OSPF Per-Interface Link-Local Signaling

The OSPF Per-Interface Link-Local Signaling feature allows you to selectively enable or disable Link-Local Signaling (LLS) for a specific interface regardless of the global (router level) setting that you have previously configured.

Finding Feature Information in This Module
Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “Feature Information for OSPF Per-Interface Link-Local Signaling” section on page 9.

Finding Support Information for Platforms and Cisco IOS Software Images
Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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- Information About OSPF Per-Interface Link-Local Signaling, page 1
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- Feature Information for OSPF Per-Interface Link-Local Signaling, page 9

Information About OSPF Per-Interface Link-Local Signaling

Before configuring the feature, you should understand the concept in the following section:

- Benefits of the OSPF Per-Interface Link-Local Signaling Feature, page 2
Benefits of the OSPF Per-Interface Link-Local Signaling Feature

LLS allows for the extension of existing OSPF packets in order to provide additional bit space. The additional bit space enables greater information per packet exchange between OSPF neighbors. This functionality is used, for example, by the OSPF Nonstop Forwarding (NSF) Awareness feature that allows customer premises equipment (CPE) routers that are NSF-aware to help NSF-capable routers perform nonstop forwarding of packets.

When LLS is enabled at the router level, it is automatically enabled for all interfaces. The OSPF Per-Interface Link-Local Signaling feature allows you to selectively enable or disable LLS for a specific interface. You may want to disable LLS on a per-interface basis depending on your network design. For example, disabling LLS on an interface that is connected to a non-Cisco device that may be noncompliant with RFC 2328 can prevent problems with the forming of Open Shortest Path First (OSPF) neighbors in the network.

How to Configure the OSPF Per-Interface Link-Local Signaling Feature

This section contains the following procedure:

- Turning Off LLS on a Per-Interface Basis, page 2 (optional)

Turning Off LLS on a Per-Interface Basis

This task disables LLS on a specific interface.

SUMMARY STEPS

1. enable
2. configure terminal
3. interface type slot/port
4. ip address ip-address mask [secondary]
5. no ip directed-broadcast [access-list-number | extended access-list-number]
6. ip ospf message-digest-key key-id encryption-type md5 key
7. [no | default] ip ospf lls [disable]
DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
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| **Step 1** enable | Enables privileged EXEC mode.  
- Enter your password if prompted. |

Example:
Router> enable

**Step 2** configure terminal
Enters global configuration mode.

Example:
Router# configure terminal

**Step 3** interface type slot/port
Configures an interface type and enters interface configuration mode.

Example:
Router(config)# interface Ethernet 1/0

**Step 4** ip address ip-address mask [secondary]
Sets a primary or secondary IP address for an interface.

Example:
Router(config-if)# ip address 10.2.145.20 255.255.255.0

**Step 5** no ip directed-broadcast [access-list-number | extended access-list-number]
Drops directed broadcasts destined for the subnet to which that interface is attached, rather than broadcasting them.  
- The forwarding of IP directed broadcasts on Ethernet interface 1/0 is disabled.

Example:
Router(config-if)# no ip directed-broadcast

**Step 6** ip ospf message-digest-key key-id encryption-type md5 key
Enables OSPF Message Digest 5 (MD5) algorithm authentication.

Example:
Router(config-if)# ip ospf message-digest-key 100 md5 testing

**Step 7** [no | default] ip ospf lls [disable]
Disables LLS on an interface, regardless of the global (router level) setting.

Example:
Router(config-if)# ip ospf lls disable

What to Do Next

To verify that LLS has been enabled or disabled for a specific interface, use the show ip ospf interface command. See the “Configuring and Verifying the OSPF Per-Interface Link-Local Signaling Feature: Example” section on page 4 for an example of the information displayed.
Configuration Examples for the OSPF Per-Interface Link-Local Signaling Feature

This section contains the following configuration example:

- Configuring and Verifying the OSPF Per-Interface Link-Local Signaling Feature: Example, page 4

Configuring and Verifying the OSPF Per-Interface Link-Local Signaling Feature: Example

In the following example, LLS has been enabled on Ethernet interface 1/0 and disabled on Ethernet interface 2/0:

```
interface Ethernet1/0
  ip address 10.2.145.2 255.255.255.0
  no ip directed-broadcast
  ip ospf message-digest-key 1 md5 testing
  ip ospf lls

interface Ethernet2/0
  ip address 10.1.145.2 255.255.0.0
  no ip directed-broadcast
  ip ospf message-digest-key 1 md5 testing
  ip ospf lls disable

interface Ethernet3/0
  ip address 10.3.145.2 255.255.255.0
  no ip directed-broadcast

router ospf 1
  log-adjacency-changes detail
  area 0 authentication message-digest
  redistribute connected subnets
  network 10.0.0.0 0.255.255.255 area 1
  network 10.2.3.0 0.0.0.255 area 1
```

In the following example, the `show ip ospf interface` command has been entered to verify that LLS has been enabled for Ethernet interface 1/0 and disabled for interface Ethernet 2/0:

```
Router# show ip ospf interface

Ethernet1/0 is up, line protocol is up
  Internet Address 10.2.145.2/24, Area 1
  Process ID 1, Router ID 10.22.222.2, Network Type BROADCAST, Cost: 10
  Transmit Delay is 1 sec, State BDR, Priority 1
  Designated Router (ID) 10.2.2.3, Interface address 10.2.145.1
  Backup Designated router (ID) 10.22.222.2, Interface address 10.2.145.2
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  oob-resync timeout 40
  Hello due in 00:00:00
  ! Supports Link-local Signaling (LLS)
  Index 1/1, flood queue length 0
    Next 0x0(0)/0x0(0)
    Last flood scan length is 2, maximum is 8
    Last flood scan time is 0 msec, maximum is 0 msec
    Neighbor Count is 1, Adjacent neighbor count is 1
      Adjacent with neighbor 10.2.2.3 (Designated Router)
  Suppress hello for 0 neighbor(s)
  Ethernet2/0 is up, line protocol is up
```
Internet Address 10.1.145.2/16, Area 1
Process ID 1, Router ID 10.22.222.2, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State BDR, Priority 1
Designated Router (ID) 10.2.2.3, Interface address 10.1.145.1
Backup Designated router (ID) 10.22.222.2, Interface address 10.1.145.2
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
   oob-resync timeout 40
   Hello due in 00:00:04
!  Does not support Link-local Signaling (LLS)
Index 2/2, flood queue length 0
   Next 0x0(0)/0x0(0)
   Last flood scan length is 2, maximum is 11
   Last flood scan time is 0 msec, maximum is 0 msec
   Neighbor Count is 1, Adjacent neighbor count is 1
   Adjacent with neighbor 10.2.2.3 (Designated Router)
   Suppress hello for 0 neighbor(s)
Ethernet3/0 is up, line protocol is up
Internet Address 10.3.145.2/24, Area 1
Process ID 1, Router ID 10.22.222.2, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State BDR, Priority 1
Designated Router (ID) 10.2.2.3, Interface address 10.3.145.1
Backup Designated router (ID) 10.22.222.2, Interface address 10.3.145.2
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
   oob-resync timeout 40
   Hello due in 00:00:07
!  Supports Link-local Signaling (LLS)
Index 3/3, flood queue length 0
   Next 0x0(0)/0x0(0)
   Last flood scan length is 2, maximum is 11
   Last flood scan time is 0 msec, maximum is 0 msec
   Neighbor Count is 1, Adjacent neighbor count is 1
   Adjacent with neighbor 10.2.2.3 (Designated Router)
   Suppress hello for 0 neighbor(s)

Additional References

The following sections provide references related to the OSPF Per-Interface Link-Local Signaling feature.

Related Documents

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<thead>
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<th>Related Topic</th>
<th>Document Title</th>
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<tr>
<td>Configuring OSPF</td>
<td>Cisco IOS IP Configuration Guide, Release 12.4</td>
</tr>
<tr>
<td>Configuring OSPF NSF Awareness</td>
<td>OSPF Nonstop Forwarding (NSF) Awareness</td>
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<tr>
<td>OSPF commands</td>
<td>Cisco IOS IP Routing Protocols Command Reference,</td>
</tr>
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<td></td>
<td>Release 12.2(33)SRA</td>
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Standards

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MIBs

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<th>MIBs</th>
<th>MIBs Link</th>
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<tr>
<td>None</td>
<td>To locate and download MIBs for selected platforms, Cisco IOS releases,</td>
</tr>
<tr>
<td></td>
<td>and feature sets, use Cisco MIB Locator found at the following URL:</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a></td>
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RFCs

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<tr>
<td>RFC 2328</td>
<td>OSPF Version 2</td>
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Technical Assistance

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<td>searchable technical content, including links to products, technologies,</td>
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<td>solutions, technical tips, and tools. Registered Cisco.com users can</td>
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<tr>
<td>log in from this page to access even more content.</td>
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Command Reference

This section documents a modified command only.

- `ip ospf llfs`
**ip ospf lls**

To enable Link-Local Signaling (LLS) on an interface, regardless of the router-level LLS setting, use the `ip ospf lls` command in interface configuration mode. To reconfigure the router-level LLS setting on the specific interface, use the `no` or `default` version of this command.

```
ip ospf lls [disable]
```

*no | default | ip ospf lls [disable]*

<table>
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<tr>
<th>Syntax Description</th>
<th>Command Default</th>
<th>Command Modes</th>
<th>Command History</th>
<th>Usage Guidelines</th>
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<tbody>
<tr>
<td><code>no</code></td>
<td>Restores the default LLS setting for the interface that has been configured at the router level.</td>
<td>Interface configuration</td>
<td>12.0(27)S This command was introduced.</td>
<td>By default, each Open Shortest Path First (OSPF) interface inherits the LLS setting from the router level. The <code>ip ospf lls</code> interface-level command takes precedence over the <code>capability lls</code> router-level command. For example, if you have entered the <code>no capability lls</code> command to disable LLS at the router level, you can use the <code>ip ospf lls</code> command to selectively enable LLS for specific interfaces, in order to allow the router to enable OSPF nonstop forwarding (NSF) awareness only for these specified interfaces. To unconfigure the interface LLS setting, enter either the <code>default ip ospf lls</code> command or the <code>no ip ospf lls</code> command to restore the default LLS setting for the interface that has been configured at the router level. For example, if the <code>capability lls</code> command is enabled (by default) at the router level, you can use either the <code>default ip ospf lls</code> command or the <code>no ip ospf lls</code> command to disable LLS on specific interfaces, for instance, to interoperate on network segments where there are routers that do not properly handle LLS.</td>
</tr>
<tr>
<td><code>default</code></td>
<td>Inherits the global (router level) LLS settings for the interface that has been specified.</td>
<td></td>
<td>12.3(7)T This command was integrated into Cisco IOS Release 12.3(7)T.</td>
<td></td>
</tr>
<tr>
<td><code>disable</code></td>
<td>(Optional) Disables LLS on a specified interface regardless of the global (router level) setting.</td>
<td></td>
<td>12.2(25)S This command was integrated into Cisco IOS Release 12.2(25)S.</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td>12.2(18)SXE This command was integrated into Cisco IOS Release 12.2(18)SXE.</td>
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<td>12.2(27)SBC This command was integrated into Cisco IOS Release 12.2(27)SBC.</td>
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<tr>
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<td></td>
<td></td>
<td>12.2(33)SRA This command was integrated into Cisco IOS Release 12.2(33)SRA.</td>
<td></td>
</tr>
</tbody>
</table>
If the network is running OSPF with the LLS feature enabled by default, LLS is globally enabled for all interfaces. If a router in the network is connected to a non-Cisco device that is not in compliance with RFC 2328, there may be network difficulties involving the forming of OSPF neighbors. In this situation, we recommend that you use the `ip ospf lls` command with the `disable` keyword to disable LLS on the router that is connected to the non-Cisco device.

Examples

In following example, LLS is disabled on Ethernet interface 2/0:

```plaintext
Router(config)# interface Ethernet2/0
Router(config-if)# ip address 10.1.145.2 255.255.0.0
Router(config-if)# no ip directed-broadcast
Router(config-if)# ip ospf message-digest-key 1 md5 testing
Router(config-if)# ip ospf lls disable
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
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<tr>
<td><code>capability lls</code></td>
<td>Enables the use of the LLS data block in originated OSPF packets and reenables OSPF NSF awareness.</td>
</tr>
<tr>
<td><code>show ip ospf interface</code></td>
<td>Displays OSPF-related interface information.</td>
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Feature Information for OSPF Per-Interface Link-Local Signaling

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for OSPF Per-Interface Link-Local Signaling

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
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<tr>
<td>OSPF Per-Interface Link-Local Signaling</td>
<td>12.0(27)S</td>
<td>The OSPF Per-Interface Link-Local Signaling feature allows you to selectively enable</td>
</tr>
<tr>
<td></td>
<td>12.3(7)T</td>
<td>or disable Link-Local Signaling (LLS) for a specific interface regardless of the</td>
</tr>
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<td></td>
<td>12.2(25)S</td>
<td>global (router level) setting that you have previously configured.</td>
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<td>12.2(18)SXE</td>
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Cisco IOS Release: Multiple releases (see the Feature Information for OSPF Per-Interface Link-Local Signaling table)