:0e:bd:d2:2e:47:cd:45:41:f1:82:a1:67:c7:0b:a4:05:95
68:b5:73:20:01:6a:49:9a:4b:8e:c9:9f:0f:99:55:73:51:dc:40:b1
30:42:94:f8:a3:24:40:8f:0b:13:09:a0:68:68:3c:a8:11:b8:16:e9
66:1c:de:2a:a7:16:73:7d:fa:43:03:e8:3b:2d:44:8e:c6:7d:67:60
29:59:cc:2c:d1:04:b4:63:62:cf:2d:a2:91:cb:69:3d:4a:4f:be:d1
9f:69:ef:88:18:47:f5:85:b3:76:59:30:4e:e2:b5:5f:19:d3:67:96
b6:5a:01:c8:db:06:99:36:4b:a9:c2:be:b3:84:a2:b3:b3:fc:b8:9e
db:1d:80:e6:dd:c0:f0:30:cd:ac:93:dd:99:28:b9:08:dd:43:e0:2d
50:d9:63:f1:af:97:3e:c3:d3:a6:b8:24:8b:77:f8:15:78:72:d0:34
bf:da:a5:82:ee:f6:da:b6:c9:a6:c8:65:67:84:b8:ff:2e:08:86:bc
88:4e:6b:a0:fc:2f:b0:f9:63:19:cd:97:fc:38:5b:f0:53:86:d5:fb
68:03:71:ef:37:01:7f:72:3f:8d:da:dd:f0:39:bb:51:3e:2d:85:25
84:
Signature algorithm: sha256WithRSAEncryption
Distribution CRL:
  http://10.213.5.125/pki-ocsp-crl-req/openssl_root1-crl.pem
Authority Information Access OCSP:
  http://10.213.5.125:8090
Fingerprint:
  64:4d:0e:c0:db:81:b4:21:f7:d7:a0:90:cb:f2:fd:8a:15:bc:d0:ee (sha1)
  37:83:74:fc:8b:56:bd:0d:d6:5c:82:83:4c:1e:7f:48 (md5)
Auto-re-enrollment:
Status: Disabled
Next trigger time: Timer not started

```

show security tcp-encap connection

Syntax `show security tcp-encap connection`
`<brief | detail>`
`<session-id session-id>`

Release Information Command introduced in Junos OS Release 15.1X49-D80.

Description Display information about TCP encapsulation sessions.

Options **none**—Display information about TCP encapsulation sessions.

brief | detail—(Optional) Display the specified level of output.

session-id session-id—(Optional) Display information for the specified session identifier.

Required Privilege Level view

Related Documentation

- [tcp-encap on page 1243](#)

List of Sample Output [show security tcp-encap connection on page 1437](#)
[show security tcp-encap connection detail on page 1437](#)
[show security tcp-encap connection session-id 644 on page 1437](#)

Output Fields [Table 135 on page 1436](#) lists the output fields for the **show security tcp-encap connection** command. Output fields are listed in the approximate order in which they appear.

Table 135: show security tcp-encap connection Output Fields

Field Name	Field Description
Session-Id	Session identifier.
Client	Name of the remote access client.
Gateway	IP address of the remote gateway.
Local Gateway	IP address of the local gateway.
Remote Gateway	IP address of the remote gateway.
Started	Date and time the connection started.
Anchor spu	Services Processing Unit (SPU) on which the connection is anchored.

Sample Output

show security tcp-encap connection

```
user@host> show security tcp-encap connection
```

Session-Id	Client	Gateway
34	NCP-1	10.4.0.1
644	NCP-1	10.5.0.1

show security tcp-encap connection detail

```
user@host> show security tcp-encap connection detail
```

```
Session id: 34
  Local Gateway: 10.4.0.2:500 , Remote Gateway: 10.4.0.1:9500
  Client: NCP-1
  Started: Sun Jan 08 2017 21:32:58
  Anchor spu: 1
```

```
Session id: 644
  Local Gateway: 10.4.0.2:443 , Remote Gateway: 10.5.0.1:9500
  Client: NCP-1
  Started: Sun Jan 08 2017 21:32:58
  Anchor spu: 1
```

show security tcp-encap connection session-id 644

```
user@host> show security tcp-encap connection session-id 644
```

```
Session id: 644
  Local Gateway: 10.4.0.2:443 , Remote Gateway: 10.5.0.1:9500
  Client: NCP-1
  Started: Sun Jan 08 2017 21:32:58
  Anchor spu: 1
```

show security tcp-encap statistics

Syntax	show security tcp-encap statistics
Release Information	Command introduced in Junos OS Release 15.1X49-D80.
Description	Display TCP encapsulation statistics.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear security tcp-encap statistics on page 1294
List of Sample Output	show security tcp-encap statistics on page 1438
Output Fields	Table 136 on page 1438 lists the output fields for the show security tcp-encap statistics command. Output fields are listed in the approximate order in which they appear.

Table 136: show security tcp-encap statistics Output Fields

Field Name	Field Description
Policy Matched	Number of policies matched.
TCP sessions	Number of TCP sessions.

Sample Output

show security tcp-encap statistics

```
user@host> show security tcp-encap statistics
```

```
TCP encapsulation statistics:
  Policy Matched:           16
  TCP sessions:             16
```