OSPF Nonstop Routing

The OSPF 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. The OSPF state is maintained by checkpointing the state information from OSPF on the active RP to the standby RP. After a switchover to the standby RP, OSPF uses the checkpointed information to continue operations 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.

Restrictions for OSPF Nonstop Routing

- OSPF Nonstop Routing (NSR) is available only for platforms with redundant RPs running Cisco IOS Release 15.1(2)S, 15.2(1)E, or later releases.

- OSPF NSR can significantly increase the memory used by OSPF during certain phases of its operation. CPU usage also can be increased. Before configuring OSPF NSR, you must be aware of the device memory capacity and estimate the likely memory requirements of OSPF NSR. For more information, see the section Configuring OSPF NSR, on page 2. For devices in which memory and CPU are limited, consider using OSPF Nonstop Forwarding (NSF) instead. For more information, see RFC 3623, *OSPF Graceful Restart*.

- A switchover from the active to the standby RP can take several seconds (depending on the hardware platform), and during this time OSPF is unable to send Hello packets. As a result, configurations that use small OSPF dead intervals might not be able to maintain adjacencies across a switchover.

Information About OSPF Nonstop Routing

OSPF NSR Functionality

Although OSPF Nonstop Routing (NSR) serves a similar function to OSPF Nonstop Forwarding (NSF), it works differently. With NSF, OSPF on the newly active standby RP initially has no state information. OSPF uses extensions to the OSPF protocol to recover its state from neighboring OSPF devices. For the recovery to work, the neighbors must support the NSF protocol extensions and be willing to act as "helpers" to the device that is restarting. The neighbors must also continue forwarding data traffic to the device that is restarting while protocol state recovery takes place.

With NSR, by contrast, the device that performs the switchover preserves its state internally, and in most cases the neighbors are unaware of the switchover. Because assistance is not needed from neighboring devices, NSR can be used in situations where NSF cannot be used; for example, in networks where not all neighbors implement the NSF protocol extensions, or where network topology changes during the recovery making NSF unreliable, use NSR instead of NSF.

How to Configure OSPF Nonstop Routing

Configuring OSPF NSR

Before you begin

Ensure that Nonstop Routing (NSR) is supported on the device. The **nsr** command in router configuration mode is supported only on devices that support NSR.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id*
4. **nsr**
5. **end**
6. **show ip ospf** [*process-id*] **nsr** [**objects** | **statistics**]

DETAILED STEPS

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

	Command or Action	Purpose
	`Device> enable`	
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router ospf** *process-id* **Example:** `Device(config)# router ospf 109`	Configures an OSPF routing process and enters router configuration mode.
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 ip ospf** [*process-id*] **nsr** [**objects** | **statistics**] **Example:** `Device# show ip ospf 109 nsr`	Displays OSPF NSR status information.

Troubleshooting Tips

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

```
Device# show processes|include OSPF

 276 Mwe  133BE14         1900        1792    1060 8904/12000  0 OSPF-1 Router
 296 Mwe  133A824           10         971      10 8640/12000  0 OSPF-1 Hello
```

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

```
Device# show processes memory 276

Process ID: 276
Process Name: OSPF-1 Router
Total Memory Held: 4454800 bytes
```

In the above example, OSPF is using 4,454,800 bytes, or approximately 4.5 megabytes (MB). Because OSPF NSR can consume double this memory for brief periods, ensure that the device has at least 5 MB of free memory before enabling OSPF NSR.

Configuration Examples for OSPF Nonstop Routing

Example: Configuring OSPF NSR

The following example shows how to configure OSPF NSR:

```
Device> enable
Device# configure terminal
Device(config)# router ospf 1
Device(config-router)# nsr
Device(config-router)# end
```

Example: Verifying OSPF NSR

The following is sample output from the **show ip ospf nsr** command. The output displays that OSPF NSR is configured and OSPF on the standby RP is fully synchronized and ready to continue operation if the active RP fails or if a manual switchover is performed.

```
Device# show ip ospf 1 nsr

Standby RP
 Operating in duplex mode
 Redundancy state: STANDBY HOT
 Peer redundancy state: ACTIVE
 ISSU negotiation complete
 ISSU versions compatible
Routing Process "ospf 1" with ID 10.1.1.100
 NSR configured
 Checkpoint message sequence number: 3290
 Standby synchronization state: synchronized
 Bulk sync operations:  1
 Last sync start time:  15:22:48.971 UTC Fri Jan 14 2011
 Last sync finish time: 15:22:48.971 UTC Fri Jan 14 2011
 Last sync lost time:   -
 Last sync reset time:  -
 LSA Count: 2, Checksum Sum 0x00008AB4
```

The following is sample output from the **show ip ospf nsr statistics** command. The output displays the current global and per OSPF instance state of NSR processing along with other statistics.

```
Device# show ip ospf nsr statistics

 Pending checkpoint requests (current/max): 0/109
 Pending checkpoint messages (current/max): 0/109
 Routing Process "ospf 1" with ID 10.1.1.100
 Pending checkpoint requests (current/max): 0/109
 Pending checkpoint messages (current/max): 0/109
 Time spent scheduling bulk syncs (max): 0 ms
 Time spent in checkpoint loop (average/max): 1/9 ms
 Checkpoint loop interruptions: 0
```

Additional References for OSPF Nonstop Routing

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
OSPF commands	Cisco IOS IP Routing: OSPF Command Reference
Configuring IETF NSF or Cisco NSF	"Configuring NSF-OSPF" module in the *Cisco IOS High Availability Configuration Guide*

Standard and RFCs

Standard/RFC	Title
RFC 2328	*OSPF Version 2*
RFC 3623	*Graceful OSPF 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 OSPF Nonstop Routing

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 OSPF Nonstop Routing

Feature Name	Releases	Feature Information
OSPF NSR	15.1(2)S	The OSPF Nonstop Routing feature allows a device with redundant Route Processors to maintain its OSPF state and adjacencies across planned and unplanned RP switchovers. In Cisco IOS 15.1(2)S the following commands were introduced or modified: **nsr**, **show ip ospf nsr**.