EIGRP IPv6 NSF/GR

The EIGRP IPv6 NSF/GR feature allows a Nonstop Forwarding (NSF)-aware device that is running Enhanced Interior Gateway Routing Protocol (EIGRP) to forward IPv6 packets while EIGRP restarts after recovering from a failure.

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 EIGRP IPv6 NSF/GR

- EIGRP (Enhanced Interior Gateway Routing Protocol) IPv6 must be configured on devices. You need not specify the **network** *network-number* command in EIGRP named mode. By default, EIGRP IPv6 enables EIGRP on all interfaces configured with an IPv6 address.

- Cisco software that supports Nonstop Forwarding (NSF) awareness or NSF capabilities must be installed.

- A redundant facility must be configured to notify EIGRP during a switchover and to notify whether the restart is due to a switchover or a device reboot.

- An NSF-aware device must be up and completely converged with the network before it can assist an NSF-capable device in an NSF restart operation.

• All neighboring devices participating in EIGRP NSF must be NSF-capable or NSF-aware.

Restrictions for EIGRP IPv6 NSF/GR

• Nonstop Forwarding (NSF) is supported on platforms that support high-availability systems.

• An Enhanced Interior Gateway Routing Protocol (EIGRP) NSF-aware network does not allow two neighbors to perform an NSF restart operation at the same time. However, neighbors can re-establish peering sessions after the NSF restart operation is complete.

• NSF for IPv6 is supported only in EIGRP named mode configurations.

Information About EIGRP IPv6 NSF/GR

EIGRP IPv6 NSF/GR

The EIGRP IPv6 NSF/GR feature allows a Nonstop Forwarding (NSF)-aware device that is running Enhanced Interior Gateway Routing Protocol (EIGRP) to forward IPv6 packets along routes that are known to a device that is performing a switchover operation. EIGRP peers retain adjacencies and routes learned from a restarting peer (the device that is undergoing a switchover), and the EIGRP peers continue to forward IPv6 packets to the restarting peer. The high-availability systems on the device retain the forwarding table and continue to forward IPv6 packets until the control plane (EIGRP) has converged on the restarting device.

NSF allows forwarding of IPv6 packets while the device restarts after a failure. Graceful Restart (GR) allows topology databases to resynchronize while maintaining neighbor relationships and forwarding paths.

Note   NSF supports IPv4 in EIGRP classic mode and named mode configurations. NSF supports IPv6 in named mode. For more information about the EIGRP IPv4 NSF feature, see the "EIGRP Nonstop Forwarding Awareness" module in the *IP Routing: EIGRP Configuration Guide*.

EIGRP IPv6 NSF Timers

The EIGRP IPv6 NSF/GR feature supports three types of timers: the signal timer, the converge timer, and the graceful-restart purge-time timer.

Configure the signal timer to adjust the maximum time of the initial restart period. The restarting device sends hello packets with the restart-signal (RS) bit set. If the restarting device has not learned about any neighbor or any Nonstop Forwarding (NSF)-aware neighbor or has not received all updates from neighbors when the timer expires, the Routing Information Base (RIB) is notified for convergence. The default value for the signal timer is 20 seconds. The **timers nsf signal** command is used to configure the signal timer.

Configure the converge timer to adjust the maximum time that a restarting device waits for the end-of-table (EOT) indications from all neighbors. The default value for the converge timer is 120 seconds. The **timers nsf converge** command is used to configure the converge timer.

Configure the graceful-restart purge-time timer to adjust the maximum waiting time to receive the convergent signal from a restarting device. The graceful-restart purge-time timer is used when the NSF-aware peer does not receive the EOT indication from the restarting neighbor. When the graceful-restart purge-time timer expires, the Enhanced Interior Gateway Routing Protocol (EIGRP) peer scans the topology table for stale routes from the restarting neighbor and changes the stale routes to active. This process allows EIGRP peers to find alternate routes instead of waiting during a long switchover operation. The default value for the graceful-restart purge-time timer is 240 seconds. The **timers graceful-restart purge-time** command is used to configure the graceful-restart purge-time timer.

How to Configure EIGRP IPv6 NSF/GR

Enabling EIGRP IPv6 NSF/GR

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router eigrp** *name*
4. **address-family ipv6 autonomous-system** *number*
5. **nsf**
6. **end**

DETAILED STEPS

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 eigrp** *name* **Example:** `Device(config)# router eigrp e1`	Configures an Enhanced Interior Gateway Routing Protocol (EIGRP) routing process and enters router configuration mode.
Step 4	**address-family ipv6 autonomous-system** *number* **Example:** `Device(config-router)# address-family ipv6 autonomous-system 1`	Enters address family configuration mode to configure an EIGRP IPv6 routing instance.

	Command or Action	Purpose
Step 5	**nsf** **Example:** Device(config-router-af)# nsf	Enables Nonstop Forwarding (NSF) for the specific address family on the device.
Step 6	**end** **Example:** Device(config-router-af)# end	Exits address family configuration mode and returns to privileged EXEC mode.

Modifying EIGRP IPv6 NSF Timers

Perform this task to modify EIGRP IPv6 NSF timers. This task is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router eigrp** *name*
4. **address-family ipv6 autonomous-system** *number*
5. **timers nsf signal** *seconds*
6. **timers nsf converge** *seconds*
7. **timers graceful-restart purge-time** *seconds*
8. **end**

DETAILED STEPS

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 eigrp** *name* **Example:** Device(config)# router eigrp e1	Configures an Enhanced Interior Gateway Routing Protocol (EIGRP) routing process and enters router configuration mode.

	Command or Action	Purpose
Step 4	**address-family ipv6 autonomous-system** *number* **Example:** Device(config-router)# address-family ipv6 autonomous-system 1	Enters address family configuration mode to configure an EIGRP IPv6 routing instance.
Step 5	**timers nsf signal** *seconds* **Example:** Device(config-router-af)# timers nsf signal 15	Sets the initial restart period, in seconds, for the restarting device to send hello packets with the restart-signal (RS) bit set.
Step 6	**timers nsf converge** *seconds* **Example:** Device(config-router-af)# timers nsf converge 60	Sets the maximum time, in seconds, that the restarting device must wait for end-of-table (EOT) indications from all neighbors.
Step 7	**timers graceful-restart purge-time** *seconds* **Example:** Device(config-router-af)# timers graceful-restart purge-time 150	Sets the graceful-restart purge-time timer to determine the period, in seconds, for which a Nonstop Forwarding (NSF)-aware device that is running EIGRP must hold routes for an inactive peer.
Step 8	**end** **Example:** Device(config-router-af)# end	Exits address family configuration mode and returns to privileged EXEC mode.

Verifying the EIGRP IPv6 NSF/GR Configuration

SUMMARY STEPS

1. **enable**
2. **show ipv6 protocols**

DETAILED STEPS

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	**show ipv6 protocols** **Example:** `Device# show ipv6 protocols`	Displays parameters and the current state of the active IPv6 routing protocol process. • The output of this command can be used to verify the EIGRP IPv6 NSF/GR configuration.

Monitoring EIGRP IPv6 NSF/GR Events

SUMMARY STEPS

1. **enable**
2. **debug eigrp nsf**
3. **debug eigrp address-family ipv6 notifications**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**debug eigrp nsf** **Example:** `Device# debug eigrp nsf`	Displays debugging information about NSF events on the console of the router.
Step 3	**debug eigrp address-family ipv6 notifications** **Example:** `Device# debug eigrp address-family ipv6 notifications`	Displays debugging information about Enhanced Interior Gateway Routing Protocol (EIGRP) address family IPv6 event notifications.

Configuration Examples for EIGRP IPv6 NSF/GR

Example: Configuring an EIGRP NSF Converge Timer

The following example shows how to adjust the maximum time that the restarting router waits for end-of-table (EOT) indications from all neighbors:

```
Device> enable
Device# configure terminal
Device(config)# router eigrp name
```

```
Device(config-router)# address-family ipv6 autonomous system 1
Device(config-router-af)# timers nsf converge 60
Device(config-router-af)# end
```

Example: Verifying the Configuration of EIGRP IPv6 NSF/GR on an NSF-Aware Device

The following is a sample output from the **show ipv6 protocols** command, which shows that EIGRP NSF is enabled, the graceful-restart purge-time timer is set to 260 seconds, the signal timer is set to 15 seconds, and the converge timer is set to 65 seconds:

```
Device> enable
Device# show ipv6 protocols

IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "bgp 1"
  IGP synchronization is disabled
  Redistribution:
    None
IPv6 Routing Protocol is "bgp multicast"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "eigrp 1"
EIGRP-IPv6 VR(name) Address-Family Protocol for AS(1)
  Metric weight K1=1, K2=0, K3=1, K4=0, K5=0 K6=0
  Metric rib-scale 128
  Metric version 64bit
  NSF-aware route hold timer is 260
  EIGRP NSF enabled
     NSF signal timer is 15s
     NSF converge timer is 65s
  Router-ID: 10.1.1.1
  Topology : 0 (base)
    Active Timer: 3 min
    Distance: internal 90 external 170
    Maximum path: 16
    Maximum hopcount 100
    Maximum metric variance 1
    Total Prefix Count: 0
    Total Redist Count: 0

  Interfaces:
  Redistribution:
    None
```

Additional References for EIGRP IPv6 NSF/GR

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases

Related Topic	Document Title
Cisco Express Forwarding (formerly known as CEF) commands	Cisco IOS IP Switching Command Reference
EIGRP commands	Cisco IOS IP Routing: EIGRP Command Reference
Nonstop Forwarding (NSF)	• "Cisco Nonstop Forwarding" module in the Stateful Switchover Deployment Guide • "Cisco Nonstop Forwarding" module in the *High Availability Configuration Guide* • "EIGRP Nonstop Forwarding Awareness" module in the *IP Routing: EIGRP Configuration Guide*
Command Lookup Tool	http://tools.cisco.com/Support/CLILookup

Standards and RFCs

Standard/RFC	Title
RFC 4724	*Graceful Restart Mechanism for BGP*

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 Overview of Cisco TrustSec

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 Overview of Cisco TrustSec

Feature Name	Releases	Feature Information
IPv6 enablement - Inline Tagging	Cisco IOS XE Fuji 16.8.1	The support for IPv6 is introduced.