OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

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This document describes the Open Shortest Path First (OSPF) mechanism to exclude IP prefixes of connected networks from link-state advertisements (LSAs). When OSPF is deployed in large networks, limiting the number of IP prefixes that are carried in the OSPF LSAs can speed up OSPF convergence.

This feature can also be utilized to enhance the security of an OSPF network by allowing the network administrator to prevent IP routing toward internal nodes.

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 the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements" section on page 15.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS 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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Prerequisites for the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

Before you can use the mechanism to exclude IP prefixes from LSAs, the OSPF routing protocol must be configured.

Information About the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

One way to improve OSPF network convergence is to limit the number of IP prefixes carried in LSAs.

Previous Methods to Limit the Number of IP Prefixes Carried in LSAs

Configuring interfaces as unnumbered limits IP prefixes. However, for network management and the ease of identifying and troubleshooting numbered interfaces, you might want to have numbered interfaces and also want to limit the number of IP advertisements.

Feature Overview of the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

The OSPF mechanism to exclude connected IP prefixes from LSAs allows network administrators to control what IP prefixes are installed into LSAs. This functionality is implemented for router and network LSAs in the following manner:

- For the router LSA, to exclude prefixes, the feature excludes link type 3 (stub link).
- For the network LSA, the OSPF Designated Router (DR) generates LSAs with a special /32 network mask (0xFFFFFFFF).

Note Previous versions of Cisco IOS software that do not have this feature will install the /32 prefix into the routing table.

Globally Suppressing IP Prefix Advertisements per OSPF Process

You can reduce OSPF convergence time by configuring the OSPF process on a router to prevent the advertisement of all IP prefixes by using the **prefix-suppression** command in router configuration mode.

Note Prefixes that are associated with loopbacks, secondary IP addresses, and passive interfaces are excluded because typical network designs require those to remain reachable.

Suppressing IP Prefix Advertisements on a Per-Interface Basis

You can explicitly configure an OSPF interface not to advertise its IP network to its neighbors by using the **ip ospf prefix-suppression** command in interface configuration mode.

Note If you have globally suppressed IP prefixes from connected IP networks by configuring the **prefix-suppression** router configuration command, the interface configuration command takes precedence over the router configuration mode command.

How to Exclude Connected IP Prefixes from OSPF LSAs

This section describes how to configure two alternative methods to suppress IP prefix advertisements. You can suppress IP prefix advertisements per OSPF process or per interface. This section also explains how you can troubleshoot IP prefix suppression.

Excluding IP Prefixes per OSPF Process

This section provides the necessary steps to exclude IP prefixes from connected networks for all interface types except for loopbacks, secondary IP addresses, and passive interfaces for an OSPF process.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** [*process-id*] [**vrf** *vpn-name*]
4. **prefix-suppression**
5. **end**
6. **show ip ospf**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**router ospf** *process-id* [**vrf** *vpn-name*] **Example:** `Router(config)# router ospf 23`	Configures an OSPFv2 routing process and enters router configuration mode.
Step 4	**prefix-suppression** **Example:** `Router(config-router)# prefix-suppression`	Prevents OSPF from advertising all IP prefixes except prefixes that are associated with loopbacks, secondary IP addresses, and passive interfaces.
Step 5	**end** **Example:** `Router(config-router)# end`	Returns to privileged EXEC mode.
Step 6	**show ip ospf** **Example:** `Router# show ip ospf`	Displays general information about OSPF routing processes. **Note** Use this command to verify that IP prefix suppression has been enabled.

Examples

In the following example, output from the **show ip ospf** command shows that IP prefix advertisement has been suppressed for OSPF process 1.

```
Router# show ip ospf

Routing Process "ospf 1" with ID 10.0.0.6
Start time: 00:00:04.912, Time elapsed: 00:02:35.184
Supports only single TOS(TOS0) routes
Supports opaque LSA
Supports Link-local Signaling (LLS)
Supports area transit capability
It is an area border router
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msecs
Minimum hold time between two consecutive SPFs 10000 msecs
Maximum wait time between two consecutive SPFs 10000 msecs
Incremental-SPF disabled
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msecs
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msecs
Retransmission pacing timer 66 msecs
```

```
Number of external LSA 2. Checksum Sum 0x0132C8
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 3. 3 normal 0 stub 0 nssa
Number of areas transit capable is 1
External flood list length 0
IETF NSF helper support enabled
Cisco NSF helper support enabled
Prefix-suppression is enabled
.
.
.
```

Excluding IP Prefixes on a Per-Interface Basis

This section provides the steps necessary to prevent OSPF routers from advertising all IP prefixes that are associated with a specific interface. When you enter the **ip ospf prefix suppression** command in interface configuration mode, it takes precedence over the **prefix-suppression** command that is entered in router configuration mode.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip ospf prefix-suppression** [**disable**]
5. **end**
6. **show ip ospf interface**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface serial 0/0`	Configures an interface type and enters interface configuration mode.
Step 4	**ip ospf prefix-suppression** [**disable**] **Example:** `Router(config-if)# ip ospf prefix-suppression`	Prevents OSPF from advertising IP prefixes that belong to a specific interface, except those that are associated with secondary IP addresses.
Step 5	**end** **Example:** `Router(config-if)# end`	Returns to privileged EXEC mode.
Step 6	**show ip ospf interface** **Example:** `Router# show ip ospf interface`	Displays OSPF-related interface information. **Note** Use this command to verify that IP prefix suppression has been enabled for a specific interface.

Examples

In the following example, the output from the **show ip ospf interface** command verifies that prefix suppression has been enabled for Ethernet interface 0/0.

```
Router# show ip ospf interface

Ethernet0/0 is up, line protocol is up
  Internet Address 192.168.130.2/24, Area 2
  Process ID 1, Router ID 10.0.0.6, Network Type BROADCAST, Cost: 10
  Prefix-suppression is enabled
.
.
.
```

Troubleshooting IP Prefix Suppression

This section describes how to troubleshoot IP prefix suppression by using the **debug ip ospf lsa-generation** command.

SUMMARY STEPS

1. **enable**
2. **debug ip ospf lsa-generation**
3. **debug condition interface** *interface-type interface-number* [**dlci** *dlci*] [**vc** {*vci* | *vpi* | *vci*}]
4.
5. **show debugging**
6. **show logging**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**debug ip ospf lsa-generation** **Example:** `Router# debug ip ospf lsa-generation`	Displays informations about each OSPF LSA generated.
Step 3	**debug condition interface** *interface-type interface-number* [**dlci** *dlci*] [**vc** {*vci* | *vpi* | *vci*}] **Example:** `Router# debug interface serial 0/0`	Limits output for some **debug** commands on the basis of the interface or virtual circuit.
Step 4	**show debugging** **Example:** `Router# show debugging`	Displays information about the types of debugging that are enabled for your router.
Step 5	**show logging** [**slot** *slot-number* | **summary**] **Example:** `Router# show logging`	Displays the state of syslog and the contents of the standard system logging buffer.

Examples

The following sample output from the **debug ip ospf lsa-generation** command verifies that for the Ethernet interface 0/0, IP prefixes from the connected network 192.168.131.0 are excluded.

```
Router# debug ip ospf lsa-generation

OSPF summary lsa generation debugging is on

Router# debug condition interface e0/0

Condition 1 set

Router# show debugging
```

```
IP routing:
   OSPF summary lsa generation debugging is on

Condition 1: interface Et0/0 (1 flags triggered)
        Flags: Et0/0

Router# show logging

*Jun  5 21:54:47.295: OSPF: Suppressing 192.168.131.0/24 on Ethernet1/0 from router LSA
*Jun  5 21:54:52.355: OSPF: Suppressing 192.168.131.0/24 on Ethernet1/0 from router LSA
.
.
.
```

Configuration Examples for the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

This section contains the following examples:

- Excluding IP Prefixes from LSA Advertisements for an OSPF Process: Example, page 8
- Excluding IP Prefixes from LSA Advertisements for a Specified Interface: Example, page 9

Excluding IP Prefixes from LSA Advertisements for an OSPF Process: Example

The following example configures IP prefix suppression for OSPF routing process 23.

```
router ospf 23
 prefix-suppression
 end
```

When the **show ip ospf** command is entered, the displayed output verifies that IP prefix suppression has been enabled for OSPF process 23.

```
Router# show ip ospf

outing Process "ospf 23" with ID 10.0.0.6
Start time: 00:00:04.912, Time elapsed: 00:02:35.184
Supports only single TOS(TOS0) routes
Supports opaque LSA
Supports Link-local Signaling (LLS)
Supports area transit capability
It is an area border router
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msecs
Minimum hold time between two consecutive SPFs 10000 msecs
Maximum wait time between two consecutive SPFs 10000 msecs
Incremental-SPF disabled
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msecs
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msecs
Retransmission pacing timer 66 msecs
Number of external LSA 2. Checksum Sum 0x0132C8
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
```

```
Number of areas in this router is 3. 3 normal 0 stub 0 nssa
Number of areas transit capable is 1
External flood list length 0
IETF NSF helper support enabled
Cisco NSF helper support enabled
Prefix-suppression is enabled
.
.
.
```

Excluding IP Prefixes from LSA Advertisements for a Specified Interface: Example

The following example configures the suppression of all IP prefixes that are associated with Ethernet interface 0/0:

```
interface Ethernet 0/0
 ip ospf prefix-suppression
 end
```

When the **show ip ospf interface** command is entered, the displayed output verifies that IP prefix suppression is enabled for Ethernet interface 0/0.

```
Router# show ip ospf interface

Ethernet0/0 is up, line protocol is up
  Internet Address 192.168.130.2/24, Area 2
  Process ID 1, Router ID 10.0.0.6, Network Type BROADCAST, Cost: 10
  Prefix-suppression is enabled
.
.
.
```

Additional References

The following sections provide references related to the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements feature.

Related Documents

Related Topic	Document Title
OSPF commands	"OSPF Commands" chapter of the *Cisco IOS IP Routing Protocols Command Reference*, Release 12.4T.
OSPF configuration tasks	"Configuring OSPF" chapter of the *Cisco IOS Routing Protocols Configuration Guide*, Release 12.4T.

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
There are no new MIBs that are associated with this feature.	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

RFCs

RFC	Title
None	—

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/techsupport

Command Reference

This section documents only commands that are new or modified.

- **ip ospf prefix-suppression**
- **prefix-suppression**

ip ospf prefix-suppression

To prevent OSPF from advertising all IP prefixes that belong to a specific interface, except for prefixes that are associated with secondary IP addresses, use the **ip ospf prefix-suppression** command in interface configuration mode. To remove the per-interface configuration from the interface and allow the interface to inherit the IP prefix suppression setting from the router configuration, use the **no** form of this command.

ip ospf prefix-suppression [**disable**]

no ip ospf prefix-suppression

Syntax Description

disable	(Optional) Specifies that OSPF will advertise the interface IP prefix, regardless of the router mode configuration for IP prefix suppression.

Command Default

All IP prefixes that are associated with the interface are advertised.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.4(15)T	This command was introduced.

Usage Guidelines

You can suppress IP prefixes on a per-interface basis for all interface types by entering the **ip ospf prefix-suppression** command in interface configuration mode.

When the **ip ospf prefix-suppression** command is configured, it takes precedence over the **prefix-suppression** router configuration command. If the **prefix-suppression** router configuration command has been entered, the interfaces for the specified OSPF process will inherit the prefix suppression setting from the router configuration command.

When you enter the **ip ospf prefix-suppression** command, prefix generation for any interface type, including loopbacks and passive interfaces, are suppressed. Only prefixes associated with secondary IP addressees remain unaffected.

Examples

The following example suppresses all IP prefixes, except for secondary IP addresses, for Ethernet interface 1/1:

```
interface ethernet 1/1
 ip ospf prefix-suppression
```

Related Commands

Command	Description
prefix-suppression	Prevents OSPF from advertising all IP prefixes except prefixes associated with loopbacks, secondary IP addresses, and passive interfaces for a specific OSPF process.

prefix-suppression

To prevent OSPF from advertising all IP prefixes except prefixes that are associated with loopbacks, secondary IP addresses, and passive interfaces for a specific OSPF process, use the **prefix-suppression** command in router configuration mode. To advertise all IP prefixes, use the **no** form of this command.

prefix-suppression

no prefix-suppression

Syntax Description

This command has no arguments or keywords.

Command Default

All IP prefixes are advertised.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.4(15)T	This command was introduced.

Usage Guidelines

You can globally suppress all IP prefixes (except prefixes that are associated with loopbacks, secondary IP addresses, and passive interfaces) for an entire OSPF process by using the **prefix-suppression** command in router configuration mode. You can also suppress IP prefixes on a per-interface basis by using the **ip ospf prefix-suppression** command in interface configuration mode. When the **ip ospf prefix-suppression** command is configured, it takes precedence over the **prefix-suppression** router configuration command.

Examples

The following example globally suppresses all IP prefixes except prefixes that are associated with loopbacks, secondary IP addresses, and passive interfaces for OSPF process 4:

```
router ospf 4
 prefix-suppression
```

Related Commands

Command	Description
ip ospf prefix-suppression	Prevents OSPF from advertising all IP prefixes that belong to a specific interface, except for IP prefixes that are associated with secondary IP addresses.

Feature Information for the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

Table 1 lists the release history for this feature.

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

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note 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 the OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements

Feature Name	Releases	Feature Information
OSPF Mechanism to Exclude Connected IP Prefixes from LSA Advertisements	12.4(15)T	This document describes the Open Shortest Path First (OSPF) mechanism to exclude IP prefixes of connected networks from link-state advertisements (LSAs). When OSPF is deployed in large networks, limiting the number of IP prefixes that are carried in the OSPF LSAs can speed up OSPF convergence. This feature can also be utilized to enhance the security of an OSPF network by allowing the network administrator to prevent IP routing toward internal nodes.

Glossary

network LSA—The link-state advertisement created by the designated router (DR) or pseudonode that represents a group of routers on the same interface. The network LSA advertises summary information to represent the group of routers on the network.

router LSA—The link-state advertisement that is generated by a router. The router LSA advertises routing information (connected routes) for the router.
