OSPF Limit on Number of Redistributed Routes

Open Shortest Path First (OSPF) supports a user-defined maximum number of prefixes (routes) that are allowed to be redistributed into OSPF from other protocols or other OSPF processes. Such a limit could help prevent the router from being flooded by too many redistributed routes.

History for the OSPF Limit on Number of Redistributed Routes Feature

Release	Modification
12.0(25)S	This feature was introduced.
12.3(2)T	This feature was integrated into Cisco IOS Release 12.3(2)T.
12.2(18)S	This feature was integrated into Cisco IOS Release 12.2(18)S.
12.2(27)SBC	This feature was integrated into Cisco IOS Release 12.2(27)SBC.

Finding Support Information for Platforms and Cisco IOS Software Images

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.

Contents

Prerequisites for OSPF Limit on Number of Redistributed Routes

It is presumed that you have OSPF configured in your network, along with another protocol or another OSPF process you are redistributing.

Information About OSPF Limit on Number of Redistributed Routes

Before you limit the number of OSPF redistributed routes, you should understand the concept described in this section.

Benefits of OSPF Limit on Number of Redistributed Routes

If someone mistakenly injects a large number of IP routes into OSPF, perhaps by redistributing Border Gateway Protocol (BGP) into OSPF, the network can be severely flooded. Limiting the number of redistributed routes prevents this potential problem.

How to Limit the Number of OSPF Redistributed Routes or Receive a Warning About the Number of OSPF Redistributed Routes

This section contains the following procedures, which are mutually exclusive. That is, you cannot both limit redistributed prefixes and also choose to be warned.

Limiting the Number of OSPF Redistributed Routes

This task describes how to limit the number of OSPF redistributed routes. If the number of redistributed routes reaches the maximum value configured, no more routes will be redistributed.

The redistribution limit applies to all IP redistributed prefixes, including summarized ones. The redistribution limit does not apply to default routes or prefixes that are generated as a result of Type-7 to Type-5 translation.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id*

4. **redistribute** *protocol* [*process-id*] [*as-number*] [**metric** *metric-value*] [**metric-type** *type-value*] [**match** {**internal** | **external 1** | **external 2**}] [**tag** *tag-value*] [**route-map** *map-tag*] [**subnets**]

5. **redistribute maximum-prefix** *maximum* [*threshold*]

6. **end**

7. **show ip ospf** [*process-id*]

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* **Example:** `Router(config)# router ospf 1`	Configures an OSPF routing process.
Step 4	**redistribute** *protocol* [*process-id*] [*as-number*] [**metric** *metric-value*] [**metric-type** *type-value*] [**match** {**internal** | **external 1** | **external 2**}] [**tag** *tag-value*] [**route-map** *map-tag*] [**subnets**] **Example:** `Router(config-router)# redistribute eigrp 10`	Redistributes routes from one routing domain into another routing domain.
Step 5	**redistribute maximum-prefix** *maximum* [*threshold*] **Example:** `Router(config-router)# redistribute maximum-prefix 100 80`	Sets a maximum number of IP prefixes that are allowed to be redistributed into OSPF. • There is no default value for the *maximum* argument. • The *threshold* value defaults to 75 percent. **Note** If the **warning-only** keyword had been configured in this command, no limit would be enforced; a warning message is simply logged.

	Command or Action	Purpose
Step 6	**end**	Exits router configuration mode.
	Example: Router(config-router)# end	
Step 7	**show ip ospf** [*process-id*]	(Optional) Displays general information about OSPF routing processes.
	Example: Router# show ip ospf 1	• If a redistribution limit was configured, the output will include the maximum limit of redistributed prefixes and the threshold for warning messages.

Requesting a Warning About the Number of Routes Redistributed into OSPF

This task describes how to cause the system to generate a warning message when the number of redistributed prefixes reaches a maximum value. However, additional redistribution is not prevented.

The redistribution count applies to external IP prefixes, including summarized routes. Default routes and prefixes that are generated as a result of Type-7 to Type-5 translation are not considered.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id*
4. **redistribute** *protocol* [*process-id*] [*as-number*] [**metric** *metric-value*] [**metric-type** *type-value*] [**match** {**internal** | **external 1** | **external 2**}] [**tag** *tag-value*] [**route-map** *map-tag*] [**subnets**]
5. **redistribute maximum-prefix** *maximum* [*threshold*] **warning-only**
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.
	Example: Router> enable	• Enter your password if prompted.
Step 2	**configure terminal**	Enters global configuration mode.
	Example: Router# configure terminal	
Step 3	**router ospf** *process-id*	Configures an OSPF routing process.
	Example: Router(config)# router ospf 1	

	Command or Action	Purpose
Step 4	**redistribute** *protocol* [*process-id*] [*as-number*] [**metric** *metric-value*] [**metric-type** *type-value*] [**match** {**internal** | **external 1** | **external 2**}] [**tag** *tag-value*] [**route-map** *map-tag*] [**subnets**] **Example:** `Router(config-router)# redistribute eigrp 10`	Redistributes routes from one routing domain into another routing domain.
Step 5	**redistribute maximum-prefix** *maximum* [*threshold*] **warning-only** **Example:** `Router(config-router)# redistribute maximum-prefix 1000 80 warning-only`	Causes a warning message to be logged when the maximum number of IP prefixes has been redistributed into OSPF. • Because the **warning-only** keyword is included, no limit is imposed on the number of redistributed prefixes into OSPF. • There is no default value for the *maximum* argument. • The *threshold* value defaults to 75 percent. • This example causes two warnings: one at 80 percent of 1000 (800 routes redistributed) and another at 1000 routes redistributed.
Step 6	**end** **Example:** `Router(config-router)# end`	Exits router configuration mode.

Configuration Examples for OSPF Limit on Number of Redistributed Routes

This section contains the following examples:

OSPF Limit on Number of Redistributed Routes: Example

This example sets a maximum of 1200 prefixes that can be redistributed into OSPF process 1. Prior to reaching the limit, when the number of prefixes redistributed reaches 80 percent of 1200 (960 prefixes), a warning message is logged. Another warning is logged when the limit is reached and no more routes are redistributed.

```
router ospf 1
 router-id 10.0.0.1
 domain-id 5.6.7.8
 log-adjacency-changes
 timers lsa-interval 2
 network 10.0.0.1 0.0.0.0 area 0
 network 10.1.5.1 0.0.0.0 area 0
 network 10.2.2.1 0.0.0.0 area 0
 redistribute static subnets
 redistribute maximum-prefix 1200 80
```

Requesting a Warning About the Number of Redistributed Routes: Example

This example allows two warning messages to be logged, the first if the number of prefixes redistributed reaches 85 percent of 600 (510 prefixes), and the second if the number of redistributed routes reaches 600. However, the number of redistributed routes is not limited.

```
router ospf 1
 network 10.0.0.0 0.0.0.255 area 0
 redistribute eigrp 10 subnets
 redistribute maximum-prefix 600 85 warning-only
```

Additional References

The following sections provide references related to OSPF Limit on Number of Redistributed Routes.

Related Documents

Related Topic	Document Title
Redistribution commands	"IP Routing Protocol-Independent Commands" chapter in the *Network Protocols Command Reference, Part 1,* Release 12.0
Redistribution configuration tasks	"Configuring IP Routing Protocol-Independent Features" chapter in the *Network Protocols Configuration Guide, Part 1,* Release 12.0
OSPF commands	"OSPF Commands" chapter in the *Network Protocols Command Reference, Part 1,* Release 12.0
OSPF configuration tasks	"Configuring OSPF" chapter in the *Network Protocols Configuration Guide, Part 1,* Release 12.0

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
None	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

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents modified commands only.

- **redistribute maximum-prefix**
- **show ip ospf**
- **show ip ospf database**

redistribute maximum-prefix

To limit the number of prefixes redistributed into Open Shortest Path First (OSPF) or to generate a warning when the number of prefixes redistributed into OSPF reaches a maximum, use the **redistribute maximum-prefix** command in router configuration mode. To remove the values, use the **no** form of this command.

> **redistribute maximum-prefix** *maximum* [*seconds*] [**warning-only** | **withdraw**]

> **no redistribute maximum-prefix**

Syntax Description		
	maximum	The maximum number of IP prefixes that are allowed to be redistributed into OSPF, or sets a number of prefixes allowed to be redistributed into OSPF before the system logs a warning message, depending on whether the **warning-only** keyword is present.
		• There is no default value for the *maximum* argument.
		• If the **warning-only** keyword is also configured, this value does not limit redistribution; it is simply the number of redistributed prefixes that, when reached, causes a warning message to be logged.
	seconds	(Optional) Percentage of the value set for *maximum* number of redistributed prefixes that, when reached, causes a warning message to be logged.
		• The *threshold* value defaults to 75 percent.
	warning-only	(Optional) Causes a warning to be logged when the number of routes defined by the *maximum* argument have been redistributed. Additional redistribution is not prevented.
	withdraw	(Optional) Prevents additional redistribution when the number of routes defined by the *maximum* argument have been redistributed. Also, IS-IS rebuilds link-state PDUs (LSPs) without the external (redistributed) IP prefixes.

Defaults *seconds:* 75 percent

Command Modes Router configuration

Command History	Release	Modification
	12.0(25)S	This command was introduced.
	12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
	12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
	12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines   If someone mistakenly injects a large number of IP routes into IS-IS, perhaps by redistributing Border Gateway Protocol (BGP) into IS-IS, the network can be severely flooded. Limiting the number of redistributed routes prevents this potential problem.

When the **redistributed maximum-prefix** command is configured, if the number of redistributed routes reaches the maximum value configured, no more routes will be redistributed (unless the **warning-only** keyword was configured).

The redistribution limit applies only to external IP prefixes. Default routes and summarized routes are not limited.

The limit is tracked separately for each not-so-stubby-area (NSSA) because redistribution to NSSAs is done independently for each NSSA and independently of all other regular areas.

Select a *maximum* value based on your knowledge of how many prefixes are redistributed on the router to the OSPF process.

Examples   **Examples for IS-IS Protocol**

This example sets a maximum of 600 prefixes that can be redistributed into IS-IS. If the number of prefixes redistributed reaches 75 percent of 600 (450 prefixes), a warning message is logged.

```
router isis
 redistribute maximum-prefix 600
```

This example sets a maximum of 1200 prefixes that can be redistributed into IS-IS. If the number of prefixes redistributed reaches 80 percent of 1200 (960 prefixes), a warning message is logged.

```
router isis
 redistribute maximum-prefix 1200 80
```

This example allows two warning messages to be logged, the first if the number of prefixes redistributed reaches 85 percent of 600 (510 prefixes), and the second if the number of redistributed routes reaches 600. However, the number of redistributed routes is not limited.

```
router isis
 redistribute maximum-prefix 600 85 warning-only
```

This example sets a maximum of 2000 prefixes that can be redistributed into OSPF process 1. If the number of prefixes redistributed reaches 75 percent of 2000 (1500 prefixes), a warning message is logged. Another warning is logged if the limit is reached, and no more routes are redistributed.

Examples for OSPF Routing Protocol

```
router ospf 1
 network 10.0.0.0 0.0.0.255 area 0
 redistribute eigrp 10 subnets
 redistribute maximum-prefix 2000
```

This example sets a maximum of 1200 prefixes that can be redistributed into OSPF process 1. If the number of prefixes redistributed reaches 80 percent of 1200 (960 prefixes), a warning message is logged. Another warning is logged if the limit is reached, and no more routes are redistributed.

```
router ospf 1
 network 10.0.0.0 0.0.0.255 area 0
 redistribute eigrp 10 subnets
 redistribute maximum-prefix 1200 80
```

This example allows two warning messages to be logged, the first if the number of prefixes redistributed reaches 85 percent of 600 (510 prefixes), and the second if the number of redistributed routes reaches 600. However, the number of redistributed routes is not limited.

```
router ospf 1
 network 10.0.0.0 0.0.0.255 area 0
 redistribute eigrp 10 subnets
 redistribute maximum-prefix 600 85 warning-only
```

show ip ospf

To display general information about Open Shortest Path First (OSPF) routing processes, use the **show ip ospf** command in EXEC mode.

show ip ospf [*process-id*]

Syntax Description

process-id	(Optional) Process ID. If this argument is included, only information for the specified routing process is included.

Command Modes   EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(4)T	This command was modified to show packet pacing timers in the displayed output.
12.2(15)T	This command was modified to show additional information if the OSPF Forwarding Address Suppression in Type-5 link-state advertisements (LSAs) feature is configured.
12.0(25)S	The output of this command was expanded to display LSA throttling timers.
12.3(2)T	The output of this command was expanded to display LSA throttling timers and the limit on redistributed routes.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Examples

The following is sample output from the **show ip ospf** command when entered without a specific OSPF process ID:

```
Router# show ip ospf

  Routing Process "ospf 201" with ID 10.0.0.1 and Domain ID 10.20.0.1
  Supports only single TOS(TOS0) routes
  Supports opaque LSA
  SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
  Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
  LSA group pacing timer 100 secs
  Interface flood pacing timer 55 msecs
  Retransmission pacing timer 100 msecs
  Number of external LSA 0. Checksum Sum 0x0
  Number of opaque AS LSA 0. Checksum Sum 0x0
  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 2. 2 normal 0 stub 0 nssa
  External flood list length 0
     Area BACKBONE(0)
         Number of interfaces in this area is 2
         Area has message digest authentication
         SPF algorithm executed 4 times
         Area ranges are
         Number of LSA 4. Checksum Sum 0x29BEB
```

```
            Number of opaque link LSA 0. Checksum Sum 0x0
            Number of DCbitless LSA 3
            Number of indication LSA 0
            Number of DoNotAge LSA 0
            Flood list length 0
        Area 172.16.26.0
            Number of interfaces in this area is 0
            Area has no authentication
            SPF algorithm executed 1 times
            Area ranges are
                192.168.0.0/16 Passive Advertise
            Number of LSA 1. Checksum Sum 0x44FD
            Number of opaque link LSA 0. Checksum Sum 0x0
            Number of DCbitless LSA 1
            Number of indication LSA 1
            Number of DoNotAge LSA 0
            Flood list length 0
```

Table 1describes the significant fields shown in the display.

Table 1   show ip ospf Field Descriptions

Field	Description
Routing Process "ospf 201" with ID 10.0.0.1	Process ID and OSPF router ID.
Supports...	Number of types of service supported (Type 0 only).
SPF schedule delay	Delay time of SPF calculations.
Minimum LSA interval	Minimum interval between link-state advertisements.
LSA group pacing timer	Configured LSA group pacing timer (in seconds).
Interface flood pacing timer	Configured LSA flood pacing timer (in milliseconds).
Retransmission pacing timer	Configured LSA retransmission pacing timer (in milliseconds).
Number of...	Number and type of link-state advertisements that have been received.
Number of external LSA	Number of external link-state advertisements.
Number of opaque AS LSA	Number of opaque link-state advertisements.
Number of DCbitless external and opaque AS LSA	Number of demand circuit external and opaque link-state advertisements.
Number of DoNotAge external and opaque AS LSA	Number of do not age external and opaque link-state advertisements.
Number of areas in this router is	Number of areas configured for the router.
External flood list length	External flood list length.

The following is an excerpt of output from the **show ip ospf** command when the OSPF Forwarding Address Suppression in Type-5 LSAs feature is configured:

```
Router# show ip ospf

.
.
.
Area 2
   Number of interfaces in this area is 4
```

```
    It is a NSSA area
    Perform type-7/type-5 LSA translation, suppress forwarding address
.
.
.
Routing Process "ospf 1" with ID 192.168.0.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Link-local Signaling (LLS)
 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 0. Checksum Sum 0x0
 Number of opaque AS LSA 0. Checksum Sum 0x0
 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 0. 0 normal 0 stub 0 nssa
 External flood list length 0
```

Table 2 describes the significant fields shown in the display.

Table 2   *show ip ospf Field Descriptions*

Field	Description
Area	OSPF area and tag.
Number of interfaces...	Number of interfaces configured in the area.
It is...	Possible types are internal, area border, or autonomous system boundary.
Routing process "ospf 1" with ID 192.168.0.1	Process ID and OSPF router ID.
Supports...	Number of types of service supported (Type 0 only).
Initial SPF schedule delay	Delay time of SPF calculations at startup.
Minimum hold time	Minimum hold time between consecutive SPF calculations.
Maximum wait time	Maximum wait time between consecutive SPF calculations.
Incremental-SPF	Status of incremental SPF calculations.
Minimum LSA...	Minimum time interval (in seconds) between link-state advertisements, and maximum arrival time (in milliseconds) of link-state advertisements,
LSA group pacing timer	Configured LSA group pacing timer (in seconds).
Interface flood pacing timer	Configured LSA flood pacing timer (in milliseconds).
Retransmission pacing timer	Configured LSA retransmission pacing timer (in milliseconds).
Number of...	Number and type of link-state advertisements that have been received.
Number of external LSA	Number of external link-state advertisements.

Table 2   show ip ospf Field Descriptions (continued)

Field	Description
Number of opaque AS LSA	Number of opaque link-state advertisements.
Number of DCbitless external and opaque AS LSA	Number of demand circuit external and opaque link-state advertisements.
Number of DoNotAge external and opaque AS LSA	Number of do not age external and opaque link-state advertisements.
Number of areas in this router is	Number of areas configured for the router listed by type.
External flood list length	External flood list length.

The following is sample output from the **show ip ospf** command. In this example, the user had configured the **redistribution maximum-prefix** command to set a limit of 2000 redistributed routes. Shortest Path First (SPF) throttling was configured with the **timers throttle spf** command.

```
Router# show ip ospf 1

 Routing Process "ospf 1" with ID 10.0.0.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Link-local Signaling (LLS)
 It is an autonomous system boundary router
 Redistributing External Routes from,
    static, includes subnets in redistribution
    Maximum limit of redistributed prefixes 2000
    Threshold for warning message 75%
Initial SPF schedule delay 5000 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
```

Table 3 describes the significant fields shown in the display.

Table 3   show ip ospf Field Descriptions

Field	Description
Routing Process "ospf 1" with ID 10.0.0.1	Process ID and OSPF router ID.
Supports ...	Number of Types of Service (TOS) supported.
It is ...	Possible types are internal, area border, or autonomous system boundary.
Redistributing External Routes from	Lists of redistributed routes, by protocol.
Maximum limit of redistributed prefixes	Value set in the **redistribution maximum-prefix** command to set a limit on the number of redistributed routes.
Threshold for warning message	Percentage set in the **redistribution maximum-prefix** command for the threshold number of redistributed routes needed to cause a warning message. The default is 75 percent of the maximum limit.
Initial SPF schedule delay	Delay (in milliseconds) before initial SPF schedule for SPF throttling. Configured with the **timers throttle spf** command.

Table 3   ***show ip ospf Field Descriptions (continued)***

Field	Description
Minimum hold time between two consecutive SPFs	Minimum hold time (in milliseconds) between two consecutive SPF calculations for SPF throttling. Configured with the **timers throttle spf** command.
Maximum wait time between two consecutive SPFs	Maximum wait time (in milliseconds) between two consecutive SPF calculations for SPF throttling. Configured with the **timers throttle spf** command.
Number of areas	Number of areas in router, area addresses, and so on.

The following is sample output from the **show ip ospf** command. In this example, the user had configured LSA throttling, and those lines of output are displayed in bold.

```
Router# show ip ospf 1

Routing Process "ospf 4" with ID 10.10.24.4
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Link-local Signaling (LLS)
 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
 Initial LSA throttle delay 100 msecs
 Minimum hold time for LSA throttle 10000 msecs
 Maximum wait time for LSA throttle 45000 msecs
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 0. Checksum Sum 0x0
 Number of opaque AS LSA 0. Checksum Sum 0x0
 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 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area 24
        Number of interfaces in this area is 2
        Area has no authentication
        SPF algorithm last executed 04:28:18.396 ago
        SPF algorithm executed 8 times
        Area ranges are
        Number of LSA 4. Checksum Sum 0x23EB9
        Number of opaque link LSA 0. Checksum Sum 0x0
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

The following is sample output from the **show ip ospf** command. In this example, the user had configured the **redistribution maximum-prefix** command to set a limit of 2000 redistributed routes. Shortest Path First (SPF) throttling was configured with the **timers throttle spf** command.

```
Router# show ip ospf 1

 Routing Process "ospf 1" with ID 10.0.0.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Link-local Signaling (LLS)
```

```
   It is an autonomous system boundary router
 Redistributing External Routes from,
     static, includes subnets in redistribution
     Maximum limit of redistributed prefixes 2000
     Threshold for warning message 75%
Initial SPF schedule delay 5000 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
```

Table 4 describes significant fields shown in the display.

Table 4   ***show ip ospf Field Descriptions***

Field	Description
Routing Process "ospf 1" with ID 10.0.0.1	Process ID and OSPF router ID.
Supports ...	Number of Types of service supported.
It is ...	Possible types are internal, area border, or autonomous system boundary.
Redistributing External Routes from	Lists of redistributed routes, by protocol.
Maximum limit of redistributed prefixes	Value set in the **redistribution maximum-prefix** command to set a limit on the number of redistributed routes.
Threshold for warning message	Percentage set in the **redistribution maximum-prefix** command for the threshold number of redistributed routes needed to cause a warning message. The default is 75 percent of the maximum limit.
Initial SPF schedule delay	Delay (in milliseconds) before the initial SPF schedule for SPF throttling. Configured with the **timers throttle spf** command.
Minimum hold time between two consecutive SPFs	Minimum hold time (in milliseconds) between two consecutive SPF calculations for SPF throttling. Configured with the **timers throttle spf** command.
Maximum wait time between two consecutive SPFs	Maximum wait time (in milliseconds) between two consecutive SPF calculations for SPF throttling. Configured with the **timers throttle spf** command.
Number of areas	Number of areas in router, area addresses, and so on.

The following is sample output from the **show ip ospf** command. In this example, the user had configured LSA throttling, and those lines of output are displayed in bold.

```
Router# show ip ospf 1

Routing Process "ospf 4" with ID 10.10.24.4
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Link-local Signaling (LLS)
 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
 Initial LSA throttle delay 100 msecs
 Minimum hold time for LSA throttle 10000 msecs
 Maximum wait time for LSA throttle 45000 msecs
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 0. Checksum Sum 0x0
Number of opaque AS LSA 0. Checksum Sum 0x0
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 1. 1 normal 0 stub 0 nssa
External flood list length 0
   Area 24
       Number of interfaces in this area is 2
       Area has no authentication
       SPF algorithm last executed 04:28:18.396 ago
       SPF algorithm executed 8 times
       Area ranges are
       Number of LSA 4. Checksum Sum 0x23EB9
       Number of opaque link LSA 0. Checksum Sum 0x0
       Number of DCbitless LSA 0
       Number of indication LSA 0
       Number of DoNotAge LSA 0
       Flood list length 0
```

show ip ospf database

To display lists of information related to the Open Shortest Path First (OSPF) database for a specific router, use the **show ip ospf database** command in EXEC mode.

show ip ospf [*process-id area-id*] **database**

show ip ospf [*process-id area-id*] **database** [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**asbr-summary**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**asbr-summary**] [*link-state-id*] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**asbr-summary**] [*link-state-id*] [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**database-summary**]

show ip ospf [*process-id*] **database** [**external**] [*link-state-id*]

show ip ospf [*process-id*] **database** [**external**] [*link-state-id*] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**external**] [*link-state-id*] [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**network**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**network**] [*link-state-id*] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**network**] [*link-state-id*] [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**nssa-external**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**nssa-external**] [*link-state-id*] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**nssa-external**] [*link-state-id*] [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**router**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**router**] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**router**] [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**self-originate**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**summary**] [*link-state-id*]

show ip ospf [*process-id area-id*] **database** [**summary**] [*link-state-id*] [**adv-router** [*ip-address*]]

show ip ospf [*process-id area-id*] **database** [**summary**] [*link-state-id*] [**self-originate**] [*link-state-id*]

Syntax Description

process-id	(Optional) Internal identification. It is locally assigned and can be any positive integer. The number used here is the number assigned administratively when enabling the OSPF routing process.	
area-id	(Optional) Area number associated with the OSPF address range defined in the **network** router configuration command used to define the particular area.	
adv-router [*ip-address*]	(Optional) Displays all the LSAs of the specified router. If no IP address is included, the information is about the local router itself (in this case, the same as **self-originate**).	
link-state-id	(Optional) Portion of the Internet environment that is being described by the advertisement. The value entered depends on the advertisement's LS type. It must be entered in the form of an IP address.	
	When the link state advertisement is describing a network, the *link-state-id* can take one of two forms:	
	The network's IP address (as in type 3 summary link advertisements and in autonomous system external link advertisements).	
	A derived address obtained from the link state ID. (Note that masking a network links advertisement's link state ID with the network's subnet mask yields the network's IP address.)	
	When the link state advertisement is describing a router, the link state ID is always the described router's OSPF router ID.	
	When an autonomous system external advertisement (LS Type = 5) is describing a default route, its link state ID is set to Default Destination (0.0.0.0).	
asbr-summary	(Optional) Displays information only about the autonomous system boundary router summary LSAs.	
database-summary	(Optional) Displays how many of each type of LSA for each area there are in the database, and the total.	
external	(Optional) Displays information only about the external LSAs.	
network	(Optional) Displays information only about the network LSAs.	
nssa-external	(Optional) Displays information only about the NSSA external LSAs.	
router	(Optional) Displays information only about the router LSAs.	
self-originate	(Optional) Displays only self-originated LSAs (from the local router).	
summary	(Optional) Displays information only about the summary LSAs.	

Command Modes   EXEC

Command History

Release	Modification
10.0	This command was introduced.
11.0	The **database-summary** keyword was added.
12.0	The following keywords were added: • **self-originate** • **adv-router**

Release	Modification
12.0(25)S	The output of the **show ip ospf database database-summary** command was increased to include Self-originated Type-7 and Self-originated Type-5 output.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines   The various forms of this command deliver information about different OSPF link state advertisements.

Examples   The following is sample output from the **show ip ospf database** command when no arguments or keywords are used:

```
Router# show ip ospf database

OSPF Router with id(192.168.239.66) (Process ID 300)

                Displaying Router Link States(Area 0.0.0.0)

   Link ID        ADV Router     Age        Seq#       Checksum  Link count
172.16.21.6    172.16.21.6    1731     0x80002CFB    0x69BC      8
172.16.21.5    172.16.21.5    1112     0x800009D2    0xA2B8      5
172.16.1.2     172.16.1.2     1662     0x80000A98    0x4CB6      9
172.16.1.1     172.16.1.1     1115     0x800009B6    0x5F2C      1
172.16.1.5     172.16.1.5     1691     0x80002BC     0x2A1A      5
172.16.65.6    172.16.65.6    1395     0x80001947    0xEEE1      4
172.16.241.5   172.16.241.5   1161     0x8000007C    0x7C70      1
172.16.27.6    172.16.27.6    1723     0x80000548    0x8641      4
172.16.70.6    172.16.70.6    1485     0x80000B97    0xEB84      6

                Displaying Net Link States(Area 0.0.0.0)

   Link ID        ADV Router      Age        Seq#        Checksum
172.16.1.3   192.168.239.66    1245     0x800000EC     0x82E

                Displaying Summary Net Link States(Area 0.0.0.0)

   Link ID        ADV Router      Age        Seq#        Checksumould yopu
172.16.240.0   172.16.241.5    1152     0x80000077     0x7A05
172.16.241.0   172.16.241.5    1152     0x80000070     0xAEB7
172.16.244.0   172.16.241.5    1152     0x80000071     0x95CB
```

Table 5 describes the significant fields shown in the display.

Table 5   show ip ospf Database Field Descriptions

Field	Description
Link ID	Router ID number.
ADV Router	Advertising router's ID.
Age	Link state age.
Seq#	Link state sequence number (detects old or duplicate link state advertisements).
Checksum	Fletcher checksum of the complete contents of the link state advertisement.
Link count	Number of interfaces detected for router.

The following is sample output from the **show ip ospf database** command with the **asbr-summary** keyword:

```
Router# show ip ospf database asbr-summary

OSPF Router with id(192.168.239.66) (Process ID 300)

                Displaying Summary ASB Link States(Area 0.0.0.0)

    LS age: 1463
    Options: (No TOS-capability)
    LS Type: Summary Links(AS Boundary Router)
    Link State ID: 172.16.245.1 (AS Boundary Router address)
    Advertising Router: 172.16.241.5
    LS Seq Number: 80000072
    Checksum: 0x3548
    Length: 28
    Network Mask: 0.0.0.0 TOS: 0  Metric: 1
```

Table 6 describes the significant fields shown in the display.

Table 6   show ip ospf database asbr-summary Field Descriptions

Field	Description
OSPF Router with id	Router ID number.
Process ID	OSPF process ID.
LS age	Link state age.
Options	Type of service options (Type 0 only).
LS Type	Link state type.
Link State ID	Link state ID (autonomous system boundary router).
Advertising Router	Advertising router's ID.
LS Seq Number	Link state sequence (detects old or duplicate link state advertisements).
Checksum	LS checksum (Fletcher checksum of the complete contents of the link state advertisement).
Length	Length in bytes of the link state advertisement.
Network Mask	Network mask implemented.
TOS	Type of service.
Metric	Link state metric.

The following is sample output from the **show ip ospf database** command with the **external** keyword:

```
Router# show ip ospf database external

OSPF Router with id(192.168.239.66) (Autonomous system 300)

                Displaying AS External Link States

LS age: 280
Options: (No TOS-capability)
LS Type: AS External Link
```

```
Link State ID: 10.105.0.0 (External Network Number)
Advertising Router: 172.16.70.6
LS Seq Number: 80000AFD
Checksum: 0xC3A
Length: 36
Network Mask: 255.255.0.0
        Metric Type: 2 (Larger than any link state path)
        TOS: 0
        Metric: 1
        Forward Address: 0.0.0.0
        External Route Tag: 0
```

Table 7 describes the significant fields shown in the display.

Table 7   show ip ospf database external Field Descriptions

Field	Description
OSPF Router with id	Router ID number.
Autonomous system	OSPF autonomous system number (OSPF process ID).
LS age	Link state age.
Options	Type of service options (Type 0 only).
LS Type	Link state type.
Link State ID	Link state ID (external network number).
Advertising Router	Advertising router's ID.
LS Seq Number	Link state sequence number (detects old or duplicate link state advertisements).
Checksum	LS checksum (Fletcher checksum of the complete contents of the LSA).
Length	Length in bytes of the link state advertisement.
Network Mask	Network mask implemented.
Metric Type	External Type.
TOS	Type of service.
Metric	Link state metric.
Forward Address	Forwarding address. Data traffic for the advertised destination will be forwarded to this address. If the forwarding address is set to 0.0.0.0, data traffic will be forwarded instead to the advertisement's originator.
External Route Tag	External route tag, a 32-bit field attached to each external route. This is not used by the OSPF protocol itself.

The following is sample output from the **show ip ospf database** command with the **network** keyword:

```
Router# show ip ospf database network

 OSPF Router with id(192.168.239.66) (Process ID 300)

                Displaying Net Link States(Area 0.0.0.0)

LS age: 1367
Options: (No TOS-capability)
LS Type: Network Links
Link State ID: 172.16.1.3 (address of Designated Router)
Advertising Router: 192.168.239.66
```

```
LS Seq Number: 800000E7
Checksum: 0x1229
Length: 52
Network Mask: 255.255.255.0
        Attached Router: 192.168.239.66
        Attached Router: 172.16.241.5
        Attached Router: 172.16.1.1
        Attached Router: 172.16.54.5
        Attached Router: 172.16.1.5
```

Table 8 describes the significant fields shown in the display.

Table 8   *show ip ospf database network Field Descriptions*

Field	Description
OSPF Router with id	Router ID number.
Process ID 300	OSPF process ID.
LS age	Link state age.
Options	Type of service options (Type 0 only).
LS Type:	Link state type.
Link State ID	Link state ID of designated router.
Advertising Router	Advertising router's ID.
LS Seq Number	Link state sequence (detects old or duplicate link state advertisements).
Checksum	LS checksum (Fletcher checksum of the complete contents of the link state advertisement).
Length	Length in bytes of the link state advertisement.
Network Mask	Network mask implemented.
AS Boundary Router	Definition of router type.
Attached Router	List of routers attached to the network, by IP address.

The following is sample output from the **show ip ospf database** command with the **router** keyword:

```
Router# show ip ospf database router

OSPF Router with id(192.168.239.66) (Process ID 300)


            Displaying Router Link States(Area 0.0.0.0)

LS age: 1176
Options: (No TOS-capability)
LS Type: Router Links
Link State ID: 172.16.21.6
Advertising Router: 172.16.21.6
LS Seq Number: 80002CF6
Checksum: 0x73B7
Length: 120
AS Boundary Router
155   Number of Links: 8

Link connected to: another Router (point-to-point)
(link ID) Neighboring Router ID: 172.16.21.5
```

```
(Link Data) Router Interface address: 172.16.21.6
Number of TOS metrics: 0
TOS 0 Metrics: 2
```

Table 9 describes the significant fields shown in the display.

Table 9   show ip ospf database router Field Descriptions

Field	Description
OSPF Router with id	Router ID number.
Process ID	OSPF process ID.
LS age	Link state age.
Options	Type of service options (Type 0 only).
LS Type	Link state type.
Link State ID	Link state ID.
Advertising Router	Advertising router's ID.
LS Seq Number	Link state sequence (detects old or duplicate link state advertisements).
Checksum	LS checksum (Fletcher checksum of the complete contents of the link state advertisement).
Length	Length in bytes of the link state advertisement.
AS Boundary Router	Definition of router type.
Number of Links	Number of active links.
link ID	Link type.
Link Data	Router interface address.
TOS	Type of service metric (Type 0 only).

The following is sample output from **show ip ospf database** command with the **summary** keyword:

```
Router# show ip ospf database summary

        OSPF Router with id(192.168.239.66) (Process ID 300)

                Displaying Summary Net Link States(Area 0.0.0.0)

LS age: 1401
Options: (No TOS-capability)
LS Type: Summary Links(Network)
Link State ID: 172.16.240.0 (summary Network Number)
Advertising Router: 172.16.241.5
LS Seq Number: 80000072
Checksum: 0x84FF
Length: 28
Network Mask: 255.255.255.0   TOS: 0  Metric: 1
```

Table 10 describes the significant fields shown in the display.

Table 10   show ip ospf database summary Field Descriptions

Field	Description
OSPF Router with id	Router ID number.
Process ID	OSPF process ID.
LS age	Link state age.
Options	Type of service options (Type 0 only).
LS Type	Link state type.
Link State ID	Link state ID (summary network number).
Advertising Router	Advertising router's ID.
LS Seq Number	Link state sequence (detects old or duplicate link state advertisements).
Checksum	LS checksum (Fletcher checksum of the complete contents of the link state advertisement).
Length	Length in bytes of the link state advertisement.
Network Mask	Network mask implemented.
TOS	Type of service.
Metric	Link state metric.

The following is sample output from **show ip ospf database** command with the **database-summary** keyword:

```
Router# show ip ospf database database-summary

OSPF Router with ID (10.0.0.1) (Process ID 1)

Area 0 database summary
  LSA Type        Count    Delete   Maxage
  Router          3        0        0
  Network         0        0        0
  Summary Net     0        0        0
  Summary ASBR    0        0        0
  Type-7 Ext      0        0        0
    Self-originated Type-7   0
Opaque Link       0        0        0
  Opaque Area     0        0        0
  Subtotal        3        0        0

Process 1 database summary
  LSA Type        Count    Delete   Maxage
  Router          3        0        0
  Network         0        0        0
  Summary Net     0        0        0
  Summary ASBR    0        0        0
  Type-7 Ext      0        0        0
  Opaque Link     0        0        0
  Opaque Area     0        0        0
  Type-5 Ext      0        0        0
    Self-originated Type-5   200
Opaque AS         0        0        0
  Total        203        0        0
```

Table 11 describes the significant fields shown in the display.

Table 11   show ip ospf database database-summary Field Descriptions

Field	Description
Area 0 database summary	Area number.
Count	Count of LSAs of the type identified in the first column.
Router	Number of router link state advertisements in that area.
Network	Number of network link state advertisements in that area.
Summary Net	Number of summary link state advertisements in that area.
Summary ASBR	Number of summary autonomous system boundary router (ASBR) link state advertisements in that area.
Type-7 Ext	Type-7 LSA count.
Self-originated Type-7	Self-originated Type-7 LSA.
Opaque Link	Type-9 LSA count.
Opaque Area	Type-10 LSA count
Subtotal	Sum of LSAs for that area.
Delete	Number of link state advertisements that are marked "Deleted" in that area.
Maxage	Number of link state advertisements that are marked "Maxaged" in that area.
Process 1 database summary	Database summary for the process.
Count	Count of LSAs of the type identified in the first column.
Router	Number of router link state advertisements in that process.
Network	Number of network link state advertisements in that process.
Summary Net	Number of summary link state advertisements in that process.
Summary ASBR	Number of summary autonomous system boundary router (ASBR) link state advertisements in that process.
Type-7 Ext	Type-7 LSA count.
Opaque Link	Type-9 LSA count.
Opaque Area	Type-10 LSA count.
Type-5 Ext	Type-5 LSA count.
Self-Originated Type-5	Self-originated Type-5 LSA count.
Opaque AS	Type-11 LSA count.
Total	Sum of LSAs for that process.
Delete	Number of link state advertisements that are marked "Deleted" in that process.
Maxage	Number of link state advertisements that are marked "Maxaged" in that process.

show ip ospf database