Configuring OSPFv3 Fast Convergence: LSA and SPF Throttling

Understanding Fast Convergence: LSA and SPF Throttling

The Open Shortest Path First version 3 (OSPFv3) link-state advertisement (LSAs) and shortest-path first (SPF) throttling feature provides a dynamic mechanism to slow down link-state advertisement updates in OSPFv3 during times of network instability. It also allows faster OSPFv3 convergence by providing LSA rate limiting in milliseconds.

The OSPFv3 LSA and SPF throttling feature provides a dynamic mechanism to slow down link-state advertisement updates in OSPFv3 during times of network instability. It also allows faster OSPFv3 convergence by providing LSA rate limiting in milliseconds.

OSPFv3 can use static timers for rate-limiting SPF calculation and LSA generation. Although these timers are configurable, the values used are specified in seconds, which poses a limitation on OSPFv3 convergence. LSA and SPF throttling achieves subsecond convergence by providing a more sophisticated SPF and LSA rate-limiting mechanism that is able to react quickly to changes and also provide stability and protection during prolonged periods of instability.

How to Configure OSPFv3 Fast Convergence - LSA and SPF Throttling

Tuning LSA and SPF Timers for OSPFv3 Fast Convergence

To tune LSA and SPF Timers for OSPFv3 Fast Convergence, perform this procedure:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospfv3** [*process-id*]
4. **timers lsa arrival** *milliseconds*
5. **timers pacing flood** *milliseconds*
6. **timers pacing lsa-group** *seconds*
7. **timers pacing retransmission** *milliseconds*

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 ospfv3** [*process-id*] **Example:** `Device(config)# router ospfv3 1`	Enables OSPFv3 router configuration mode for the IPv4 or IPv6 address family.
Step 4	**timers lsa arrival** *milliseconds* **Example:** `Device(config-router)# timers lsa arrival 300`	Sets the minimum interval at which the software accepts the same LSA from OSPFv3 neighbors.
Step 5	**timers pacing flood** *milliseconds* **Example:** `Device(config-router)# timers pacing flood 30`	Configures LSA flood packet pacing.
Step 6	**timers pacing lsa-group** *seconds* **Example:** `Device(config-router)# timers pacing lsa-group 300`	Changes the interval at which OSPFv3 LSAs are collected into a group and refreshed, checksummed, or aged.
Step 7	**timers pacing retransmission** *milliseconds* **Example:** `Device(config-router)# timers pacing retransmission 100`	Configures LSA retransmission packet pacing in IPv4 OSPFv3.

Configuring LSA and SPF Throttling for OSPFv3 Fast Convergence

To configure LSA and SPF throttling for OSPFv3 fast convergence, perform this procedure:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 router ospf** *process-id*
4. **timers throttle spf** *spf-start spf-hold spf-max-wait*
5. **timers throttle lsa** *start-interval hold-interval max-interval*
6. **timers lsa arrival** *milliseconds*
7. **timers pacing flood** *milliseconds*

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	**ipv6 router ospf** *process-id* **Example:** `Device(config)# ipv6 router ospf 1`	Enables OSPFv3 router configuration mode.
Step 4	**timers throttle spf** *spf-start spf-hold spf-max-wait* **Example:** `Device(config-router)# timers throttle spf 200 200 200`	Turns on SPF throttling.
Step 5	**timers throttle lsa** *start-interval hold-interval max-interval* **Example:** `Device(config-router)# timers throttle lsa 300 300 300`	Sets rate-limiting values for OSPFv3 LSA generation.
Step 6	**timers lsa arrival** *milliseconds* **Example:** `Device(config-router)# timers lsa arrival 300`	Sets the minimum interval at which the software accepts the same LSA from OSPFv3 neighbors.

	Command or Action	Purpose
Step 7	**timers pacing flood** *milliseconds* **Example:** `Device(config-router)# timers pacing flood 30`	Configures LSA flood packet pacing.

Configuration Examples for OSPFv3 Fast Convergence - LSA and SPF Throttling

Example: Configuring LSA and SPF Throttling for OSPFv3 Fast Convergence

The following example show how to display the configuration values for SPF and LSA throttling timers:

```
Device# show ipv6 ospf

Routing Process "ospfv3 1" with ID 10.9.4.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
 It is an autonomous system boundary router
 Redistributing External Routes from,
    ospf 2
 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
```

Additional References for Fast Convergence: LSA and SPF Throttling

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	*Command Reference (Catalyst 9500 Series Switches)*

MIBs

MIB	MIBs Link
All the supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Fast Convergence: LSA and SPF Throttling

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 OSPFv3 Fast Convergence: LSA and SPF Throttling

Feature Name	Releases	Feature Information
OSPFv3 Fast Convergence: LSA and SPF Throttling	Cisco IOS XE Fuji 16.8.1a	The OSPFv3 LSA and SPF throttling feature provides a dynamic mechanism to slow down link-state advertisement updates in OSPFv3 during times of network instability.