



## OSPF Nonstop Routing

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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.

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### Prerequisites for OSPF NSR

- OSPF NSR is available for platforms with redundant RPs or Cisco IOS software redundancy running Cisco IOS Release XE 3.3S or later releases.

### Restrictions for OSPF NSR

- OSPF nonstop routing (NSR) can significantly increase the memory used by OSPF during certain phases of its operation. CPU usage also can be increased. You should be aware of router memory capacity and estimate the likely memory requirements of OSPF NSR. For more information see [Configuring OSPF NSR](#). For routers where memory and CPU are constrained you might want to consider using OSPF NSF instead. For more information, see [OSPF RFC 3623 Graceful Restart Helper Mode](#).
- 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 OSPFv3 Authentication Trailer

## 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

Perform this task to configure OSPF NSR.

NSR adds a single new line, "nsr," to the OSPF router mode configuration. Routers that do not support NSR, for whatever reason, will not accept this command.

#### 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	<b>enable</b> <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b> <b>Example:</b>	Enters global configuration mode.

	Command or Action	Purpose
	Router# configure terminal	
<b>Step 3</b>	<b>router ospf</b> <i>process-id</i> <b>Example:</b> Router(config)# router ospf 109	Places the router in router configuration mode and configures an OSPF routing process.
<b>Step 4</b>	<b>nsr</b> <b>Example:</b> Router(config-router)# nsr	Configures NSR.
<b>Step 5</b>	<b>end</b> <b>Example:</b> Router(config-router)# end	Exits router configuration mode and returns to privileged EXEC mode.
<b>Step 6</b>	<b>show ip ospf</b> [ <i>process-id</i> ] <b>nsr</b> [[ <b>objects</b> ]][ <b>statistics</b> ] <b>Example:</b> Router# 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
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 output shows that OSPF NSR is configured and that OSPF on the standby RP is fully synchronized and ready to continue operation should the active RP fail or if a manual switchover is performed.

## Additional References

### Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
OSPF commands: complete command syntax, command mode, defaults, command history, usage guidelines, and examples	<i>Cisco IOS IP Routing: OSPF Command Reference</i>
Configuring OSPF	“Configuring OSPF” in the <i>IP Routing: OSPF Configuration Guide</i> .
OSPFv2 loop-free alternate fast reroute	“OSPFv2 Loop-Free Alternate Fast Reroute” in the <i>IP Routing: OSPF Configuration Guide</i>

**Standards and RFCs**

Standard/RFC	Title
RFC 5286	<i>Basic Specification for IP Fast Reroute: Loop-Free Alternates</i>

**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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## Feature Information for OSPF 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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

**Table 1: Feature Information for OSPF NSR**

Feature Name	Releases	Feature Information
OSPF NSR	XE 3.3S Cisco IOS Release 15.1(1)SY	The OSPF NSR feature allows a router with redundant route processors to maintain its OSPF state and adjacencies across planned and unplanned RP switchovers.  In Cisco IOS Release XE 3.3S, this feature was introduced.  The following commands were introduced or modified: <b>nsr</b> , <b>show ip ospf nsr</b> .

**Table 2: Feature Information for OSPF NSR**

Feature Name	Releases	Feature Information
OSPF NSR	Cisco IOS XE Release 17.4	This feature was introduced.

