Configuring OSPFv3 NSR

Information About OSPFv3 Nonstop Routing

OSPFv3 Nonstop Routing feature allows a device with redundant Route Processors (RPs) to maintain its Open Shortest Path First (OSPF) state and adjacencies across planned and unplanned RP switchovers. This feature works by checkpointing the OSPFv3 information from the active RP to the standby RP. When a changeover occurs and the standby RP becomes the new active RP, this checkpointed information is used to continue operation without interruption.

Although OSPFv3 Nonstop Routing 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 nonstop routing, by contrast, the device performing the changeover preserves its state internally, and in most cases the neighbors are unaware that changeover has happened. Because no assistance is needed from neighboring devices, nonstop routing 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 recovery.

Note When nonstop routing 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 RP.

How to Configure OSPFv3 Nonstop Routing

The following sections provide information on how to configure OSPFv3 and how to enable and disable OSPFv3 Nonstop Routing for an address family.

Configuring OSPFv3 Nonstop Routing

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

Procedure

	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`	Enters router configuration mode and configures an OSPFv3 routing process.
Step 4	**nsr** **Example:** `Device(config-router)# nsr`	Configures nonstop routing.
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 nonstop routing status information.

Enabling OSPFv3 Nonstop Routing for an Address Family

To enable OSPFv3 nonstop routing for an address family, perform this procedure.

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

Procedure

	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`	Enters router configuration mode and configures an OSPFv3 routing process.
Step 4	**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 5	**nsr** **Example:** `Device(config-router-af)# nsr`	Enables nonstop routing for the address family that is configured.
Step 6	**end** **Example:** `Device(config-router)# end`	Exits router configuration mode and returns to privileged EXEC mode.

Disabling OSPFv3 Nonstop Routing for an Address Family

To disable OSPFv3 nonstop routing for an address family, perform this procedure.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router ospfv3** *process-id* **Example:** `Device(config)# router ospfv3 109`	Enters router configuration mode and configures an OSPFv3 routing process.
Step 4	**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 5	**nsr** [**disable**] **Example:** `Device(config-router-af)# nsr disable`	Disables nonstop routing for the address family that is configured.
Step 6	**end** **Example:** `Device(config-router)# end`	Exits router configuration mode and returns to privileged EXEC mode.

Configuration Examples for OSPFv3 Nonstop Routing

Example: Configuring OSPFv3 Nonstop Routing

The following example shows how to configure OSPFv3 nonstop routing and to 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
```

Example: Verifying OSPFv3 Nonstop Routing Status

The following example shows how to verify OSPFv3 nonstop routing 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 nonstop routing 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 changeover is performed.

Troubleshooting Tips

OSPFv3 nonstop routing 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 nonstop routing could double this for brief periods, so you should make sure the device has at least 5 MB of free memory before enabling OSPFv3 nonstop routing.

Additional References

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 History for OSPFv3 Nonstop Routing

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Amsterdam 17.3.1	OSPFv3 Nonstop Routing	OSPFv3 Nonstop Routing feature allows a device with redundant Route Processors to maintain its OSPF state and adjacencies across planned and unplanned RP switchovers.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn.