High Availability Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3650 Switches)

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C O N T E N T S

Configuring NSF-OSPF

This module describes how to configure Nonstop Forwarding (NSF) in Cisco software to minimize the duration for which a network is unavailable to its users after a switchover. The main objective of NSF is to continue forwarding IP packets following a Route Processor (RP) switchover. NSF is supported by the Open Shortest Path First (OSPF) protocol for routing. A device that is running NSF-compatible software is known as an NSF-aware device and a device that is configured to support NSF is called an NSF-capable device. NSF-capable devices can rebuild routing information from either NSF-aware or NSF-capable neighboring devices.

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.

Prerequisites for NSF-OSPF

For Nonstop Forwarding (NSF) Open Shortest Path First (OSPF), all networking devices on the network segment must be NSF-aware.

Restrictions for NSF-OSPF

- Nonstop Forwarding (NSF) capability is not enabled by default for the Open Shortest Path First (OSPF) configurations.
- NSF OSPF for virtual links is not supported.
- NSF OSPF for sham links is not supported.
- NSF OSPF supports NSF/Stateful Switchover (SSO) for IPv4 traffic only.
- OSPFv3 is not supported with NSF/SSO. Only OSPFv2 is supported with NSF/SSO.
- If an NSF-capable device discovers that it has non-NSF-aware neighbors on a particular network segment, the device will disable NSF capabilities for that segment. Other network segments composed entirely of NSF-capable or NSF-aware devices will continue to provide NSF capabilities.
- You can configure strict link state advertisement (LSA) checking on both NSF-aware and NSF-capable devices. However, configuring an LSA is effective only when the device is in helper mode.

Information About NSF-OSPF

NSF-OSPF Operations

For Cisco Nonstop Forwarding (NSF), the Open Shortest Path First (OSPF) routing protocol has been enhanced to support high availability (HA) features in Stateful Switchover (SSO). Before an OSPF NSF-capable device can perform a Route Processor (RP) switchover, the device must be aware of the available OSPF neighbors on the network without resetting the neighbor relationship, and the device must acquire the contents of the link state database for the network. The NSF-capable device sends an OSPF NSF signal to neighboring NSF-aware devices to notify the devices that the neighbor relationship with the sending device must not be reset. The NSF-capable device uses the signals that it receives from other devices on the network to rebuild its neighbor list.

The NSF-capable device synchronizes its database with all the NSF-aware neighbors on its neighbor list. After all neighbors exchange routing information, the NSF-capable device uses the routing information to remove stale routes and update the routing information base (RIB) and the forwarding information base (FIB) with the new forwarding information. The OSPF protocols are then fully converged.

Prior to RFC 3623, Cisco implemented the proprietary Cisco NSF. The RFC 3623 Graceful OSPF Restart feature supports IETF NSF for OSPF processes in multivendor networks. The following are NSF device modes of operation common to Cisco and IETF NSF implementations:

- Restarting mode—In this mode, the OSPF device performs nonstop forwarding recovery because of an RP switchover.

- Helper mode—Also known as NSF-awareness mode. In this mode, the neighboring device is in the restarting state and helps in NSF recovery.

The strict link state advertisement (LSA) checking feature allows a helper device to terminate the graceful restart process if the device detects a changed LSA that would cause flooding during the graceful restart process. Strict LSA checking is disabled by default. You can enable strict LSA checking when there is a change to an LSA that would be flooded to the restarting device.

How to Configure NSF-OSPF

Configuring NSF-OSPF

Perform only one of the following tasks:

Configuring Cisco NSF-OSPF

SUMMARY STEPS

1. **enable**
2. **configure   terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **nsf cisco** [**enforce global**]
5. **nsf cisco helper** [**disable**]
6. **nsf   ietf helper** [**disable** | **strict-lsa-checking**]
7. **end**
8. **show ip ospf nsf**

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.

	Command or Action	**Purpose**
Step 3	**router ospf** *process-id* [**vrf** *vpn-name*] **Example:** Device(config)# router ospf 12	Enables Open Shortest Path First (OSPF) routing process and enters router configuration mode.
Step 4	**nsf cisco** [**enforce global**] **Example:** Device(config-router)# nsf cisco	Enables Cisco Nonstop Forwarding (NSF) restarting mode. • This command is not required on devices that operate only in NSF helper mode.
Step 5	**nsf cisco helper** [**disable**] **Example:** Device(config-router)# nsf cisco helper	Enables Cisco NSF helper support. • This command shows how to enable Cisco NSF helper mode.
Step 6	**nsf ietf helper** [**disable** | **strict-lsa-checking**] **Example:** Device(config-router)# nsf ietf helper disable	(Optional) Disables IETF NSF helper mode on an NSF-aware device.
Step 7	**end** **Example:** Device(config-router)# end	Returns to privileged EXEC mode.
Step 8	**show ip ospf nsf** **Example:** Device# show ip ospf nsf	Displays OSPF NSF state information.

Configuring IETF NSF-OSPF

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **nsf ietf** [**restart-interval** *seconds*]
5. **nsf ietf helper** [**disable** | **strict-lsa-checking**]
6. **nsf cisco helper disable**
7. **end**
8. **show ip ospf nsf**

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 ospf** *process-id* [**vrf** *vpn-name*] **Example:** Device(config)# router ospf 12	Enables Open Shortest Path First (OSPF) routing process and enters router configuration mode.
Step 4	**nsf ietf** [**restart-interval** *seconds*] **Example:** Device(config-router)# nsf ietf restart-interval 180	Enables IETF Nonstop Forwarding (NSF) restarting mode. • This command is not required on devices that operate only in helper mode.
Step 5	**nsf ietf helper** [**disable**	**strict-lsa-checking**] **Example:** Device(config-router)# nsf ietf helper strict-lsa-checking	(Optional) Configures IETF NSF helper mode on neighbor devices that operate in helper mode.

	Command or Action	**Purpose**
Step 6	**nsf cisco helper disable** **Example:** Device(config-router)# nsf cisco helper disable	(Optional) Disables Cisco NSF helper mode on an NSF-aware device.
Step 7	**end** **Example:** Device(config-router)# end	Returns to privileged EXEC mode.
Step 8	**show ip ospf nsf** **Example:** Device# show ip ospf nsf	Displays OSPF NSF state information.

Verifying NSF-OSPF

SUMMARY STEPS

1. **enable**
2. **show ip ospf**
3. **show ip ospf neighbor** [**detail**]

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Device> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show ip ospf** **Example:** Device# show ip ospf	Displays general information about Open Shortest Path First (OSPF) routing processes.

	Command or Action	Purpose
Step 3	**show ip ospf neighbor** [**detail**] **Example:** `Device# show ip ospf neighbor detail`	Displays OSPF-neighbor information on a per-interface basis.

Configuration Examples for NSF-OSPF

Example: Configuring Cisco NSF-OSPF

The following example shows how to enable Cisco Nonstop Forwarding (NSF) helper support in the router configuration mode:

```
Device> enable
Device# configure terminal
Device(config)# router ospf 400
Device(config-router)# nsf cisco helper
Device(config-router)# nsf ietf helper disable
Device(config-router)# end
```

The following sample output from the **show ip ospf nsf** command shows that NSF is enabled for Open Shortest Path First (OSPF) process 400. NSF helper mode is enabled by default on devices running NSF-compatible software. In this configuration, IETF helper mode is disabled for process 400.

```
Device> show ip ospf nsf

Routing Process "ospf 400"
Non-Stop Forwarding enabled
IETF NSF helper support disabled
Cisco NSF helper support enabled
  OSPF restart state is NO_RESTART
  Handle 2162698, Router ID 192.168.2.155, checkpoint Router ID 0.0.0.0
  Config wait timer interval 10, timer not running
  Dbase wait timer interval 120, timer not running
```

Example: Configuring IETF NSF-OSPF

The following example shows how to enable IETF Nonstop Forwarding (NSF) helper support in the router configuration mode:

```
Device> enable
Device# configure terminal
Device(config)# router ospf 500
Device(config-router)# nsf ietf helper strict-lsa-checking
Device(config-router)# nsf cisco helper disable
Device(config-router)# end
```

The following sample output from the **show ip ospf nsf** command shows that NSF is enabled for Open Shortest Path First (OSPF) process 500. NSF helper mode is enabled by default on devices running NSF-compatible software. In this configuration, Cisco helper mode is disabled.

```
Device> show ip ospf nsf

Routing Process "ospf 500"
Non-Stop Forwarding enabled
IETF NSF helper support enabled
Cisco NSF helper support disabled
  OSPF restart state is NO_RESTART
  Handle 1786466333, Router ID 10.1.1.1, checkpoint Router ID 0.0.0.0
  Config wait timer interval 10, timer not running
  Dbase wait timer interval 120, timer not running
```

Additional References for Configuring NSF-OSPF

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Debug commands	- Cisco IOS Debug Command Reference - Commands A through D - Cisco IOS Debug Command Reference - Commands E through H - Cisco IOS Debug Command Reference - Commands I through L - Cisco IOS Debug Command Reference - Commands M through R - Cisco IOS Debug Command Reference - Commands S through Z
High Availability commands	Cisco IOS High Availability Command Reference

Standards and RFCs

Standard/RFC	Title
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 Configuring NSF-OSPF

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.

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Table 1: Feature Information for Configuring NSF-OSPF

Feature Name	Releases	Feature Information
NSF Awareness–OSPF	12.2(31)SB2 15.0(1)S	The Nonstop Forwarding (NSF) Awareness-Open Shortest Path First (OSPF) allows customer premises equipment (CPE) devices to participate in the upstream device's NSF recovery process. The following commands were introduced or modified: **debug ospf nsf**, **nsf (OSPF)**, **nsf cisco**, **nsf ietf**, **show ip ospf neighbor**, **show ip ospf nsf**.

Feature Name	Releases	Feature Information
NSF–OSPF (RFC 3623 OSPF Graceful Restart)	12.0(32)S 12.2(33)SRA 12.2(31)SB2 12.2(33)SXH	The NSF-OSPFv2 feature was introduced in Cisco software. The feature uses the IETF standardized graceful restart functionality as described in RFC 3623. The following commands were introduced or modified: **nsf cisco**, **nsf ietf**, **nsf (OSPF)**.