



# OSPFv3 Fast Convergence: LSA and SPF Throttling

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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.

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## Information About OSPFv3 Fast Convergence: LSA and SPF Throttling

### Fast Convergence: LSA and SPF Throttling

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

This task can be performed in Cisco IOS Release 15.1(3)S and 15.2(1)T and later releases.

### 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
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>router ospfv3</b> <i>[process-id]</i> <b>Example:</b> Device(config)# router ospfv3 1	Enables OSPFv3 router configuration mode for the IPv4 or IPv6 address family.
<b>Step 4</b>	<b>timers lsa arrival</b> <i>milliseconds</i> <b>Example:</b> Device(config-rtr)# timers lsa arrival 300	Sets the minimum interval at which the software accepts the same LSA from OSPFv3 neighbors.
<b>Step 5</b>	<b>timers pacing flood</b> <i>milliseconds</i> <b>Example:</b> Device(config-rtr)# timers pacing flood 30	Configures LSA flood packet pacing.

	Command or Action	Purpose
<b>Step 6</b>	<b>timers pacing lsa-group</b> <i>seconds</i> <b>Example:</b> 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.
<b>Step 7</b>	<b>timers pacing retransmission</b> <i>milliseconds</i> <b>Example:</b> Device(config-router)# timers pacing retransmission 100	Configures LSA retransmission packet pacing in IPv4 OSPFv3.

## Configuring LSA and SPF Throttling for OSPFv3 Fast Convergence

This task can be performed in releases prior to Cisco IOS Release 15.1(3)S and 15.2(1)T.

### 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
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ipv6 router ospf</b> <i>process-id</i> <b>Example:</b> Device(config)# ipv6 router ospf 1	Enables OSPFv3 router configuration mode.
<b>Step 4</b>	<b>timers throttle spf</b> <i>spf-start spf-hold spf-max-wait</i> <b>Example:</b>	Turns on SPF throttling.

	Command or Action	Purpose
	Device(config-rtr)# timers throttle spf 200 200 200	
<b>Step 5</b>	<b>timers throttle lsa</b> <i>start-interval hold-interval max-interval</i> <b>Example:</b> Device(config-rtr)# timers throttle lsa 300 300 300	Sets rate-limiting values for OSPFv3 LSA generation.
<b>Step 6</b>	<b>timers lsa arrival</b> <i>milliseconds</i> <b>Example:</b> Device(config-rtr)# timers lsa arrival 300	Sets the minimum interval at which the software accepts the same LSA from OSPFv3 neighbors.
<b>Step 7</b>	<b>timers pacing flood</b> <i>milliseconds</i> <b>Example:</b> Device(config-rtr)# 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

## Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	<i>IPv6 Configuration Guide</i>
Cisco IOS commands	<i>Cisco IOS Master Commands List, All Releases</i>
IPv6 commands	<i>Cisco IOS IPv6 Command Reference</i>
Cisco IOS IPv6 features	<i>Cisco IOS IPv6 Feature Mapping</i>
OSPFv3 Fast Convergence: LSA and SPF Throttling	“OSPF Link-State Advertisement Throttling” module

## Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	IPv6 RFCs

## MIBs

MIB	MIBs Link
	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## 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 OSPFv3 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](http://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 Release 2.1	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.

**Table 2: 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 Release 17.4	This feature was introduced.