OSPFv3 NSR

The OSPFv3 NSR feature allows a router with redundant Route Processors (RPs) to maintain its Open Shortest Path First (OSPF) state and adjacencies across planned and unplanned RP switchovers. It does this by checkpointing state information from OSPFv3 on the active RP to the standby RP. Later, following a switchover to the standby RP, OSPFv3 can use this checkpointed information to continue operation without interruption.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About OSPFv3 NSR

OSPFv3 NSR Functionality

Although OSPFv3 NSR serves a similar function to the OSPFv3 graceful restart feature, it works differently. With graceful restart, OSPFv3 on the newly active standby RP initially has no state information, so it uses extensions to the OSPFv3 protocol to recover its state from neighboring OSPFv3 devices. For this to work, the neighbors must support the graceful restart protocol extensions and be able to act as helpers to the restarting device. They must also continue forwarding data traffic to the restarting device while this recovery is taking place.

With NSR, by contrast, the device performing the switchover preserves its state internally, and in most cases the neighbors are unaware that anything has happened. Because no assistance is needed from neighboring

devices, NSR can be used in situations where graceful restart cannot; for example, graceful restart is unreliable in networks where not all the neighbors implement the graceful restart protocol extensions or where the network topology changes during the recovery.

Note When NSR is enabled, the responsiveness and scalability of OSPF is degraded. The performance degradation happens because OSPF uses cpu and memory to checkpoint data to the standby Route Processor (RP).

How to Configure OSPFv3 NSR

Configuring OSPFv3 NSR

Perform this task to configure OSPFv3 NSR.

Note Devices that do not support NSR will not accept the **nsr** (OSPFv3) command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospfv3** *process-id*
4. **nsr**
5. **end**
6. **show ospfv3** [*process-id*] [*address-family*] **nsr**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router ospfv3** *process-id* **Example:** `Device(config)# router ospfv3 109`	Places the device in router configuration mode and configures an OSPFv3 routing process.

	Command or Action	Purpose
Step 4	**nsr** **Example:** `Device(config-router)# nsr`	Configures NSR.
Step 5	**end** **Example:** `Device(config-router)# end`	Exits router configuration mode and returns to privileged EXEC mode.
Step 6	**show ospfv3** [*process-id*] [*address-family*] **nsr** **Example:** `Device# show ospfv3 109 nsr`	Displays OSPFv3 NSR status information.

Configuring OSPFv3 NSR for an Address Family

In address family configuration mode you can configure NSR for a particular address family. Perform this task to enable OSPFv3 NSR for an address family.

Note Devices that do not support NSR will not accept the **nsr** (OSPFv3) command.

SUMMARY STEPS

1. **router ospfv3** *process-id*
2. **address-family** {**ipv4** | **ipv6**} **unicast** [**vrf** *vrf-name*]
3. **nsr** [**disable**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**router ospfv3** *process-id* **Example:** `Device(config)# router ospfv3 109`	Places the device in router configuration mode and configures an OSPFv3 routing process.
Step 2	**address-family** {**ipv4**	**ipv6**} **unicast** [**vrf** *vrf-name*] **Example:** `Device(config-router)# address-family ipv4 unicast`	Enters IPv4 or IPv6 address family configuration mode for OSPFv3 router configuration mode.
Step 3	**nsr** [**disable**] **Example:**	Enables NSR for the address family that is configured.

	Command or Action	Purpose
	`Device(config-router-af)# nsr`	

Disabling OSPFv3 NSR for an Address Family

In address family configuration mode the optional **disable** keyword is available for the **nsr** command. Perform this task to disable OSPFv3 NSR for an address family.

SUMMARY STEPS

1. **router ospfv3** *process-id*
2. **address-family** {**ipv4** | **ipv6**} **unicast** [**vrf** *vrf-name*]
3. **nsr** [**disable**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**router ospfv3** *process-id* **Example:** `Device(config)# router ospfv3 109`	Places the device in router configuration mode and configures an OSPFv3 routing process.
Step 2	**address-family** {**ipv4** | **ipv6**} **unicast** [**vrf** *vrf-name*] **Example:** `Device(config-router)# address-family ipv6 unicast`	Enters IPv4 or IPv6 address family configuration mode for OSPFv3 router configuration mode.
Step 3	**nsr** [**disable**] **Example:** `Device(config-router-af)# nsr disable`	Disables NSR for the address family that is configured.

Troubleshooting Tips

OSPFv3 NSR can increase the amount of memory used by the OSPFv3 device process. To determine how much memory OSPFv3 is currently using without NSR, you can use the **show processes** and **show processes memory** commands:

```
Device# show processes
 | include OSPFv3
 276 Mwe  133BE14         1900       1792    1060 8904/12000  0 OSPFv3-1 Router
 296 Mwe  133A824           10        971      10 8640/12000  0 OSPFv3-1 Hello
```

Process 276 is the OSPFv3 device process that is to be checked. The **show processes memory** command is used to display its current memory use:

```
Device# show processes memory 276
Process ID: 276
```

```
Process Name: OSPFv3-1 Router
Total Memory Held: 4454800 bytes
```

In this case OSPFv3 is using 4,454,800 bytes or approximately 4.5 megabytes (MB). OSPFv3 NSR could double this for brief periods, so you should make sure the device has at least 5 MB of free memory before enabling OSPFv3 NSR.

Configuration Examples for OSPFv3 NSR

Example Configuring OSPFv3 NSR

The following example shows how to configure OSPFv3 NSR and verify that it is enabled:

```
Device(config)# router ospfv3 1
Device(config-router)# nsr
Device(config-router)# end
Device# show ospfv3 1
  OSPFv3 1 address-family ipv4
  Router ID 10.0.0.1
  Supports NSSA (compatible with RFC 3101)
  Event-log enabled, Maximum number of events: 1000, Mode: cyclic
  It is an area border and autonomous system boundary router
  Redistributing External Routes from,
  Router is not originating router-LSAs with maximum metric
  Initial SPF schedule delay 5000 msecs
  Minimum hold time between two consecutive SPFs 10000 msecs
  Maximum wait time between two consecutive SPFs 10000 msecs
  Minimum LSA interval 5 secs
  Minimum LSA arrival 1000 msecs
  LSA group pacing timer 240 secs
  Interface flood pacing timer 33 msecs
  Retransmission pacing timer 66 msecs
  Retransmission limit dc 24 non-dc 24
  Number of external LSA 0. Checksum Sum 0x000000
  Number of areas in this router is 3. 2 normal 0 stub 1 nssa
  Non-Stop Routing enabled
  Graceful restart helper support enabled
  Reference bandwidth unit is 100 mbps
  RFC1583 compatibility enabled
     Area BACKBONE(0) (Inactive)
         Number of interfaces in this area is 1
         SPF algorithm executed 3 times
         Number of LSA 6. Checksum Sum 0x03C938
         Number of DCbitless LSA 0
         Number of indication LSA 0
         Number of DoNotAge LSA 0
         Flood list length 0
     Area 1
         Number of interfaces in this area is 3
         SPF algorithm executed 3 times
         Number of LSA 6. Checksum Sum 0x024041
         Number of DCbitless LSA 0
         Number of indication LSA 0
         Number of DoNotAge LSA 0
         Flood list length 0
     Area 3
         Number of interfaces in this area is 1
         It is a NSSA area
```

```
        Perform type-7/type-5 LSA translation
        SPF algorithm executed 4 times
        Number of LSA 5. Checksum Sum 0x024910
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0

OSPFv3 1 address-family ipv6
Router ID 10.0.0.1
Supports NSSA (compatible with RFC 3101)
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an area border and autonomous system boundary router
Redistributing External Routes from,
   ospf 2
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msecs
Minimum hold time between two consecutive SPFs 10000 msecs
Maximum wait time between two consecutive SPFs 10000 msecs
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msecs
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msecs
Retransmission pacing timer 66 msecs
Retransmission limit dc 24 non-dc 24
Number of external LSA 0. Checksum Sum 0x000000
Number of areas in this router is 3. 2 normal 0 stub 1 nssa
Non-Stop Routing enabled
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
   Area BACKBONE(0) (Inactive)
       Number of interfaces in this area is 2
       SPF algorithm executed 2 times
       Number of LSA 6. Checksum Sum 0x02BAB7
       Number of DCbitless LSA 0
       Number of indication LSA 0
       Number of DoNotAge LSA 0
       Flood list length 0
   Area 1
       Number of interfaces in this area is 4
       SPF algorithm executed 2 times
       Number of LSA 7. Checksum Sum 0x04FF3A
       Number of DCbitless LSA 0
       Number of indication LSA 0
       Number of DoNotAge LSA 0
       Flood list length 0
   Area 3
       Number of interfaces in this area is 1
       It is a NSSA area
       Perform type-7/type-5 LSA translation
       SPF algorithm executed 3 times
       Number of LSA 5. Checksum Sum 0x011014
       Number of DCbitless LSA 0
       Number of indication LSA 0
       Number of DoNotAge LSA 0
       Flood list length 0
```

The output shows that OSPFv3 NSR is configured.

Example Verifying OSPFv3 NSR

The following example shows how to verify OSPFv3 NSR status:

```
Device# show ospfv3 1 nsr
  Active RP
  Operating in duplex mode
  Redundancy state: ACTIVE
  Peer redundancy state: STANDBY HOT
  Checkpoint peer ready
  Checkpoint messages enabled
  ISSU negotiation complete
  ISSU versions compatible


          OSPFv3 1 address-family ipv4 (router-id 10.0.0.1)
  NSR configured
  Checkpoint message sequence number: 29
  Standby synchronization state: synchronized
  Bulk sync operations:  1
  Next sync check time:  12:00:14.956 PDT Wed Jun 6 2012
  LSA Count: 17, Checksum Sum 0x00085289


          OSPFv3 1 address-family ipv6 (router-id 10.0.0.1)
  NSR configured
  Checkpoint message sequence number: 32
  Standby synchronization state: synchronized
  Bulk sync operations:  1
  Next sync check time:  12:00:48.537 PDT Wed Jun 6 2012
  LSA Count: 18, Checksum Sum 0x0008CA05
```

The output shows that OSPFv3 NSR is configured and that OSPFv3 on the standby RP is fully synchronized and ready to continue operation if the active RP fails or if a manual switchover is performed.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
OSPF commands	*Cisco IOS IP Routing: OSPF Command Reference*
OSPFv3 Address Families	*OSPFv3 Address Families* module

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
RFC 5187.	*OSPFv3 Graceful Restart*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for OSPFv3 NSR

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for OSPFv3 NSR

Feature Name	Releases	Feature Information
OSPFv3 NSR	15.1(2)SY 15.2(4)S	The OSPFv3 NSR feature allows a router with redundant RPs to maintain its OSPFv3 state and adjacencies across planned and unplanned RP switchovers. The following commands were introduced or modified: **clear ospfv3 nsr**, **nsr (OSPFv3)**, **show ospfv3 nsr**.