



## 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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## 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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

# 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                                                                                                          |
|--------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Step 1 | <code>enable</code><br><br>Example:<br><code>Device&gt; enable</code> | Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul> |

|               | Command or Action                                                                                                                  | Purpose                                                                                                   |
|---------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Step 2</b> | <b>configure terminal</b><br><br><b>Example:</b><br>Device# configure terminal                                                     | Enters global configuration mode.                                                                         |
| <b>Step 3</b> | <b>router ospfv3 [process-id]</b><br><br><b>Example:</b><br>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 milliseconds</b><br><br><b>Example:</b><br>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 milliseconds</b><br><br><b>Example:</b><br>Device(config-rtr)# timers pacing flood 30                       | Configures LSA flood packet pacing.                                                                       |
| <b>Step 6</b> | <b>timers pacing lsa-group seconds</b><br><br><b>Example:</b><br>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 milliseconds</b><br><br><b>Example:</b><br>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><br><br><b>Example:</b><br>Device> enable                                                                                                    | Enables privileged EXEC mode.<br><br><ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul> |
| <b>Step 2</b> | <b>configure terminal</b><br><br><b>Example:</b><br>Device# configure terminal                                                                            | Enters global configuration mode.                                                                                         |
| <b>Step 3</b> | <b>ipv6 router ospf</b> <i>process-id</i><br><br><b>Example:</b><br>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><br><br><b>Example:</b><br>Device(config-rtr)# timers throttle spf 200 200 200           | Turns on SPF throttling.                                                                                                  |
| <b>Step 5</b> | <b>timers throttle lsa</b> <i>start-interval hold-interval max-interval</i><br><br><b>Example:</b><br>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><br><br><b>Example:</b><br>Device(config-rtr)# 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 | <b>timers pacing flood</b> <i>milliseconds</i><br><br><b>Example:</b><br><br>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 msec
Minimum hold time between two consecutive SPF 10000 msec
Maximum wait time between two consecutive SPF 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>                              |
| Cisco IOS commands               | <a href="#">Cisco IOS Master Commands List, All Releases</a> |
| IPv6 commands                    | <a href="#">Cisco IOS IPv6 Command Reference</a>             |
| Cisco IOS IPv6 features          | <a href="#">Cisco IOS IPv6 Feature Mapping</a>               |

| Related Topic                                   | Document Title                                        |
|-------------------------------------------------|-------------------------------------------------------|
| 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 |

#### 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:<br><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.

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

| Feature Name                                    | Releases                                          | Feature Information                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPFv3 Fast Convergence: LSA and SPF Throttling | 12.2(33)SRC<br>15.0(1)SY<br>15.0(1)M<br>15.1(1)SY | <p>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.</p> <p>The following commands were introduced or modified: <b>ipv6 router ospf</b>, <b>router ospfv3</b>, <b>timers lsa arrival</b>, <b>timers pacing flood</b>, <b>timers pacing lsa-group</b>, <b>timers pacing retransmission</b>, <b>timers throttle lsa</b>, <b>timers throttle spf</b>.</p> |

