

Junos[®] OS Release 12.1X46 Feature Guide

Junos OS Release 12.1X46-D20
21 May 2014
Revision 2

This feature guide accompanies Junos OS Release 12.1X46-D20. This guide contains detailed information about new or enhanced functionality introduced in Junos OS Release 12.1X46-D20 and Junos OS Release 12.1X46-D15 that is summarized in the Release Notes.

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New Features in Junos OS Release 12.1X46-D20

Junos OS Release 12.1X46-D20 introduces the following new or enhanced functionality:

- [Chassis Cluster on page 3](#)
- [Public Key Infrastructure \(PKI\) on page 21](#)
- [Routing on page 42](#)
- [UTM on page 56](#)
- [VPNs on page 60](#)

Chassis Cluster

This topic includes the following sections:

- [Autorecovery of fabric link on page 3](#)
- [Enhanced debugging support for chassis cluster on page 10](#)

Autorecovery of fabric link

- [Understanding the Chassis Cluster Data Plane on page 3](#)
- [show chassis cluster interfaces](#)

Understanding the Chassis Cluster Data Plane

The data plane software, which operates in active/active mode, manages flow processing and session state redundancy and processes transit traffic. All packets belonging to a particular session are processed on the same node to ensure that the same security treatment is applied to them. The system identifies the node on which a session is active and forwards its packets to that node for processing. (After a packet is processed, the Packet Forwarding Engine transmits the packet to the node on which its egress interface exists if that node is not the local one.)

To provide for session (or flow) redundancy, the data plane software synchronizes its state by sending special payload packets called runtime objects (RTOs) from one node to the other across the fabric data link. By transmitting information about a session between the nodes, RTOs ensure the consistency and stability of sessions if a failover were to occur, and thus they enable the system to continue to process traffic belonging to existing sessions. To ensure that session information is always synchronized between the two nodes, the data plane software gives RTOs transmission priority over transit traffic.

- [Understanding Session RTOs on page 3](#)
- [Understanding Data Forwarding on page 4](#)
- [Understanding Fabric Data Link Failure and Recovery on page 4](#)

Understanding Session RTOs

The data plane software creates RTOs for UDP and TCP sessions and tracks state changes. It also synchronizes traffic for IPv4 pass-through protocols such as Generic Routing Encapsulation (GRE) and IPsec.

RTOs for synchronizing a session include:

- Session creation RTOs on the first packet
- Session deletion and age-out RTOs
- Change-related RTOs, including:
 - TCP state changes
 - Timeout synchronization request and response messages

- RTOs for creating and deleting temporary openings in the firewall (pinholes) and child session pinholes

Understanding Data Forwarding

For Junos OS, flow processing occurs on a single node on which the session for that flow was established and is active. This approach ensures that the same security measures are applied to all packets belonging to a session.

A chassis cluster can receive traffic on an interface on one node and send it out to an interface on the other node. (In active/active mode, the ingress interface for traffic might exist on one node and its egress interface on the other.)

This traversal is required in the following situations:

- When packets are processed on one node, but need to be forwarded out an egress interface on the other node
- When packets arrive on an interface on one node, but must be processed on the other node

If the ingress and egress interfaces for a packet are on one node, but the packet must be processed on the other node because its session was established there, it must traverse the data link twice. This can be the case for some complex media sessions, such as voice-over-IP (VoIP) sessions.

Understanding Fabric Data Link Failure and Recovery



NOTE: Intrusion Detection and Prevention (IDP) services do not support failover. For this reason, IDP services are not applied for sessions that were present prior to the failover. IDP services are applied for new sessions created on the new primary node.

The fabric data link is vital to the chassis cluster. If the link is unavailable, traffic forwarding and RTO synchronization are affected, which can result in loss of traffic and unpredictable system behavior.

To eliminate this possibility, Junos OS uses fabric monitoring to check whether the fabric link, or the two fabric links in the case of a dual fabric link configuration, are alive by periodically transmitting probes over the fabric links. Using this process, Junos OS detects fabric faults and disables one node of the cluster. It determines that a fabric fault has occurred if a fabric probe is not received but the fabric interface is active.

To recover from this state, you must reboot the disabled node. When you reboot it, the node synchronizes its state and RTOs with the primary node.



NOTE: If you make any changes to the configuration while the secondary node is disabled, execute the `commit` command to synchronize the configuration after you reboot the node. If you did not make configuration changes, the configuration file remains synchronized with that of the primary node.



NOTE: Starting with Junos OS Release 12.1X46-D20, the fabric monitoring feature is enabled by default on high-end SRX Series devices.

Starting with Junos OS Release 12.1X46-D20, recovery of the fabric link and synchronization take place automatically.

When both the primary and secondary nodes are healthy (that is, there are no failures) and the fabric link goes down, RG1+ redundancy group(s) on the secondary node becomes ineligible. When one of the nodes is unhealthy (that is, there is a failure), RG1+ redundancy group(s) on this node (either the primary or secondary node) becomes ineligible. When both nodes are unhealthy and the fabric link goes down, RG1+ redundancy group(s) on the secondary node becomes ineligible. When the fabric link comes up, the node on which RG1+ became ineligible performs a cold synchronization on all Services Processing Units and transitions to active standby.



NOTE: Only RG1+ transitions to an ineligible state. RG0 continues to be in either a primary or secondary state.

Use the `show chassis cluster interfaces` CLI command to verify the status of the fabric link.

Related Documentation

- *Chassis Cluster Feature Guide for Security Devices*
- *Understanding Chassis Cluster Dual Fabric Links*
- *Example: Configuring the Chassis Cluster Fabric*
- *Verifying Chassis Cluster Data Plane Interfaces*
- *Verifying Chassis Cluster Data Plane Statistics*
- *Clearing Chassis Cluster Data Plane Statistics*
- *Understanding Chassis Cluster Formation*

show chassis cluster interfaces

Syntax	show chassis cluster interfaces
Release Information	Command modified in Junos OS Release 9.0. Output changed to support dual control ports in Junos OS Release 10.0. Output changed to support control interfaces in Junos OS Release 11.2. Output changed to support redundant pseudointerfaces in Junos OS Release 12.1X44-D10. For high-end SRX Series devices, output changed to support the internal security association (SA) option in Junos OS Release 12.1X45-D10.
Description	Display the status of the control interface in a chassis cluster configuration.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> <i>Chassis Cluster Feature Guide for Security Devices</i>
List of Sample Output	show chassis cluster interfaces on page 7 show chassis cluster interfaces (SRX3000 and SRX5000 line devices) on page 8 show chassis cluster interfaces on page 8
Output Fields	Table 1 on page 6 lists the output fields for the show chassis cluster interfaces command. Output fields are listed in the approximate order in which they appear.

Table 1: show chassis cluster interfaces Output Fields

Field Name	Field Description
Control link status	State of the chassis cluster control interface: up or down .
Control interfaces	<ul style="list-style-type: none"> Index—Index number of the chassis cluster control interface. Name—Name of the chassis cluster control interface. Monitored-Status—Monitored state of the interface: up or down. Internal SA—State of the internal SA option on the chassis cluster control link: enabled or disabled. <p>NOTE: This field is available only on high-end SRX Series devices.</p>
Fabric link status	State of the fabric interface: up or down .
Fabric interfaces	<ul style="list-style-type: none"> Name—Name of the fabric interface. Child-interface—Name of the child fabric interface. Status—State of the interface: up or down.
Redundant-ethernet Information	<ul style="list-style-type: none"> Name—Name of the redundant Ethernet interface. Status—State of the interface: up or down. Redundancy-group—Identification number (1–255) of the redundancy group associated with the redundant Ethernet interface.

Table 1: show chassis cluster interfaces Output Fields (*continued*)

Field Name	Field Description
Redundant-pseudo-interface Information	<ul style="list-style-type: none"> Name—Name of the redundant pseudo interface. Status—State of the redundant pseudo interface: up or down. Redundancy-group—Identification number (1–255) of the redundancy group associated with the redundant pseudo interface.
Interface Monitoring	<ul style="list-style-type: none"> Interface—Name of the interface to be monitored. Weight—Relative importance of the interface to redundancy group operation. Status—State of the interface: up or down. Redundancy-group—Identification number of the redundancy group associated with the interface.

Sample Output

show chassis cluster interfaces

```

user@host> show chassis cluster interfaces
Control link status: Up

Control interfaces:
  Index  Interface      Monitored-Status
  ----  -
  0      em0            Up
  1      em1            Down

Fabric link status: Up

Fabric interfaces:
  Name    Child-interface  Status
  ----    -
  fab0    ge-0/1/0         Up
  fab0
  fab1    ge-6/1/0         Up
  fab1

Redundant-ethernet Information:
  Name      Status      Redundancy-group
  ----      -
  reth0     Up          1
  reth1     Up          2
  reth2     Down        Not configured
  reth3     Down        Not configured
  reth4     Down        Not configured
  reth5     Down        Not configured
  reth6     Down        Not configured
  reth7     Down        Not configured
  reth8     Down        Not configured
  reth9     Down        Not configured
  reth10    Down        Not configured
  reth11    Down        Not configured

Redundant-pseudo-interface Information:
  Name      Status      Redundancy-group
  ----      -
  lo0       Up          1

Interface Monitoring:
  Interface      Weight      Status      Redundancy-group

```

```

ge-0/1/9      100    Up      0
ge-0/1/9      100    Up

```

Sample Output

show chassis cluster interfaces (SRX3000 and SRX5000 line devices)

```

user@host> show chassis cluster interfaces
Control link status: Up

Control interfaces:
  Index  Interface  Monitored-Status  Internal SA
  0      em0      Up                enabled
  1      em1      Down              enabled

Fabric link status: Up

Fabric interfaces:
  Name    Child-interface  Status
  fab0    ge-0/1/0         Up
  fab0
  fab1    ge-6/1/0         Up
  fab1

Redundant-ethernet Information:
  Name      Status      Redundancy-group
  reth0     Up          1
  reth1     Up          2
  reth2     Down        Not configured
  reth3     Down        Not configured
  reth4     Down        Not configured
  reth5     Down        Not configured
  reth6     Down        Not configured
  reth7     Down        Not configured
  reth8     Down        Not configured
  reth9     Down        Not configured
  reth10    Down        Not configured
  reth11    Down        Not configured

Redundant-pseudo-interface Information:
  Name      Status      Redundancy-group
  lo0       Up          1

Interface Monitoring:
  Interface  Weight  Status  Redundancy-group
  ge-0/1/9   100    Up      0
  ge-0/1/9   100    Up

```

Sample Output

show chassis cluster interfaces

```

user@host> show chassis cluster interfaces
The below output is specific to fabric monitoring failure.

```

```

Control link status: Up

Control interfaces:
  Index  Interface  Monitored-Status  Internal-SA
  0      fxp1      Up                Disabled

```


Fabric link status: Down

Fabric interfaces:

Name	Child-interface	Status (Physical/Monitored)
fab0	ge-0/0/2	Down / Down
fab0		
fab1	ge-9/0/2	Up / Up
fab1		

Redundant-pseudo-interface Information:

Name	Status	Redundancy-group
lo0	Up	0

Enhanced debugging support for chassis cluster

- `show chassis cluster information`
- `show chassis cluster ip-monitoring status redundancy-group`
- `show chassis cluster status`

show chassis cluster information

Syntax	show chassis cluster information
Release Information	Command introduced in Junos OS Release 12.1X46-D20.
Description	Display chassis cluster messages. The messages indicate each node's health condition and details of the monitored failure.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> show chassis cluster status on page 18
List of Sample Output	show chassis cluster information on page 11 show chassis cluster information on page 12
Output Fields	Table 2 on page 11 lists the output fields for the show chassis cluster information command. Output fields are listed in the approximate order in which they appear.

Table 2: show chassis cluster information Output Fields

Field Name	Field Description
Node	Node (device) in the chassis cluster (node0 or node1).
Redundancy Group Information	<ul style="list-style-type: none"> Redundancy Group—ID number (0 - 255) of a redundancy group in the cluster. Current State—State of the redundancy group: primary, secondary, hold, or secondary-hold. Weight—Relative importance of the redundancy group. Time—Time when the redundancy group changed the state. From—State of the redundancy group before the change. To—State of the redundancy group after the change. Reason—Reason for the change of state of the redundancy group.
Chassis cluster LED information	<ul style="list-style-type: none"> Current LED color—Current color state of the LED. Last LED change reason—Reason for change of state of the LED.

Sample Output

show chassis cluster information

```
user@host> show chassis cluster information
```

```
node0:
```

```
-----
Redundancy Group Information:
```

```
Redundancy Group 0 , Current State: primary, Weight: 255
```

```

Time           From           To           Reason
Mar 27 17:44:19 hold          secondary    Hold timer expired
```

```

Mar 27 17:44:27 secondary      primary      Better priority (200/200)

Redundancy Group 1 , Current State: primary, Weight: 255

Time          From          To          Reason
Mar 27 17:44:19 hold          secondary   Hold timer expired
Mar 27 17:44:27 secondary     primary     Remote yield (0/0)

Redundancy Group 2 , Current State: secondary, Weight: 255

Time          From          To          Reason
Mar 27 17:44:19 hold          secondary   Hold timer expired
Mar 27 17:44:27 secondary     primary     Remote yield (0/0)
Mar 27 17:50:24 primary       secondary-hold Preempt/yield(100/200)
Mar 27 17:50:25 secondary-hold secondary     Ready to become secondary

Chassis cluster LED information:
Current LED color: Green
Last LED change reason: No failures

node1:
-----
Redundancy Group Information:

Redundancy Group 0 , Current State: secondary, Weight: 255

Time          From          To          Reason
Mar 27 17:44:27 hold          secondary   Hold timer expired

Redundancy Group 1 , Current State: secondary, Weight: 255

Time          From          To          Reason
Mar 27 17:44:27 hold          secondary   Hold timer expired
Mar 27 17:50:23 secondary     primary     Remote yield (100/0)
Mar 27 17:50:24 primary       secondary-hold Preempt/yield(100/200)
Mar 27 17:50:25 secondary-hold secondary     Ready to become secondary

Redundancy Group 2 , Current State: primary, Weight: 255

Time          From          To          Reason
Mar 27 17:44:27 hold          secondary   Hold timer expired
Mar 27 17:50:23 secondary     primary     Remote yield (200/0)

Chassis cluster LED information:
Current LED color: Green
Last LED change reason: No failures

```

Sample Output

show chassis cluster information

```
user@host> show chassis cluster information
```

The following output is specific to monitoring abnormal (unhealthy) case.

```

node0:
-----
Redundancy Group Information:

Redundancy Group 0 , Current State: secondary, Weight: 255

```

Time	From	To	Reason
Apr 1 11:07:38	hold	secondary	Hold timer expired
Apr 1 11:07:41	secondary	primary	Only node present
Apr 1 11:29:20	primary	secondary-hold	Manual failover
Apr 1 11:34:20	secondary-hold	secondary	Ready to become secondary

Redundancy Group 1 , Current State: primary, Weight: 0

Time	From	To	Reason
Apr 1 11:07:38	hold	secondary	Hold timer expired
Apr 1 11:07:41	secondary	primary	Only node present

Redundancy Group 2 , Current State: primary, Weight: 255

Time	From	To	Reason
Apr 1 11:07:38	hold	secondary	Hold timer expired
Apr 1 11:07:41	secondary	primary	Only node present

Chassis cluster LED information:

Current LED color: Amber

Last LED change reason: Monitored objects are down

Failure Information:

IP Monitoring Failure Information:

Redundancy Group 1, Monitoring Status: Failed

IP Address	Status	Reason
1.1.1.1	Unreachable	redundancy-group state unknown

node1:

Redundancy Group Information:

Redundancy Group 0 , Current State: primary, Weight: 255

Time	From	To	Reason
Apr 1 11:08:40	hold	secondary	Hold timer expired
Apr 1 11:29:20	secondary	primary	Remote is in secondary hold

Redundancy Group 1 , Current State: secondary, Weight: 0

Time	From	To	Reason
Apr 1 11:08:40	hold	secondary	Hold timer expired

Redundancy Group 2 , Current State: secondary, Weight: 255

Time	From	To	Reason
Apr 1 11:08:40	hold	secondary	Hold timer expired

Chassis cluster LED information:

Current LED color: Amber

Last LED change reason: Monitored objects are down

Failure Information:

IP Monitoring Failure Information:

Redundancy Group 1, Monitoring Status: Failed

IP Address	Status	Reason
1.1.1.1	Unreachable	redundancy-group state unknown

show chassis cluster ip-monitoring status redundancy-group

Syntax	show chassis cluster ip-monitoring status <redundancy-group <i>group-number</i>>
Release Information	Command introduced in Junos OS Release 9.6. Support for global threshold, current threshold, and weight of each monitored IP address added in Junos OS Release 12.1X46-D20.
Description	Display the status of all monitored IP addresses for a redundancy group.
Options	<ul style="list-style-type: none"> • none—Display the status of monitored IP addresses for all redundancy groups on the node. • redundancy-group <i>group-number</i>—Display the status of monitored IP addresses under the specified redundancy group.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>IP Monitoring Feature Guide for Security Devices</i> • <i>Chassis Cluster Feature Guide for Security Devices</i> • <i>redundancy-group (Interfaces)</i> • <i>clear chassis cluster failover-count</i> • <i>request chassis cluster failover node</i> • <i>request chassis cluster failover reset</i>
List of Sample Output	show chassis cluster ip-monitoring status on page 16 show chassis cluster ip-monitoring status redundancy-group on page 17
Output Fields	Table 3 on page 15 lists the output fields for the show chassis cluster ip-monitoring status command.

Table 3: show chassis cluster ip-monitoring status Output Fields

Field Name	Field Description
Redundancy-group	ID number (0 - 255) of a redundancy group in the cluster.
Global threshold	Failover value for all IP addresses monitored by the redundancy group.
Current threshold	Value equal to the global threshold minus the total weight of the unreachable IP address.
IP Address	Monitored IP address in the redundancy group.

Table 3: show chassis cluster ip-monitoring status Output Fields (*continued*)

Field Name	Field Description
Status	Current reachability state of the monitored IP address. Values for this field are: reachable , unreachable , and unknown . The status is "unknown" if packet forwarding engines (PFEs) are not yet up and running.
Failure count	Number of attempts to reach an IP address.
Reason	Explanation for the reported status. See Table 4 on page 16 .
Weight	Combined weight (0 - 255) assigned to all monitored IP addresses. A higher weight value indicates greater importance.

Expanded reason output fields for unreachable IP addresses added in Junos OS Release 10.1. You might see any of the following reasons displayed.

Table 4: show chassis cluster ip-monitoring status redundancy group Reason Fields

Reason	Reason Description
No route to host	The router could not resolve the ARP, which is needed to send the ICMP packet to the host with the monitored IP address.
No auxiliary IP found	The redundant Ethernet interface does not have an auxiliary IP address configured.
Reth child not up	A child interface of a redundant Ethernet interface is down.
redundancy-group state unknown	Unable to obtain the state (primary, secondary, secondary-hold, disable) of a redundancy-group.
No reth child MAC address	Could not extract the MAC address of the redundant Ethernet child interface.
Secondary link not monitored	The secondary link may be down (the secondary child interface of a redundant Ethernet interface is either down or non-functional).
Unknown	The IP address has just been configured and the router still does not know the status of this IP. or Do not know the exact reason for the failure.

Sample Output

show chassis cluster ip-monitoring status

```
user@host> show chassis cluster ip-monitoring status
node0:
```

```
-----
Redundancy group: 1
```


Global threshold: 200
Current threshold: -120

IP address	Status	Failure count	Reason	Weight
10.254.5.44	reachable	0	n/a	220
2.2.2.1	reachable	0	n/a	100

node1:

Redundancy group: 1
Global threshold: 200
Current threshold: -120

IP address	Status	Failure count	Reason	Weight
10.254.5.44	reachable	0	n/a	220
2.2.2.1	reachable	0	n/a	100

Sample Output

show chassis cluster ip-monitoring status redundancy-group

user@host> show chassis cluster ip-monitoring status redundancy-group 1
node0:

Redundancy group: 1

IP address	Status	Failure count	Reason
10.254.5.44	reachable	0	n/a
2.2.2.1	reachable	0	n/a
1.1.1.5	reachable	0	n/a
1.1.1.4	reachable	0	n/a
1.1.1.1	reachable	0	n/a

node1:

Redundancy group: 1

IP address	Status	Failure count	Reason
10.254.5.44	reachable	0	n/a
2.2.2.1	reachable	0	n/a
1.1.1.5	reachable	0	n/a
1.1.1.4	reachable	0	n/a
1.1.1.1	reachable	0	n/a

show chassis cluster status

Syntax	show chassis cluster status <redundancy-group <i>group-number</i> >
Release Information	Command modified in Junos OS Release 9.2. Support for dual control ports added in Junos OS Release 10.0. Support for monitoring failures added in Junos OS Release 12.1X46-D20.
Description	Display the failover status of a chassis cluster.
Options	<ul style="list-style-type: none"> • none—Display the status of all redundancy groups in the chassis cluster. • redundancy-group <i>group-number</i>—(Optional) Display the status of the specified redundancy group.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>Chassis Cluster Feature Guide for Security Devices</i> • <i>redundancy-group (Chassis Cluster)</i> • <i>clear chassis cluster failover-count</i> • <i>request chassis cluster failover node</i> • <i>request chassis cluster failover reset</i> • <i>Master Administrator for Logical Systems Feature Guide for Security Devices</i>
List of Sample Output	show chassis cluster status on page 19 show chassis cluster status redundancy-group 2 on page 19 show chassis cluster status on page 19 show chassis cluster status on page 20 show chassis cluster status on page 20
Output Fields	Table 5 on page 18 lists the output fields for the show chassis cluster status command. Output fields are listed in the approximate order in which they appear.

Table 5: show chassis cluster status Output Fields

Field Name	Field Description
Cluster ID	<p>ID number (1-15) of a cluster. Setting a cluster ID to 0 is equivalent to disabling a cluster.</p> <p>On SRX3400, SRX3600, SRX5600, and SRX5800 devices, the range for the cluster ID is 1 through 255. More than 16 cluster IDs will work only if the fabric and control link interfaces are connected back-to-back.</p>
Redundancy-Group	ID number (1-255) of a redundancy group in the chassis cluster.
Node name	Node (device) in the chassis cluster (node0 or node1).

Table 5: show chassis cluster status Output Fields (*continued*)

Field Name	Field Description
Priority	Assigned priority for the redundancy group on that node.
Status	<p>State of the redundancy group (Primary, Secondary, Lost, or Unavailable).</p> <ul style="list-style-type: none"> • Primary—Redundancy group is active and passing traffic. • Secondary—Redundancy group is passive and not passing traffic. • Lost—Node loses contact with the other node through the control link. Most likely to occur when both nodes are in a cluster and due to control link failure, one node cannot exchange heartbeats, or when the other node is rebooted. • Unavailable—Node has not received a single heartbeat over the control link from the other node since the other node booted up. Most likely to occur when one node boots up before the other node, or if only one node is present in the cluster.
Preempt	<ul style="list-style-type: none"> • Yes: Mastership can be preempted based on priority. • No: Change in priority will not preempt the mastership.
Manual failover	<ul style="list-style-type: none"> • Yes: If the Mastership is set manually through the CLI with the request chassis cluster failover node or request chassis cluster failover redundancy-group command. This overrides Priority and Preempt. • No: Mastership is not set manually through the CLI.

Sample Output

show chassis cluster status

```

user@host> show chassis cluster status
Cluster ID: 3
  Node name      Priority  Status  Preempt  Manual failover
Redundancy-group: 0, Failover count: 1
  node0          254      primary no        no
  node1           2      secondary no        no
Redundancy-group: 1, Failover count: 1
  node0          254      primary no        no
  node1           1      secondary no        no

```

Sample Output

show chassis cluster status redundancy-group 2

```

user@host> show chassis cluster status redundancy-group 2
Cluster ID: 14
  Node name      Priority  Status  Preempt  Manual failover
Redundancy-Group: 2, Failover count: 1
  node0          50      secondary no        no
  node1         100      primary  no        no

```

Sample Output

show chassis cluster status

```

user@host> show chassis cluster status
Cluster ID: 15
  Node      Priority  Status  Preempt  Manual failover

```

```

Redundancy group: 0 , Failover count: 5
  node0          200      primary      no      no
  node1           0       lost       n/a     n/a
Redundancy group: 1 , Failover count: 41
  node0          101      primary      no      no
  node1           0       lost       n/a     n/a

```

Sample Output

show chassis cluster status

```

user@host> show chassis cluster status
Cluster ID: 15
Node          Priority      Status      Preempt  Manual failover
Redundancy group: 0 , Failover count: 5
  node0          200      primary      no      no
  node1           0     unavailable  n/a     n/a
Redundancy group: 1 , Failover count: 41
  node0          101      primary      no      no
  node1           0     unavailable  n/a     n/a

```

Sample Output

show chassis cluster status

```

user@host> show chassis cluster status
The following output is specific to monitoring failures.

Monitor Failure codes:
  CS Cold Sync monitoring      FL Fabric connection down
  GR GRES monitoring          HW Hardware monitoring
  IF Interface monitoring      IP IP monitoring
  LB Loopback monitoring       MB Mbuf monitoring
  NH Nexthop monitoring        NP NPC monitoring
  SP SPU monitoring           SM Schedule monitoring

Cluster ID: 3
Node  Priority Status      Preempt Manual  Monitor-failures
Redundancy group: 0 , Failover count: 2
node0 0      secondary  no      no      FL
node1 200    primary   no      no      None
Redundancy group: 1 , Failover count: 6
node0 0      ineligible no      no      FL
node1 200    primary   no      no      None

```

Public Key Infrastructure (PKI)

This topic includes the following sections:

- [Online Certificate Status Protocol \(OCSP\) on page 21](#)

Online Certificate Status Protocol (OCSP)

- [Understanding Online Certificate Status Protocol on page 21](#)
- [Comparison of Online Certificate Status Protocol and Certificate Revocation List on page 22](#)
- [ocsp \(Security PKI\) on page 24](#)
- [use-ocsp \(Security PKI\) on page 25](#)
- [ca-profile \(Security PKI\) on page 26](#)
- [revocation-check \(Security PKI\) on page 27](#)
- [Example: Configuring OCSP for Certificate Revocation Status on page 28](#)

Understanding Online Certificate Status Protocol

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.

**Related
Documentation**

- [Comparison of Online Certificate Status Protocol and Certificate Revocation List on page 22](#)
- [Example: Configuring OCSP for Certificate Revocation Status on page 28](#)
- *Public Key Infrastructure Feature Guide for Security Devices*

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 SRX Series devices, CRL is the default method used to check the revocation status of a certificate.

**Related
Documentation**

- [Understanding Online Certificate Status Protocol on page 21](#)
- [Understanding Certificate Revocation Lists](#)
- [Public Key Infrastructure Feature Guide for Security Devices](#)

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">• <i>Public Key Infrastructure Feature Guide for Security Devices</i>

use-ocsp (Security PKI)

Syntax	use-ocsp;
Hierarchy Level	[edit security pki ca-profile <i>ca-profile-name</i>]
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">• <i>Public Key Infrastructure Feature Guide for Security Devices</i>

ca-profile (Security PKI)

Syntax	<pre>ca-profile <i>ca-profile-name</i> { administrator { e-mail-address <i>e-mail-address</i>; } ca-identity <i>ca-identity</i>; enrollment { retry <i>number</i>; retry-interval <i>seconds</i>; url <i>url-name</i>; } revocation-check { crt { disable { on-download-failure; } refresh-interval <i>hours</i>; url <i>url-name</i>; } disable; ocsd { connection-failure (disable fallback-crt); disable-responder-revocation-check; nonce-payload (enable disable); url <i>ocsp-url</i>; } use-ocsp; } routing-instance <i>routing-instance-name</i>; }</pre>
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	<p>ca-profile-name —Name of a trusted CA.</p> <p>The remaining statements are explained separately.</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">Public Key Infrastructure Feature Guide for Security Devices

revocation-check (Security PKI)

Syntax	<pre> revocation-check { crl { disable { on-download-failure; } refresh-interval <i>hours</i>; url <i>url-name</i>; } disable; ocsp { connection-failure (disable fallback-crl); disable-responder-revocation-check; nonce-payload (enable disable); url <i>ocsp-url</i>; } use-ocsp; } </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 ocsp and use-ocsp 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	The remaining statements are explained separately.
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"> <i>Public Key Infrastructure Feature Guide for Security Devices</i>

Example: Configuring OCSP for Certificate Revocation Status

This example shows how to configure 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 28](#)
- [Overview on page 28](#)
- [Configuration on page 30](#)
- [Verification on page 38](#)

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://1.1.1.1:8080/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://1.1.1.1:8080/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 6 on page 28](#) shows the Phase 1 options used in this example.

Table 6: 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
Authentication algorithm	SHA 1	SHA 1

Table 6: Phase 1 Options for OCSP Configuration Example (*continued*)

Option	Peer A	Peer B
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	101.10.2.50	100.10.1.50
Remote identity	localcert11.juniper.net	-
Local identity	-	localcert11.juniper.net
External interface	reth1	ge-0/0/2.0
Version	v2	v2

[Table 7 on page 29](#) shows the Phase 2 options used in this example.

Table 7: Phase 2 Options for OCSP Configuration Example

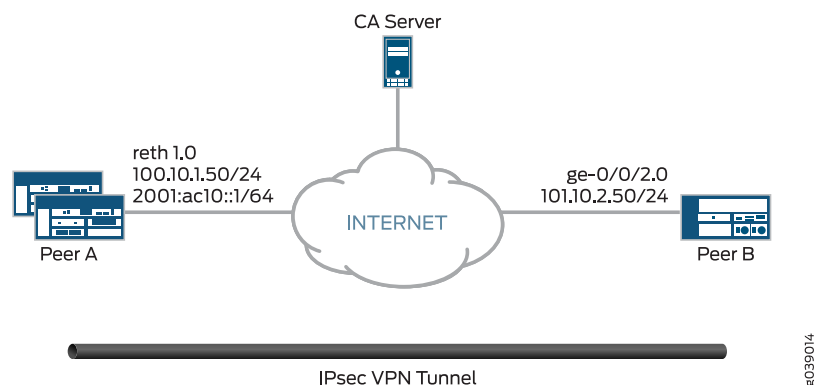
Option	Peer A	Peer B
IPsec proposal	ipsec_prop	ipsec_prop
Protocol	ESP	ESP
Authentication algorithm	HMAC SHA1-96	HMAC SHA1-96
Encryption algorithm	3DES CBC	3DES CBC
Lifetime seconds	1200	1200
Lifetime kilobytes	150,000	150,000
IPsec policy	ipsec_policy	ipsec_policy
PFC keys	group2	group2
Proposal	ipsec_prop	ipsec_prop

Table 7: Phase 2 Options for OCSP Configuration Example (*continued*)

Option	Peer A	Peer B
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

Figure 1 on page 30 shows the peer devices that are configured in this example.

Figure 1: OCSP Configuration Example



Configuration

- [Configuring Peer A on page 30](#)
- [Configuring Peer B on page 34](#)

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 100.100.1.100/24
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 100.10.1.50/24
set interfaces st0 unit 1 family inet address 202.2.1.100/24
set security pki ca-profile OCSP-ROOT ca-identity OCSP-ROOT
set security pki ca-profile OCSP-ROOT enrollment url
http://1.1.1.1:8080/scep/OCSP-ROOT/
```

```

set security pki ca-profile OCSP-ROOT revocation-check ocspl 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 ocspl
  disable-responder-revocation-check
set security pki ca-profile OCSP-ROOT revocation-check ocspl connection-failure
  fallback-crl
set security pki ca-profile OCSP-ROOT revocation-check crl url
  http://1.1.1.1:8080/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 101.10.2.50
set security ike gateway jsr_gateway remote-identity hostname localcert11.juniper.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 100.100.1.100/24
set lo0 redundant-pseudo-interface-options redundancy-group 1
set reth1 redundant-ether-options redundancy-group 1
set reth1 unit 0 family inet address 100.10.1.50/24
set st0 unit 1 family inet address 202.2.1.100/24

```

2. Configure the CA profile.

```

[edit security pki ca-profile OCSP-ROOT]
set ca-identity OCSP-ROOT
set enrollment url http://1.1.1.1:8080/scep/OCSP-ROOT/
set revocation-check ocspl url http://10.157.88.56:8210/OCSP-ROOT/
set revocation-check use-ocsp

```

```
set revocation-check ocsp disable-responder-revocation-check
set revocation-check ocsp connection-failure fallback-crl
set revocation-check crl url http://1.1.1.1:8080/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 101.10.2.50
set remote-identity hostname localcert11.juniper.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 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-0/0/3 {
  gigether-options {
    redundant-parent reth1;
  }
}
ge-9/0/3 {
```



```

    gigether-options {
        redundant-parent reth1;
    }
}
lo0 {
    unit 0 {
        family inet {
            address 100.100.1.100/24;
        }
    }
    redundant-pseudo-interface-options {
        redundancy-group 1;
    }
}
reth1 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family inet {
            address 100.10.1.50/24;
        }
    }
}
st0 {
    unit 1 {
        family inet {
            address 202.2.1.100/24;
        }
    }
}
[edit]
user@host# show security pki ca-profile OCSP-ROOT
ca-identity OCSP-ROOT;
enrollment {
    url http://1.1.1.1:8080/scep/OCSP-ROOT/;
}
revocation-check {
    crl {
        url http://1.1.1.1:8080/crl-as-der/currentcrl-45.crlid=45;
    }
    ocsd {
        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 101.10.2.50;
    remote-identity hostname localcert11.juniper.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 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-0/0/2 unit 0 family inet address 101.10.2.50/24
set interfaces lo0 unit 0 family inet address 102.100.1.100/24
set interfaces st0 unit 1 family inet address 202.2.1.1/24
set security pki ca-profile OCSP-ROOT ca-identity OCSP-ROOT
set security pki ca-profile OCSP-ROOT enrollment url
    http://1.1.1.1:8080/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 ocs
disable-responder-revocation-check
set security pki ca-profile OCSP-ROOT revocation-check ocs connection-failure
fallback-crl
set security pki ca-profile OCSP-ROOT revocation-check url
http://1.1.1.1:8080/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 100.10.1.50
set security ike gateway jsr_gateway local-identity hostname localcert11.juniper.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 101.10.2.50/24
set lo0 unit 0 family inet address 102.100.1.100/24
set st0 unit 1 family inet address 202.2.1.1/24

```

2. Configure the CA profile.

[edit security pki ca-profile OCSP-ROOT]

```

set ca-identity OCSP-ROOT
set enrollment url http://1.1.1.1:8080/scep/OCSP-ROOT/
set revocation-check ocs url http://10.157.88.56:8210/OCSP-ROOT/
set revocation-check use-ocs
set revocation-check ocs disable-responder-revocation-check
set revocation-check ocs connection-failure fallback-crl
set revocation-check url http://1.1.1.1:8080/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 100.10.1.50
set local-identity hostname localcert11.juniper.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 101.10.2.50/24;
    }
  }
}
lo0 {
  unit 0 {
    family inet {
      address 102.100.1.100/24;
```

```

    }
  }
}
st0 {
  unit 1 {
    family inet {
      address 202.2.1.1/24;
    }
  }
}
[edit]
user@host# show security pki ca-profile OCSP-ROOT
ca-identity OCSP-ROOT;
enrollment {
  url http://1.1.1.1:8080/scep/OCSP-ROOT/;
}
revocation-check {
  crl {
    url http://1.1.1.1:8080/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 localcert11;
  }
}
gateway jsr_gateway {
  ike-policy ike_policy;
  address 100.10.1.50;
  local-identity hostname localcert11.juniper.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 38](#)
- [Verifying Local Certificates on page 39](#)
- [Verifying IKE Phase 1 Status on page 40](#)
- [Verifying IPsec Phase 2 Status on page 41](#)

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 = Juniper, 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: Juniper, Country: US, Common name: OCSP-ROOT
Subject:
  Organization: Juniper, Country: US, Common name: OCSP-ROOT
Subject string:
  C=US, O=Juniper, 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://1.1.1.1:8080/crl-as-der/currentcrl-45.crl?id=45
Authority Information Access OCSP:
  http://1.1.1.1:8090/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)

```

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.

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: Juniper, Country: US, Common name: OCSP-ROOT
Subject:
  Organization: juniper1, Organizational unit: sltqa1, State: california1, Locality: sunnyvale1,
  Common name: localcert1, Domain component: domain_component1
Subject string:
  DC=domain_component1, CN=localcert1, OU=sltqa1, O=juniper1, L=sunnyvale1,
  ST=california1, C=us1
Alternate subject: "localcert1@juniper.net", localcert1.juniper.net, 100.10.1.50
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://1.1.1.1:8080/crl-as-der/currentcrl-45.crl?id=45
Authority Information Access OCSP:
http://1.1.1.1/: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

```

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      101.10.2.50

```

From operational mode, enter the **show security ike security-associations detail** command.

```

user@host> show security ike security-associations detail
IKE peer 101.10.2.50, Index 6534660, Gateway Name: jsr_gateway
Role: Responder, State: UP
Initiator cookie: 3e62e05abd6a703f, Responder cookie: c552b238e8a26668
Exchange type: IKEv2, Authentication method: RSA-signatures
Local: 100.10.1.50:500, Remote: 101.10.2.50:500
Lifetime: Expires in 26906 seconds
Peer ike-id: localcert11.juniper.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: 100.10.1.50:500, Remote: 101.10.2.50:500
 Local identity: 100.10.1.50
 Remote identity: localcert11.juniper.net
 Flags: IKE SA 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 Isys Port Gateway
<131073 ESP:3des/sha1 9d1066e2 252/ 150000 - root 500 101.10.2.50
>131073 ESP:3des/sha1 82079c2c 252/ 150000 - root 500 101.10.2.50
```

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: 100.10.1.50, Remote Gateway: 101.10.2.50
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
```

- Related Documentation**
- [Understanding Online Certificate Status Protocol on page 21](#)
 - [Public Key Infrastructure Feature Guide for Security Devices](#)

Routing

This topic includes the following sections:

- [OSPF and OSPFv3 IPsec Authentication and Confidentiality on page 42](#)

OSPF and OSPFv3 IPsec Authentication and Confidentiality

- [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 42](#)
- [security-association on page 45](#)
- [authentication \(IPsec SA for OSPF\) on page 46](#)
- [auxiliary-spi \(IPsec SA for OSPF\) on page 47](#)
- [encryption \(IPsec SA for OSPF\) on page 48](#)
- [protocol \(IPsec SA for OSPF\) on page 49](#)
- [spi \(IPsec SA for OSPF\) on page 49](#)
- [show security ipsec control-plane-security-associations](#)
- [Example: Configuring IPsec Authentication for an OSPF Interface on an SRX Series Device on page 51](#)

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.

**Related
Documentation**

- [Example: Configuring IPsec Authentication for an OSPF Interface on an SRX Series Device on page 51](#)

security-association

Syntax	<pre> security-association <i>sa-name</i> { manual { direction bidirectional { authentication { algorithm (hmac-md5-96 hmac-sha1-96); key { ascii-text <i>key</i>; hexadecimal <i>key</i>; } } auxiliary-spi <i>auxiliary-spi-value</i>; encryption { algorithm (3des-cbc des-cbc null); key { ascii-text <i>key</i>; hexadecimal <i>key</i>; } } protocol (ah esp); spi <i>spi-value</i>; } } mode transport; } </pre>
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	<p><i>sa-name</i>—Name of the SA.</p> <p>mode—SA mode. For this feature, the mode must be transport.</p> <p>direction—Direction of the manual SA. For this feature, the direction must be bidirectional.</p> <p>The remaining statements are explained separately.</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"> Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 42

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	<ul style="list-style-type: none">• Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 42

auxiliary-spi (IPsec SA for OSPF)

Syntax	<code>auxiliary-spi <i>auxiliary-spi-value</i>;</code>
Hierarchy Level	[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]
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 42

encryption (IPsec SA for OSPF)

Syntax	<pre>encryption { algorithm (3des-cbc des-cbc null); 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 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 <i>key</i>—ASCII text key. For the des-cbc option, the key contains 8 ASCII characters; for 3des-cbc, the key contains 24 ASCII characters.• hexadecimal <i>key</i>—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 42

protocol (IPsec SA for OSPF)

Syntax	protocol (ah esp);
Hierarchy Level	[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]
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 42

spi (IPsec SA for OSPF)

Syntax	spi <i>spi-value</i> ;
Hierarchy Level	[edit security ipsec security-association <i>sa-name</i> mode transport manual direction bidirectional]
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	<p>spi—SPI for the manual SA. The SPI uniquely identifies the SA to use at the receiving host (the destination address in the packet).</p> <p>Range: 256 through 16,639</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"> Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 42

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 42
List of Sample Output	show security ipsec control-plane-security-associations on page 50 show security ipsec control-plane-security-associations sa-name on page 51 show security ipsec control-plane-security-associations detail on page 51
Output Fields	Table 8 on page 50 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 8: 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,

```

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 51](#)
- [Overview on page 52](#)
- [Configuration on page 52](#)
- [Verification on page 55](#)

Requirements

Before you begin:

- Configure the device interfaces. See the *Junos OS Interfaces Library for Security Devices*.
- Configure the router identifiers for the devices in your OSPF network. See *Example: Configuring an OSPF Router Identifier*.
- Control OSPF designated router election. See *Example: Controlling OSPF Designated Router Election*

- Configure a single-area OSPF network. See *Example: Configuring a Single-Area OSPF Network*.
- Configure a multiarea OSPF network. See *Example: Configuring 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 9 on page 52](#) lists the parameters and values configured for the manual SA in this example.

Table 9: 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 52](#)
- [Enabling IPsec Authentication for an OSPF Interface on page 54](#)

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.zF69A0OR";
        ## SECRET-DATA
      }
      encryption {
        algorithm des;
        key ascii-text "$9$AP5Hp1RcylMLxSygoZUHK1REhKMVwY2oJx7jHq.zF69A0OR";
        ## 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]
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.

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

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

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 55](#)
- [Verifying the IPsec Security Association on the OSPF Interface on page 55](#)

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.

Related Documentation • [Understanding OSPF and OSPFv3 Authentication on SRX Series Devices on page 42](#)

UTM

This topic includes the following sections:

- [License Enforcement on page 56](#)
- [Understanding UTM Licensing on page 57](#)
- [Junos OS Feature License Model Number for J Series Services Routers and SRX Series Services Gateways on page 58](#)

License Enforcement

For features or scaling levels that require a license, you must install and properly configure the license to meet the requirements for using the licensable feature or scale level. The router or switch enables you to commit a configuration that specifies a licensable feature or scale without a license for a 30-day grace period. The grace period is a short-term grant that enables you to start using features in the pack or scale up to the system limits (regardless of the license key limit) without a license key installed. The grace period begins when the licensable feature or scaling level is actually used by the device (not when it is first committed). In other words, you can commit licensable features or scaling limits to the device configuration, but the grace period does not begin until the device uses the licensable feature or exceeds a licensable scaling level.



NOTE: Configurations might include both licensed and nonlicensed features. For these situations, the license is enforced up to the point where the license can be clearly distinguished. For example, an authentication-order configuration is shared by both Authentication, Authorization, and Accounting (AAA), which is licensed, and by Layer 2 Tunneling Protocol (L2TP), which is not licensed. When the configuration is committed, the device does not issue any license warnings, because it is not yet known whether AAA or L2TP is using the configuration. However, at runtime, the device checks for a license when AAA authenticates clients, but does not check when L2TP authenticates clients.

The device reports any license breach as a warning log message whenever a configuration is committed that contains a feature or scale limit usage that requires a license. Following the 30-day grace period, the device periodically reports the breach to syslog messages until a license is installed and properly configured on the device to resolve the breach.



NOTE: Successful commitment of a licensable feature or scaling configuration does not imply that the required licenses are installed or not required. If a required license is not present, the system issues a warning message after it commits the configuration.

Related Documentation

- [Junos OS Feature Licenses](#)
- [Installation and Upgrade Guide for Security Devices](#)

Understanding UTM Licensing

The majority of UTM features function as a subscription service requiring a license. You can redeem this license once you have purchased your subscription license SKUs. You redeem your license by entering your authorization code and chassis serial number into the Customer Service LMS interface. Once your entitlement is generated, you can use the CLI from your device to send a license update request to the LMS server. The LMS server then sends your subscription license directly to the device.



NOTE: UTM requires 1 GB of memory. If your J2320, J2350, or J4350 device has only 512 MB of memory, you must upgrade the memory to 1 GB to run UTM.

Table 10: UTM Feature Subscription Service License Requirements

UTM Feature	Requires License
Antispam	Yes
Antivirus: full	Yes
Antivirus: express	Yes
Antivirus: sophos	Yes
Content Filtering	No
Web Filtering: integrated	Yes
Web Filtering: redirect	No
Web Filtering: local	No
Web Filtering: enhanced	Yes

Related Documentation

- *Unified Threat Management Overview*
- *Junos OS UTM Library for Security Devices*
- *Understanding UTM Custom Objects*
- *Updating UTM Licenses (CLI Procedure)*
- *Understanding WELF Logging for UTM Features*
- *Example: Configuring WELF Logging for UTM Features*

Junos OS Feature License Model Number for J Series Services Routers and SRX Series Services Gateways

For information about how to purchase a software license, contact your Juniper Networks sales representative at <http://www.juniper.net/in/en/contact-us/>.

Each feature license is tied to exactly one software feature, and that license is valid for exactly one device. Table 11 on page 58 describes the Junos OS features that require licenses.

Table 11: Junos OS Feature Licenses

Junos OS License Requirements										
Feature	SRX100	SRX110	SRX210	SRX220	SRX240	SRX550	SRX650	SRX1400	SRX3000 line	SRX5000 line
Access Manager	X	X	X	X	X	X	X			
BGP Route Reflectors							X			
Dynamic VPN	X	X	X	X	X	X	X			
IDP Signature Update	X *	X	X *	X *	X *	X	X	X	X	X
Application Signature Update (Application Identification)	X	X	X	X	X	X	X	X	X	X
Juniper-Kaspersky Antivirus	X	X	X	X	X	X	X			
Juniper-Sophos Antivirus	X	X	X	X	X	X	X	X	X	X
Juniper-Sophos Antispam	X	X	X	X	X	X	X	X	X	X
Juniper-Enhanced Web filtering	X	X	X	X	X	X	X	X	X	X
Juniper-Websense Web filtering	X	X	X	X	X	X	X			
Logical Systems								X	X	X
SRX100 Memory Upgrade	X									
UTM	X*	X	X *	X	X *	X	X	X	X	X

* Indicates support on high-memory devices only.

Each license allows you to run the specified advanced software features on a single device.

**Related
Documentation**

- *Junos OS License Overview*
- *Installation and Upgrade Guide for Security Devices*
- *Installation and Upgrade Guide for Security Devices*
- *Administration Guide for Security Devices*

VPNs

This topic includes the following sections:

- [HMAC-SHA-256-128 authentication on page 60](#)

HMAC-SHA-256-128 authentication

- [authentication-algorithm \(Security IPsec\) on page 60](#)
- [authentication \(Security IPsec\) on page 61](#)

authentication-algorithm (Security IPsec)

Syntax	authentication-algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha-256-96 hmac-sha1-96);
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 high-end SRX Series devices in Junos OS Release 12.1X46-D20.
Description	Configure the IPsec authentication algorithm.
Options	<p>The hash algorithm to authenticate data can be one of the following:</p> <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. This option is not supported on group VPNs.• hmac-sha-256-96—Produces a 256-bit digest, truncated to 96 bits. This option is not supported on group VPNs or high-end SRX Series devices.• hmac-sha1-96—Produces a 160-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">• <i>AutoVPN Feature Guide for SRX Series Gateway Devices</i>• <i>Dynamic VPN Feature Guide for SRX Series Gateway Devices</i>• <i>IPsec VPN Feature Guide for Security Devices</i>

authentication (Security IPsec)

Syntax	authentication { algorithm (hmac-md5-96 hmac-sha-256-128 hmac-sha-256-96 hmac-sha1-96); key (ascii-text <i>key</i> hexadecimal <i>key</i>); }
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 high-end SRX Series devices in Junos OS Release 12.1X46-D20.
Description	Configure IPsec authentication parameters for a manual security association. This statement is not supported on dynamic VPN implementations.
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-sha-256-96—Produces a 256-bit digest, truncated to 96 bits. This option is not supported on high-end SRX Series devices. • 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"> • <i>Group VPN Feature Guide for Security Devices</i> • <i>IPsec VPN Feature Guide for Security Devices</i>

New Features in Junos OS Release 12.1X46-D15

Junos OS Release 12.1X46-D15 introduces the following new or enhanced functionality:

- [IP Monitoring on page 62](#)
- [Routing Protocols on page 66](#)

IP Monitoring

This topic includes the following section:

- [Next-Hop Functionality on page 62](#)

Next-Hop Functionality

- [show services ip-monitoring status](#)

show services ip-monitoring status

Syntax	show services ip-monitoring status
Release Information	Command modified in Junos OS Release 11.4 R2. Next-hop functionality added in Junos OS Release 12.1X46-D15.
Description	Display a brief summary of IP monitoring status along with the current state for a given policy.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>IP Monitoring Feature Guide for Security Devices</i> • <i>show services rpm probe-results (View)</i>
List of Sample Output	show services ip-monitoring status on page 64 show services ip-monitoring status on page 64 show services ip-monitoring status on page 65 show services ip-monitoring status on page 65 show services ip-monitoring status on page 65
Output Fields	Table 12 on page 63 lists the output fields for the show services ip-monitoring status command. Output fields are listed in the approximate order in which they appear.

Table 12: show services ip-monitoring status Output Fields

Field Name	Field Description
Policy	Name of the policy configured.
Probe Name	Name of the probe configured.
Address	Displays the configured target address.
Status	Displays the status of the probe on the target address. If the status is PASS, then the target address is reached.
Route-Action	Displays route injection information configured for the policy and its failover status.
Route-Instance	Displays the routing instance of the route to be injected during failover.
Route	Routing address of the route to be injected during failover.
Next-Hop	Specifies the next-hop address of the route to be injected during failover. P2P interfaces only.
State	Displays the state of the route injection action. If the state is APPLIED, then the ip-monitoring policy is in failover state.

Table 12: show services ip-monitoring status Output Fields (*continued*)

Field Name	Field Description
Interface Action	Displays the interface action type as enable or disable.
Policy Action	Displays the policy action type as enable or disable.
Admin State	Displays the current admin state of the interface.
Action Status	Displays the current action status of the interface.

Sample Output

show services ip-monitoring status

```
user@host> show services ip-monitoring status
```

```
Policy - policy1 (Non-preemptive. Status: FAIL)
```

```
RPM Probes:
```

Probe name	Test Name	Address	Status
probe_a	a1	15.1.1.10	FAIL
probe_a	a2	200.1.1.1	FAIL

```
Route-Action:
```

route-instance	route	next-hop	State
inet.0	200.1.1.0	150.1.1.1	APPLIED

```
Interface-Action:
```

interface	policy action	admin state	action status
fe-0/0/5.2	Enable	UP	FAILOVER
fe-0/0/5.4	Disable	DOWN	FAILOVER
t1-1/0/0	Enable	UP	FAILOVER
d10	Enable	UP	FAILOVER
ge-0/0/1	Enable	UP	FAILOVER

Sample Output

show services ip-monitoring status

In this example, the policy is in the failback state, and the no-preempt option is not configured.

```
user@host> show services ip-monitoring status
```

```
Policy - policy1 (Status: PASS)
```

```
RPM Probes:
```

Probe name	Test Name	Address	Status
probe1	a1	99.1.1.2	PASS

```
Route-Action:
```

route-instance	route	next-hop	state
inet.0	99.1.1.0	12.12.12.2	NOT-APPLIED

```
Interface-Action:
```


interface	policy action	admin state	action status
at-2/0/0	Enable	DOWN	MARKED-DOWN
ge-0/0/2.2	Enable	DOWN	MARKED-DOWN
ge-0/0/2.3	Enable	DOWN	MARKED-DOWN

Sample Output

show services ip-monitoring status

In this example, the policy is in the failover state, and the primary is restored. The no-preempt option is configured.

```
user@host> show services ip-monitoring status
```

Policy - policy1 (Non-preemptive. Status: FAILOVER-NO-PREEMPT)

RPM Probes:

Probe name	Test Name	Address	Status
probe1	a1	99.1.1.2	PASS

Route-Action:

route-instance	route	next-hop	state
inet.0	99.1.1.0	12.12.12.2	APPLIED

Interface-Action:

interface	policy action	admin state	action status
at-2/0/0	Enable	UP	FAILOVER
ge-0/0/2.2	Enable	UP	FAILOVER
ge-0/0/2.3	Enable	UP	FAILOVER

Sample Output

show services ip-monitoring status

When the probe succeeds and the policy is not applied, the output is as follows:

```
user@host> show services ip-monitoring status
```

Policy payment (Status: PASS)

RPM Probes:

Probe name	Test Name	Address	Status
Probe-Payment-Server	paysvr	9.9.9.2	PASS

Route-Action:

route-instance	route	next-hop	state
inet.0	9.9.9.0/24	e1-6/0/0.0	NOT-APPLIED

Sample Output

show services ip-monitoring status

When the probe fails and the policy is applied, the output is as follows:

```
user@host> show services ip-monitoring status
```

Policy payment (Status: FAIL)

RPM Probes:

Probe name	Test Name	Address	Status
Probe-Payment-Server	paysvr	9.9.9.2	FAIL

Route-Action:			
route-instance	route	next-hop	state
inet.0	9.9.9.0/24	e1-6/0/0.0	APPLIED

Routing Protocols

This topic includes the following section:

- [OSPF Nonbroadcast Multiaccess and Point-to-Multipoint Network Support on page 66](#)

OSPF Nonbroadcast Multiaccess and Point-to-Multipoint Network Support

- [Example: Configuring an OSPF Interface on a Nonbroadcast Multiaccess Network on page 66](#)
- [Example: Configuring an OSPF Interface on a Point-to-Multipoint Network on page 69](#)

Example: Configuring an OSPF Interface on a Nonbroadcast Multiaccess Network

This example shows how to configure an OSPFv2 interface on a nonbroadcast multiaccess (NBMA) network on high-end SRX Series devices.

- [Requirements on page 66](#)
- [Overview on page 66](#)
- [Configuration on page 67](#)
- [Verification on page 68](#)

Requirements

Before you begin:

- Configure the router identifiers for the devices in your OSPF network. See *Example: Configuring an OSPF Router Identifier*.
- Control OSPF designated router election. See *Example: Controlling OSPF Designated Router Election*.
- Configure a multiarea OSPF network. See *Example: Configuring a Multiarea OSPF Network*.

Overview

When you configure OSPFv2 on an NBMA network, you can use nonbroadcast mode to interoperate with other equipment. Because there is no autodiscovery mechanism, you must configure each neighbor.

Nonbroadcast mode treats the NBMA network as a partially connected LAN, electing designated and backup designated routers. All routing devices must have a direct connection to both the designated and backup designated routers; otherwise, unpredictable results can occur.

When you configure the interface, specify either the IP address or the interface name. Using both the IP address and the interface name produces an invalid configuration. For

nonbroadcast interfaces, specify the IP address of the nonbroadcast interface as the interface name.

In this example, you configure the Ethernet interface xe-2/0/0.0 as an OSPFv2 interface in OSPF area 0.0.0.1 and specify the following settings:

- **interface-type nbma**—Sets the interface to run in NBMA mode. You must explicitly configure the interface to run in NBMA mode.
- **neighbor address <eligible>**—Specifies the IP address of the neighboring device as 192.0.1.2. If you want the neighbor to be a designated router, include the **eligible** keyword.



NOTE: OSPF routing devices normally discover their neighbors dynamically by listening to the broadcast or multicast hello packets on the network. Because an NBMA network does not support broadcast (or multicast), the device cannot discover its neighbors dynamically, so you must configure all the neighbors statically. To configure multiple neighbors, include multiple **neighbor** statements.

- **hello-interval**—Specifies the length of time, in seconds, before the device sends hello packets out of the interface before it establishes adjacency with a neighbor.

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.

```
[edit]
set interfaces xe-2/0/0 unit 0 family inet address 192.0.2.1/24
set protocols ospf area 0.0.0.1 interface xe-2/0/0.0 interface-type nbma
set protocols ospf area 0.0.0.1 interface xe-2/0/0.0 neighbor 192.0.2.2 eligible
set protocols ospf area 0.0.0.1 interface xe-2/0/0.0 hello-interval 130
```

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 an OSPFv2 interface on an NBMA network:

1. Configure the interface.

```
[edit]
user@host# set interfaces xe-2/0/0 unit 0 family inet address 192.0.2.1/24
```
2. Create an OSPF area.

```
[edit]
user@host# edit protocols ospf area 0.0.0.1
```
3. Assign the interface to the area.

In this example, include the **eligible** keyword to allow the neighbor to be a designated router.

```
[edit protocols ospf area 0.0.0.1 ]
user@host# set interface xe-2/0/0.0 interface-type nbma neighbor 192.0.2.2 eligible
```

4. Configure the hello interval.

```
[edit protocols ospf area 0.0.0.1 ]
user@host# set interface xe-2/0/0.0 hello-interval 130
```

Results

From configuration mode, confirm your configuration by entering the **show interfaces** and the **show protocols ospf** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host# show interfaces
xe-2/0/0 {
  unit 0 {
    family inet {
      address 192.0.2.1/24;
    }
  }
}

user@host# show protocols ospf
area 0.0.0.1 {
  interface xe-2/0/0.0 {
    interface-type nbma;
    neighbor 192.0.2.2 eligible;
    hello-interval 130;
  }
}
```

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

Verification

Confirm that the configuration is working properly.

Verifying the OSPF Interface

Purpose Verify the interface configuration by confirming that the **Type** field displays NBMA.

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

Related Documentation

- *OSPF Configuration Overview*
- *About OSPF Interfaces*
- *OSPF Timers Overview*

Example: Configuring an OSPF Interface on a Point-to-Multipoint Network

This example shows how to configure an OSPF interface on a point-to-multipoint network high-end SRX Series devices.

- [Requirements on page 69](#)
- [Overview on page 69](#)
- [Configuration on page 69](#)
- [Verification on page 70](#)

Requirements

Before you begin:

- Configure the router identifiers for the devices in your OSPF network. See *Example: Configuring an OSPF Router Identifier*.
- Control OSPF designated router election. See *Example: Controlling OSPF Designated Router Election*
- Configure a multiarea OSPF network. See *Example: Configuring a Multiarea OSPF Network*.

Overview

When you configure OSPFv2 on a nonbroadcast multiaccess (NBMA) network, such as a multipoint Asynchronous Transfer Mode (ATM) or Frame Relay, OSPFv2 operates by default in point-to-multipoint mode. In this mode, OSPFv2 treats the network as a set of point-to-point links. Because there is no autodiscovery mechanism, you must configure each neighbor.

When you configure the interface, specify either the IP address or the interface name. Using both the IP address and the interface name produces an invalid configuration.

In this example, you configure the Ethernet interface xe-2/0/0.0 as an OSPFv2 interface in OSPF area 0.0.0.1 and specify 192.0.2.1 as the neighbor's IP address.

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.

```
[edit]
set interfaces xe-2/0/0 unit 0 family inet address 192.0.2.2/24
set protocols ospf area 0.0.0.1 interface xe-2/0/0 neighbor 192.0.2.1
set protocols ospf area 0.0.0.1 interface xe-2/0/0 interface-type p2mp
```

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 an OSPFv2 interface on a point-to-multipoint network:

1. Configure the interface.

```
[edit]
user@host# set interfaces xe-2/0/0 unit 0 family inet address 192.0.2.2/24
```

2. Create an OSPF area.

```
[edit]
user@host# edit protocols ospf area 0.0.0.1
```

3. Assign the interface to the area and specify the neighbor.

```
[edit protocols ospf area 0.0.0.1]
user@host# set interface xe-2/0/0 neighbor 192.0.2.1
```

To configure multiple neighbors, include a **neighbor** statement for each neighbor.

4. Specify the interface type as **p2mp**.

```
[edit protocols ospf area 0.0.0.1]
user@host# set interface xe-2/0/0 interface-type p2mp
```

Results

From Configuration mode, confirm your configuration by entering the **show interfaces** and the **show protocols ospf** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host# show interfaces
xe-2/0/0 {
  unit 0 {
    family inet {
      address 192.0.2.2/24;
    }
  }
}

user@host# show protocols ospf
area 0.0.0.1 {
  interface xe-2/0/0 {
    interface-type p2mp;
    neighbor 192.0.2.1;
  }
}
```

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

Verification

Confirm that the configuration is working properly.

Verifying the OSPF Interface

Purpose Verify the interface configuration by confirming that the **Type** field displays P2MP.

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

Related Documentation

- *OSPF Configuration Overview*
- *About OSPF Interfaces*

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Revision History

6 March 2014—Revision 1, Junos OS Release 12.1X46-D15 Feature Guide

21 May 2014—Revision 2, Junos OS Release 12.1X46-D20 Feature Guide

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