



# Configuring OSPFv3 Fast Convergence - LSA and SPF Throttling

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## OSPFv3 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.

## 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

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
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>router ospfv3</b> <i>[process-id]</i> <b>Example:</b> Device(config)# <b>router ospfv3 1</b>	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)# <b>timers lsa arrival 300</b>	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)# <b>timers pacing flood 30</b>	Configures LSA flood packet pacing.
<b>Step 6</b>	<b>timers pacing lsa-group</b> <i>seconds</i> <b>Example:</b> Device(config-router)# <b>timers pacing lsa-group 300</b>	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)# <b>timers pacing retransmission 100</b>	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	<b>enable</b> <b>Example:</b> Device> <code>enable</code>	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> Device# <code>configure terminal</code>	Enters global configuration mode.
Step 3	<b>ipv6 router ospf process-id</b> <b>Example:</b> Device(config)# <code>ipv6 router ospf 1</code>	Enables OSPFv3 router configuration mode.
Step 4	<b>timers throttle spf spf-start spf-hold spf-max-wait</b> <b>Example:</b> Device(config-rtr)# <code>timers throttle spf 200 200 200</code>	Turns on SPF throttling.
Step 5	<b>timers throttle lsa start-interval hold-interval max-interval</b> <b>Example:</b> Device(config-rtr)# <code>timers throttle lsa 300 300 300</code>	Sets rate-limiting values for OSPFv3 LSA generation.
Step 6	<b>timers lsa arrival milliseconds</b> <b>Example:</b> Device(config-rtr)# <code>timers lsa arrival 300</code>	Sets the minimum interval at which the software accepts the same LSA from OSPFv3 neighbors.
Step 7	<b>timers pacing flood milliseconds</b> <b>Example:</b> Device(config-rtr)# <code>timers pacing flood 30</code>	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 msec
  Minimum hold time between two consecutive SPF's 10000 msec
  Maximum wait time between two consecutive SPF's 10000 msec
  Minimum LSA interval 5 sec
  Minimum LSA arrival 1000 msec

```

## Additional References

### Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	<i>IPv6 Configuration Guide</i>
OSPFv3 Fast Convergence: LSA and SPF Throttling	<i>OSPF Shortest Path First Throttling</i> module

### Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	IPv6 RFCs

## 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.

**Table 1: Feature Information for OSPFv3 Fast Convergence: LSA and SPF Throttling**

Releases	Feature Information
Cisco IOS XE Fuji 16.8.1a	The feature was introduced.