ZebOS-XP®
Network Platform

Version 1.4
Extended Performance

Open Shortest Path First
Command Reference

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Preface

This document describes the ZebOS-XP commands for Open Shortest Path First (OSPF).

Audience

This document is intended for network administrators and other engineering professionals who configure and manage OSPF.

Conventions

Table P-1 shows the conventions used in this guide.

Table P-1: Conventions

Convention	Description
Italics	Emphasized terms; titles of books
Note:	Special instructions, suggestions, or warnings
`monospaced type`	Code elements such as commands, functions, parameters, files, and directories

Contents

This document contains these chapters:

- Chapter 1, *Command Line Interface*
- Chapter 2, *OSPFv2 Commands*
- Chapter 3, *OSPFv3 Commands*
- Chapter 4, *OSPF VPN Commands*
- Chapter 5, *CSPF-TE Commands*

Related Documents

The following guides are related to this document:

- *Open Shortest Path First Developer Guide*
- *Unicast Configuration Guide*
- *Installation Guide*

Note: All ZebOS-XP technical manuals are available to licensed customers at http://www.ipinfusion.com/support/document_list.

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CHAPTER 1 Command Line Interface

This chapter introduces the ZebOS-XP Command Line Interface (CLI) and how to use its features.

Overview

You use the CLI to configure, monitor, and maintain ZebOS-XP devices. The CLI is text-based and each command is usually associated with a specific task.

You can give the commands described in this manual locally from the console of a device running ZebOS-XP or remotely from a terminal emulator such as `putty` or `xterm`. You can also use the commands in scripts to automate configuration tasks.

Starting the Command Line Interface

You must start daemons as described in this section before you can use the CLI. The general steps are listed below. For details about the ZebOS-XP daemons, see the *Installation Guide.*

1. Start your terminal emulator and connect to the device or go to the console of the device running ZebOS-XP.
2. Connect to the directory where you installed the ZebOS-XP executables.
3. Start the Network Services Module (NSM).
```
# ./nsm -d
```
4. Start the protocol module daemons that your organization uses, such as `mstpd`, `ospf6d`, or `ripd`.
```
# ./mstpd –d
```
5. Start the Integrated Management Interface (IMI) daemon.
```
# ./imi -d
```
6. Start the IMI shell.
```
# ./imish
```
Note: Your organization may use a ZebOS-XP build that does not include `imish`. If that is the case, you must connect to a port on which a protocol daemon is listening. For details, see the *Installation Guide.*

You can now begin using the CLI.

Command Line Interface Help

You access the CLI help by entering a full or partial command string and a question mark “?”. The CLI displays the command keywords or parameters along with a short description. For example, at the CLI command prompt, type:

```
> show ?
```

The CLI displays this keyword list with short descriptions for each keyword:

```
show ?
  application-priority            Application Priority
```

```
    arp                             Internet Protocol (IP)
    bfd                             Bidirectional Forwarding Detection (BFD)
    bgp                             Border Gateway Protocol (BGP)
    bi-lsp                          Bi-directional lsp status and configuration
    bridge                          Bridge group commands
    ce-vlan                         COS Preservation for Customer Edge VLAN
    class-map                       Class map entry
    cli                             Show CLI tree of current mode
    clns                            Connectionless-Mode Network Service (CLNS)
    control-adjacency               Control Adjacency status and configuration
    control-channel                 Control Channel status and configuration
    cspf                            CSPF Information
    customer                        Display Customer spanning-tree
    cvlan                           Display CVLAN information
    debugging                       Debugging functions (see also 'undebug')
    dot1x                           IEEE 802.1X Port-Based Access Control
    etherchannel                    LACP etherchannel
    ethernet                        Layer-2
  ...
```

If you type the ? in the middle of a keyword, the CLI displays help for that keyword only.

```
> show de?
debugging  Debugging functions (see also 'undebug')
```

If you type the ? in the middle of a keyword, but the incomplete keyword matches several other keywords, ZebOS-XP displays help for all matching keywords.

```
> show i? (CLI does not display the question mark).
interface  Interface status and configuration
ip         IP information
isis       ISIS information
```

Command Completion

The CLI can complete the spelling of a command or a parameter. Begin typing the command or parameter and then press the tab key. For example, at the CLI command prompt type `sh`:

```
> sh
```

Press the tab key. The CLI displays:

```
> show
```

If the spelling of a command or parameter is ambiguous, the CLI displays the choices that match the abbreviation. Type `show i` and press the tab key. The CLI displays:

```
> show i
  interface  ip         ipv6       isis
> show i
```

The CLI displays the `interface` and `ip` keywords. Type `n` to select `interface` and press the tab key. The CLI displays:

```
> show in
> show interface
```

Type ? and the CLI displays the list of parameters for the `show interface` command.

```
> show interface
  IFNAME  Interface name
  |       Output modifiers
  >       Output redirection
  <cr>
```

The CLI displays the only parameter associated with this command, the `IFNAME` parameter.

Command Abbreviations

The CLI accepts abbreviations that uniquely identify a keyword in commands. For example:

```
> sh in eth0
```

is an abbreviation for:

```
> show interface eth0
```

Command Line Errors

Any unknown spelling causes the CLI to display the error `Unrecognized command` in response to the ?. The CLI displays the command again as last entered.

```
> show dd?
% Unrecognized command
> show dd
```

When you press the Enter key after typing an invalid command, the CLI displays:

```
(config)#router ospf here
                        ^
% Invalid input detected at '^' marker.
```

where the ^ points to the first character in error in the command.

If a command is incomplete, the CLI displays the following message:

```
> show
% Incomplete command.
```

Some commands are too long for the display line and can wrap mid-parameter or mid-keyword, as shown below. This does *not* cause an error and the command performs as expected:

```
area 10.10.0.18 virtual-link 10.10.0.19 authent
ication-key 57393
```

Command Negation

Many commands have a `no` form that resets a feature to its default value or disables the feature. For example:

- The `ip address` command assigns an IPv4 address to an interface
- The `no ip address` command removes an IPv4 address from an interface

Syntax Conventions

Table 1-1 describes the conventions used to represent command syntax in this reference.

Table 1-1: Syntax conventions

Convention	Description	Example
`monospaced font`	Command strings entered on a command line	`show ip ospf`
`lowercase`	Keywords that you enter exactly as shown in the command syntax.	`show ip ospf`
`UPPERCASE`	See Variable Placeholders	`IFNAME`
`()`	Optional parameters, from which you must select one. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command.	`(A.B.C.D|<0-4294967295>)`
`()`	Optional parameters, from which you select one or none. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command.	`(A.B.C.D|<0-4294967295>|)`
`()`	Optional parameter which you can specify or omit. Do not enter the parentheses or vertical bar as part of the command.	`(IFNAME|)`
`{}`	Optional parameters, from which you must select one or more. Vertical bars delimit the selections. Do not enter the braces or vertical bars as part of the command.	`{intra-area <1-255>|inter-area <1-255>|external <1-255>}`
`[]`	Optional parameters, from which you select zero or more. Vertical bars delimit the selections. Do not enter the brackets or vertical bars as part of the command. A '?' before a parameter in square brackets limits that parameter to one occurrence in a command string.	`[<1-65535>|AA:NN|internet|local-AS|no-advertise|no-export]`
`.`	Repeatable parameter. The parameter that follows a period can be repeated more than once. Do not enter the period as part of the command.	`set as-path prepend .<1-65535>`

Variable Placeholders

Table 1-2 shows the tokens used in command syntax use to represent variables for which you supply a value.

Table 1-2: Variable placeholders

Token	Description
`WORD`	A contiguous text string (excluding spaces)
`LINE`	A text string, including spaces; no other parameters can follow this parameter
`IFNAME`	Interface name whose format varies depending on the platform; examples are: `eth0`, `Ethernet0`, `ethernet0`, `xe0`
`A.B.C.D`	IPv4 address
`A.B.C.D/M`	IPv4 address and mask/prefix
`X:X::X:X`	IPv6 address
`X:X::X:X/M`	IPv6 address and mask/prefix
`HH:MM:SS`	Time format
`AA:NN`	BGP community value
`XX:XX:XX:XX:XX:XX`	MAC address

`<1-5>`
`<1-65535>`
`<0-2147483647>`
`<0-4294967295>`
	Numeric range

Command Description Format

Table 1-3 explains the sections used to describe each command in this reference.

Table 1-3: Command descriptions

Section	Description
Command Name	The name of the command, followed by what the command does and when should it be used
Command Syntax	The syntax of the command
Parameters	Parameters and options for the command
Default	The state before the command is executed
Command Mode	The mode in which the command runs; see Command Modes
Example	An example of the command being executed

Keyboard Operations

Table 1-4 lists the operations you can perform from the keyboard.

Table 1-4: Keyboard operations

Key combination	Operation
Left arrow or Ctrl+b	Moves one character to the left. When a command extends beyond a single line, you can press left arrow or Ctrl+b repeatedly to scroll toward the beginning of the line, or you can press Ctrl+a to go directly to the beginning of the line.
Right arrow or Ctrl-f	Moves one character to the right. When a command extends beyond a single line, you can press right arrow or Ctrl+f repeatedly to scroll toward the end of the line, or you can press Ctrl+e to go directly to the end of the line.
Esc, b	Moves back one word
Esc, f	Moves forward one word
Ctrl+e	Moves to end of the line
Ctrl+a	Moves to the beginning of the line
Ctrl+u	Deletes the line
Ctrl+w	Deletes from the cursor to the previous whitespace
Alt+d	Deletes the current word
Ctrl+k	Deletes from the cursor to the end of line
Ctrl+y	Pastes text previously deleted with Ctrl+k, Alt+d, Ctrl+w, or Ctrl+u at the cursor

Table 1-4: Keyboard operations (Continued)

Key combination	Operation
Ctrl+t	Transposes the current character with the previous character
Ctrl+c	Ignores the current line and redisplays the command prompt
Ctrl+z	Ends configuration mode and returns to exec mode
Ctrl+l	Clears the screen
Up Arrow or Ctrl+p	Scroll backward through command history
Down Arrow or Ctrl+n	Scroll forward through command history

Show Command Modifiers

You can use two tokens to modify the output of a `show` command. Enter a question mark to display these tokens:

```
# show users ?
  | Output modifiers
  > Output redirection
```

You can type the | (vertical bar character) to use output modifiers. For example:

```
> show rsvp | ?
  begin     Begin with the line that matches
  exclude   Exclude lines that match
  include   Include lines that match
  redirect  Redirect output
```

Begin Modifier

The `begin` modifier displays the output beginning with the first line that contains the input string (everything typed after the `begin` keyword). For example:

```
# show run | begin eth1
...skipping
interface eth1
 ipv6 address fe80::204:75ff:fee6:5393/64
!
interface eth2
 ipv6 address fe80::20d:56ff:fe96:725a/64
!
line con 0
 login
!
end
```

You can specify a regular expression after the `begin` keyword, This example begins the output at a line with either “eth3” or “eth4”:

```
# show run | begin eth[3-4]

...skipping
interface eth3
```

```
 shutdown
!
interface eth4
 shutdown
!
interface svlan0.1
 no shutdown
!
route-map myroute permit 3
!
route-map mymap1 permit 10
!
route-map rmap1 permit 3
!
line con 0
 login
line vty 0 4
 login
!
end
```

Include Modifier

The `include` modifier includes only those lines of output that contain the input string. In the output below, all lines containing the word “input” are included:

```
# show interface eth1 | include input
    input packets 80434552, bytes 2147483647, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 1, missed 0
```

You can specify a regular expression after the `include` keyword. This examples includes all lines with “input” or “output”:

```
#show int eth0 | include (in|out)put
    input packets 597058, bytes 338081476, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 0, missed 0
    output packets 613147, bytes 126055987, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
```

Exclude Modifier

The `exclude` modifier excludes all lines of output that contain the input string. In the following output example, all lines containing the word “input” are excluded:

```
# show interface eth1 | exclude input
Interface eth1
  Scope: both
  Hardware is Ethernet, address is 0004.75e6.5393
  index 3 metric 1 mtu 1500 <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Administrative Group(s): None
  DSTE Bandwidth Constraint Mode is MAM
  inet6 fe80::204:75ff:fee6:5393/64
    output packets 4438, bytes 394940, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
    collisions 0
```

You can specify a regular expression after the `exclude` keyword. This example excludes lines with “output” or “input”:

```
# show interface eth0 | exclude (in|out)put
Interface eth0
  Scope: both
  Hardware is Ethernet  Current HW addr: 001b.2139.6c4a
  Physical:001b.2139.6c4a  Logical:(not set)
  index 2 metric 1 mtu 1500 duplex-full arp ageing timeout 3000
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 100m
  DHCP client is disabled.
  inet 10.1.2.173/24 broadcast 10.1.2.255
  VRRP Master of :  VRRP is not configured on this interface.
  inet6 fe80::21b:21ff:fe39:6c4a/64
    collisions 0
```

Redirect Modifier

The `redirect` modifier writes the output into a file. The output is not displayed.

```
# show history | redirect /var/frame.txt
```

The output redirection token (>) does the same thing:

```
# show history >/var/frame.txt
```

Command Modes

Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. Table 1-5 lists the command modes common to all protocols.

Table 1-5: Common command modes

Name	Description
Executive mode	Also called *view* mode, this is the first mode to appear after you start the CLI. It is a base mode from where you can perform basic commands such as `show`, `exit`, `quit`, `help`, `list`, and `enable`.
Privileged executive mode	Also called *enable* mode, in this mode you can run additional basic commands such as `debug`, `write`, and `show`.
Configure mode	Also called *configure terminal* mode, in this mode you can run configuration commands and go into other modes such as interface, router, route map, key chain, and address family.
Interface mode	In this mode you can configure protocol-specific settings for a particular interface. Any setting you configure in this mode overrides a setting configured in router mode.
Router mode	This mode is used to configure router-specific settings for a protocol such as RIP or OSPF.

Command Mode Tree

The diagram below shows the common command mode hierarchy.

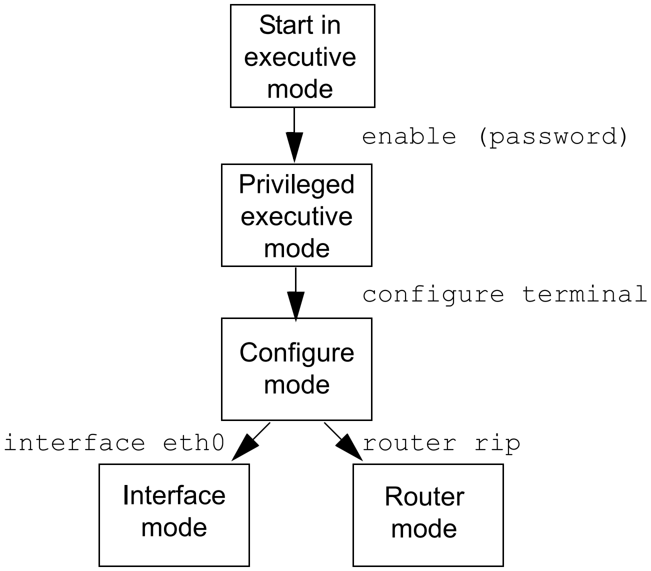
Start in executive mode
enable (password)
Privileged executive mode
configure terminal
Configure mode
interface eth0
router rip
Interface mode
Router mode

Figure 1-1: Common command modes

To change modes:

1. Enter privileged executive mode by entering `enable` in Executive mode.
2. Enter configure mode by entering `configure terminal` in Privileged Executive mode.

The example below shows starting `imish` and then moving from executive mode to privileged executive mode to configure mode and finally to router mode:

```
# ./imish
> enable mypassword
# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
(config)# router rip
(config-router)#
```

Note: Each protocol can have modes in addition to the common command modes. See the command reference for the respective protocol for details.

Debug Command

Whether the settings you make for a `debug` command persist between sessions depends on the mode where you make the settings:

- When you make settings for a `debug` command in executive mode, the configuration is valid for the current session only and is not saved in the `ZebOS.conf` file.
- When you make settings for a `debug` command in configuration mode, the configuration is retained and saved in `ZebOS.conf` and used even after the session restarts.

CHAPTER 2 OSPFv2 Commands

This chapter provides an alphabetized reference for each of the OSPFv2 commands. It includes the following commands:

- area authentication
- area default-cost
- area filter-list
- area multi-area-adjacency
- area nssa
- area range
- area shortcut
- area stub
- area virtual-link
- auto-cost reference bandwidth
- bfd all-interfaces
- capability cspf
- capability opaque
- capability restart
- clear ip ospf
- compatible rfc1583
- debug ospf
- debug ospf database-timer rate-limit
- debug ospf events
- debug ospf ifsm
- debug ip ospf lfa
- debug ospf lsa
- debug ospf nfsm
- debug ospf nsm
- debug ospf packet
- debug ospf route
- default-information originate
- default-metric
- distance
- distribute-list
- domain-id
- enable db-summary-opt
- enable ext-ospf-multi-inst

- fast-reroute keep-all-paths
- fast-reroute tie-break
- host area
- ip ospf authentication
- ip ospf authentication-key
- ip ospf bfd
- ip ospf cost
- ip ospf database-filter
- ip ospf dead-interval
- ip ospf demand-circuit
- ip ospf disable
- ip ospf fast-reroute per-prefix candidate disable
- ip ospf flood-reduction
- ip ospf hello-interval
- ip ospf message-digest-key
- ip ospf mtu
- ip ospf mtu-ignore
- ip ospf network
- ip ospf priority
- ip ospf resync-timeout
- ip ospf retransmit-interval
- ip ospf transmit-delay
- ip router ospf multi-area
- max-concurrent-dd
- maximum-area
- neighbor
- network
- ospf abr-type
- ospf flood-reduction
- ospf restart helper
- ospf router-id
- overflow database
- overflow database external
- passive-interface
- redistribute
- restart ospf graceful
- router ospf
- show debugging ospf
- show ip ospf

- show ip ospf border-routers
- show ip ospf database brief
- show ip ospf database detail
- show ip ospf igp-shortcut-lsp
- show ip ospf igp-shortcut-route
- show ip ospf interface
- show ip ospf multi-area-adjacencies
- show ip ospf neighbor
- show ip ospf route
- show ip ospf virtual-links
- show ip protocols
- show ip route fast-reroute
- snmp restart ospf
- summary-address
- timers lsa arrival
- timers throttle lsa

area authentication

Use this command to enable authentication for an OSPF area. Specifying the area authentication sets the authentication to Type 1 authentication or simple text password authentication (details in RFC 2328). Setting up a Type 1 authentication configures a 64-bit field for that particular network. All packets sent on this network must have this configured value in their OSPF header. This allows only routers that have the same passwords to join the routing domain. Give all routers that are to communicate with each other through OSPF the same authentication password.

Use the ip ospf authentication-key command to specify a simple text password.

Use the ip ospf message-digest-key command to specify an MD5 password.

Use the `no` parameter to remove the authentication specification for an area.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) authentication
area (A.B.C.D|<0-4294967295>) authentication message-digest
no area (A.B.C.D|<0-4294967295>) authentication
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as 4-octet unsigned integer value.
`message-digest`	Enables MD5 authentication in the specified area ID.

Default

Null authentication

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 authentication message-digest

(config)#router ospf 100
(config-router)#no area 1 authentication
```

area default-cost

Use this command to specify a cost for the default summary route sent into a stub or NSSA area. This command provides the metric for the summary default route, generated by the area border router, into the NSSA or stub area. Use this option only on an area border router that is attached to the NSSA or stub area. Refer to the RFC 3101 for information on NSSA.

Use the `no` form of this command to remove the assigned default-route cost.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) default-cost <0-16777215>
no area (A.B.C.D|<0-4294967295>) default-cost
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`default-cost`	Indicates the cost for the default summary route used for a stub or NSSA area.
`<0-16777215>`	Stub's advertised default summary cost. The default is 1.

Command Mode

Router mode

Examples

This example sets the default-cost to 10 for area 1.

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 default-cost 10

(config)#router ospf 100
(config-router)#no area 1 default-cost
```

area filter-list

Use this command to configure a filter to advertise summary routes on an Area Border Router (ABR).

This command suppresses incoming and outgoing summary routes between this area and other areas. You use this command in conjunction with the `prefix-list` and `access-list` commands.

Use the `no` form of this command to remove a filter.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) filter-list prefix WORD (in|out)
area (A.B.C.D|<0-4294967295>) filter-list access WORD (in|out)
no area (A.B.C.D|<0-4294967295>) filter-list prefix WORD (in|out)
no area (A.B.C.D|<0-4294967295>) filter-list access WORD (in|out)
```

Parameters

`A.B.C.D`	OSPF area ID as an IPv4 address.
`<0-4294967295>`	OSPF area ID as a decimal value.
`prefix`	Use prefix list to filter summary.
`WORD`	Name of the prefix list.
`access`	Use access list to filter summary.
`WORD`	Name of the access list.
`in`	Filter routes from other areas into this area.
`out`	Filter routes from this area into other areas.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#access-list 1 deny 172.22.0.0/8
(config)#router ospf 100
(config-router)#area 1 filter-list access 1 in
```

area multi-area-adjacency

Use this command to enable multi-area adjacency on the specified interface. Multi-area adjacency establishes adjacency between the Area Border Routers (ABRs). The specified interface of the ABR is associated with multiple areas. Multiple OSPF interfaces must be created for multiple areas.

Use the `no` parameter to disable multi-area adjacency.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) multi-area-adjacency IFNAME neighbor A.B.C.D
no area (A.B.C.D|<0-4294967295>) multi-area-adjacency IFNAME (neighbor A.B.C.D|)
```

Parameters

`IFNAME`	An alphanumeric string that is the interface name.
`neighbor`	Set the neighbor.
`A.B.C.D`	Neighbor’s IP address.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 1
(config)#router-id 10.10.10.10
(config-router)#area 1 multi-area-adjacency eth1 neighbor 20.20.20.10
(config-router)#no area 1 multi-area-adjacency eth1
```

area nssa

Use this command to set an area as a Not-So-Stubby-Area (NSSA). There are no external routes in an OSPF stub area, so you cannot redistribute from another protocol into a stub area. An NSSA allows external routes to be flooded within the area. These routes are then leaked into other areas. However, the external routes from other areas still do not enter the NSSA. You can configure an area to be a stub area or an NSSA, but not both.

This command simplifies administration when connecting a central site using OSPF to a remote site that is using a different routing protocol. You can extend OSPF to cover the remote connection by defining the area between the central router and the remote router as a NSSA.

Use the `no` form of this command to remove this designation.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) nssa

area (A.B.C.D|<0-4294967295>) nssa (translate-candidate|translate-always)

area (A.B.C.D|<0-4294967295>) nssa {translator-role (candidate|always)| stability-
  interval <0-2147483647>|no-redistribution|default-information-originate (metric
  <0-16777214>|metric-type <1-2>|metric <0-16777214> metric-type <1-2>|metric-type
  <1-2> metric <0-16777214>|)|no-summary}

no area (A.B.C.D|<0-4294967295>) nssa

no area (A.B.C.D|<0-4294967295>) nssa {translator-role|no-redistribution|default-
  information-originate|no-summary}
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`translator-role`	NSSA-ABR translator role
`candidate`	Translate NSSA-LSA to Type-5 LSA if router is elected.
`always`	Always translate NSSA-LSA to Type-5 LSA.
`stability-interval`	Stability timer for a NSSA area. If an elected translator determines its services are no longer required, it continues to perform its duties for this time interval. This minimizes excess flushing of translated Type-7 LSAs and provides a more stable translator transition.
`<0-2147483647>`	Stability interval in seconds.
`no-redistribution`	Do not redistribute into the NSSA.
`default-information-originate`	Originate Type-7 default LSA into the NSSA.
`metric`	Specify metric for default routes.
`<0-16777214>`	Specify metric value.

`metric-type`	Specify metric type (see RFC 3101).
`<1-2>`	Specify metric type: 1: Type 1 external route 2: Type 2 external route
`no-summary`	Do not inject inter-area routes into the NSSA.
`translate-candidate`	Translate NSSA-LSA to Type-5 LSA if router is elected.
`translate-always`	Always translate NSSA-LSA to Type-5 LSA.

Command Mode

Router mode

Examples

```
(config)#router ospf 100
(config-router)#area 3 nssa translator-role candidate no-redistribution
default-information-originate metric 34 metric-type 2
```

area range

Use this command to summarize OSPF routes at an area boundary. A single summary route is then advertised to other areas by the Area Border Routers (ABRs). Routing information is condensed at area boundaries and outside the area. If the network numbers in an area are assigned in a way such that they are contiguous, the ABRs can be configured to advertise a summary route that covers all the individual networks within the area that fall into the specified range.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) range A.B.C.D/M
area (A.B.C.D|<0-4294967295>) range A.B.C.D/M advertise
area (A.B.C.D|<0-4294967295>) range A.B.C.D/M not-advertise
no area (A.B.C.D|<0-4294967295>) range A.B.C.D/M
no area (A.B.C.D|<0-4294967295>) range A.B.C.D/M (advertise|not-advertise)
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`A.B.C.D/M`	The area range prefix and length.
`advertise`	Advertises this range.
`not-advertise`	Does not advertise this range.

Default

Disabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 range 192.16.0.0/24

(config)#router ospf 100
(config-router)#no area 1 range 192.16.0.0/24
```

area shortcut

Use this command to configure the short-cutting mode of an area. An area shortcut enables traffic to go through the non-backbone area with a lower metric whether or not an ABR router is attached to the backbone area.

Use the `no` form of this command to disable this function.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) shortcut (default|enable|disable)
no area (A.B.C.D|<0-4294967295>) shortcut
no area (A.B.C.D|<0-4294967295>) shortcut (enable|disable)
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`default`	Sets default short-cutting behavior.
`enable`	Forces short-cutting through the area.
`disable`	Disables short-cutting through the area.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 shortcut default

(config)#router ospf 100
(config-router)#area 52 shortcut disable

(config)#router ospf 100
(config-router)#no area 42 shortcut enable
```

area stub

Use this command to define an area as a stub area. There are two stub area router configuration commands: the `stub` and `default-cost` commands. In all routers attached to the stub area, configure the area by using the `stub` option of the area command. For an area border router (ABR) attached to the stub area, use the `area default-cost` command.

Use the `no-summary` parameter with this command to define a totally stubby area. Define an area as a totally stubby area when routers in the area do not need to learn about summary LSAs from other areas.

Use the `no` form of this command to disable this function.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) stub
area (A.B.C.D|<0-4294967295>) stub no-summary
no area (A.B.C.D|<0-4294967295>) stub
no area (A.B.C.D|<0-4294967295>) stub no-summary
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`no-summary`	Stops an ABR from sending summary link advertisements into the stub area.

Default

No stub area is defined.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 stub no-summary
```

area virtual-link

Use this command to configure a link between two backbone areas that are physically separated through other non-backbone area.

In OSPF, all non-backbone areas must be connected to a backbone area. If the connection to the backbone is lost, the virtual link repairs the connection. Configure virtual links between any two backbone routers that have an interface to a common non-backbone area. The protocol treats these routers joined by a virtual link as if they were connected by an unnumbered point-to-point network.

Configure the hello-interval to be the same for all routers attached to a common network. A short hello-interval results in the router detecting topological changes faster but also an increase in the routing traffic. The retransmit-interval is the expected round-trip delay between any two routers in a network. Set the value to be greater than the expected round-trip delay to avoid needless retransmissions.

The transmit-delay is the time taken to transmit a link state update packet on the interface. Before transmission, the link state advertisements in the update packet, are incremented by this amount. Set the transmit-delay to be greater than zero. Also, take into account the transmission and propagation delays for the interface. Include the transit area ID and the corresponding virtual link neighbor's router ID in each virtual link neighbor to properly configure a virtual link.

Use the `no` parameter with this command to remove a virtual link.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D

area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D {authentication (message-
  digest|null|)|authentication-key LINE|message-digest-key <1-255> md5 LINE|dead-
  interval <1-65535>|hello-interval <1-65535>|retransmit-interval <1-
  3600>|transmit-delay <1-3600>}

area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D {fall-over bfd}

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D {dead-interval|hello-
  interval|retransmit-interval|transmit-delay|authentication|authentication-
  key|message-digest-key <1-255>}

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D {fall-over bfd}
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`A.B.C.D`	Specify IP address of the virtual link neighbor.
`authentication`	Enable authentication on this virtual link
`message-digest`	Cryptographic authentication.
`null`	Null authentication.
`authentication-key`	Set authentication key.
`LINE`	Authentication key ID of 8 characters.
`message-digest-key`	

	Set message digest key.
`<1-255>`	Set message digest key.
`md5`	Specify the MD5 key.
`LINE`	MD5 key.
`dead-interval`	The interval during which no packets are received and after which the router acknowledges a neighboring router as off-line.
`<1-65535>`	The interval in seconds. The default is 40 seconds.
`hello-interval`	The interval the router waits before it sends a hello packet.
`<1-65535>`	The interval in seconds. The default is 10 seconds.
`retransmit-interval`	
	The interval the router waits before it retransmits a packet.
`<1-3600>`	The interval in seconds. The default is 5 seconds.
`transmit-delay`	The interval the router waits before it transmits a packet.
`<1-3600>`	The interval in seconds. The default is 1 second
`fall-over`	Specify fall-over detection.
`bfd`	Bidirectional Forwarding Detection (BFD)

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#area 1 virtual-link 10.10.11.50 hello 5 dead 10
```

auto-cost reference bandwidth

Use this command to control how OSPF calculates the default metric for the interface.

By default, OSPF calculates the OSPF metric for an interface by dividing the reference bandwidth by the interface bandwidth. The default value for the reference bandwidth is 100Mbps. The auto-cost command is used to differentiate high bandwidth links. For multiple links with high bandwidth, specify a larger reference bandwidth value to differentiate cost on those links.

Use the `no` form of this command to assign cost based only on the interface bandwidth.

Command Syntax

```
auto-cost reference-bandwidth <1-4294967>

no auto-cost reference-bandwidth
```

Parameters

`<1-4294967>`	The reference bandwidth in Mbps per second. The default is 100 Mbps.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#auto-cost reference-bandwidth 50

(config)#router ospf 100
(config-router)#no auto-cost reference-bandwidth
```

bfd all-interfaces

Use this command to enable Bidirectional Forwarding Detection (BFD) on all interfaces.

Use the `no` form of this command to disable BFD.

Command Syntax

```
bfd all-interfaces
```

```
no bfd all-interfaces
```

Parameters

None

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#bfd all-interfaces

(config)#router ospf 100
(config-router)#no bfd all-interfaces
```

capability cspf

Use this command to enable the CSPF (Constrained Shortest Path First) feature for an OSPFv2 or OSPFv3 instance.

Use the `no` parameter with this command to disable CSPF functionality for the OSPFv2 or OSPFv3 instance.

Command Syntax

```
capability cspf
no capability cspf
```

Parameters

None

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#capability cspf

(config)#router ospf 100
(config-router)#no capability cspf
```

capability opaque

Use this command to enable opaque-LSAs which are Type 9, 10 and 11 LSAs that deliver information used by external applications.

Use the `no` form of this command to disable the feature.

Command Syntax

```
capability opaque
```

```
no capability opaque
```

Parameters

None

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#capability opaque

(config)#router ospf 100
(config-router)#no capability opaque
```

capability restart

Use this command to enable OSPF graceful restart or restart signaling. If a router is not restart-enabled, it cannot enter graceful restart mode and act as a helper.

Use the `no` parameter with this command to disable the features.

Command Syntax

```
capability restart (graceful|signaling)

no capability restart
```

Parameters

`graceful`	Specify enabling OSPF graceful restart feature.
`signaling`	Specify enabling OSPF signaling restart feature.

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#capability restart graceful

(config)#router ospf 100
(config-router)#no capability restart
```

clear ip ospf

Use this command to clear and restart all OSPF routing processes or a given OSPF routing process.

Command Syntax

```
clear ip ospf (<0-65535>|) process
```

Parameter

`<0-65535>`	Specify the process ID.

Command Mode

Privileged Exec Mode

Examples

```
#clear ip ospf process
#clear ip ospf 555 process
```

compatible rfc1583

Use this command to restore the method used to calculate summary route costs per RFC.

RFC 1583 specified a method for calculating the metrics for summary routes based on the minimum metric of the component paths available. RFC 2328 specifies a method for calculating metrics based on maximum cost. With this change, it is possible that all of the ABRs in an area might not be upgraded to the new code at the same time. This command addresses this issue and allows the selective disabling of RFC 2328 compatibility.

Use the `no` parameter with this command to disable RFC 1583 compatibility.

Command Syntax

```
compatible rfc1583
no compatible rfc1583
```

Parameters

None

Default

By default, OSPF is RFC 2328 compatible.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#compatible rfc1583

(config)#router ospf 100
(config-router)#no compatible rfc1583
```

debug ospf

Use this command to specify debugging options for OSPF.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf (all|bfd|database-timer|events|ifsm|lsa|nfsm|nsm| packet|route|)

no debug ospf (all|bfd|database-timer|events|ifsm|lsa|nfsm|nsm| packet|route|)
undebug ospf (all|bfd|database-timer|events|ifsm|lsa|nfsm|nsm| packet|route|)
no debug all ospf
undebug all ospf
no debug all
undebug all
```

Parameters

`all`	Enable or disable debugging for `ifsm`, `nsfm`, `lsa`, `nsm`, `events`, and `route`.
`bfd`	Debug Bidirectional Forwarding Detection (BFD)
`database-timer`	Debug OSPF rate-limiting values for LSA throttling (see debug ospf database-timer rate-limit)
`events`	Debug OSPF events information (see debug ospf events)
`ifsm`	Debug OSPF Interface State Machine (see debug ospf ifsm)
`lsa`	Debug OSPF Link State Advertisement (see debug ospf lsa)
`nfsm`	Debug OSPF Neighbor State Machine (see debug ospf nfsm)
`nsm`	Debug OSPF NSM information (see debug ospf nsm)
`packet`	Debug OSPF packets (see debug ospf packet)
`route`	Debug OSPF route information (see debug ospf route)

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ospf all

#debug ospf bfd
#no debug ospf bfd
```

debug ospf database-timer rate-limit

Use this command to log when link-state advertisement (LSA) rate-limiting timers will expire. These messages are logged only when debug ospf lsa `generate` or debug ospf lsa `refresh` is enabled

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf database-timer rate-limit


no debug ospf database-timer rate-limit
undebug ospf database-timer rate-limit
```

Parameters

None

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ospf database-timer rate-limit

#undebug ospf database-timer rate-limit
```

debug ospf events

Use this command to specify debugging options for OSPF event troubleshooting. Use this command without parameters to turn on all the options.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf events ({abr|asbr|lsa|nssa|os|router|vlink}|)


no debug ospf events ({abr|asbr|lsa|nssa|os|router|vlink}|)
undebug ospf events ({abr|asbr|lsa|nssa|os|router|vlink}|)
```

Parameters

`abr`	Debug OSPF ABR events.
`asbr`	Debug ASBR events.
`lsa`	Debug LSA events.
`nssa`	Debug NSSA events.
`os`	Debug OS interaction events.
`router`	Debug other router events.
`vlink`	Debug virtual link events.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#no debug ospf event abr
#debug ospf event asbr
#debug ospf event lsa
#no debug ospf event nssa
#debug ospf event os
#debug ospf event router
#debug ospf event vl
```

debug ospf ifsm

Use this command to specify debugging options for OSPF Interface Finite State Machine (IFSM) troubleshooting.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf ifsm ({events|status|timers}|)


no debug ospf ifsm ({events|status|timers}|)
undebug ospf ifsm ({events|status|timers}|)
```

Parameters

`events`	Debug IFSM event information
`status`	Debug IFSM status information
`timers`	Debug IFSM timer information

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#no debug ospf ifsm events
#debug ospf ifsm status
#debug ospf ifsm timers
```

debug ip ospf lfa

Use this command to specify the debugging options for OSPFv2 Loop-free Alternate path

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ip ospf lfa
no debug ip ospf lfa
```

Parameters

None

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ip ospf lfa
```

debug ospf lsa

Use this command to specify debugging options for OSPF Link State Advertisements (LSA) troubleshooting.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf lsa ({flooding|generate|install|maxage|refresh}|)

no debug ospf lsa ({flooding|generate|install|maxage|refresh}|)
undebug ospf lsa ({flooding|generate|install|maxage|refresh}|)
```

Parameters

`flooding`	Debug LSA flooding.
`generate`	Debug LSA generation.
`install`	Debug LSA installation.
`maxage`	Debug the maximum age processing.
`refresh`	Debug LSA refresh.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#no debug ospf lsa refresh
#debug ospf lsa flooding
#debug ospf lsa install
#debug ospf lsa maxage
#debug ospf lsa generate
```

debug ospf nfsm

Use this command to specify debugging options for OSPF Neighbor Finite State Machines (NFSMs).

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf nfsm ({events|status|timers}|)


no debug ospf nfsm ({events|status|timers}|)
undebug ospf nfsm ({events|status|timers}|)
```

Parameters

`events`	Debug NFSM event information
`status`	Debug NFSM status information
`timers`	Debug NFSM timer information

Command Mode

Privileged Exec mode Configure mode

Examples

```
#debug ospf nfsm events
#no debug ospf nfsm timers
```

debug ospf nsm

Use this command to specify debugging options for OSPF NSM information.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf nsm ({interface|redistribute}|)


no debug ospf nsm ({interface|redistribute}|)
undebug ospf nsm ({interface|redistribute}|)
```

Parameters

`interface`	Debug NSM interface information.
`redistribute`	Debug NSM redistribute information.

Command Mode

Priviledged Exec mode and Configure mode

Example

The `debug ospf nsm` command enables the display of debug information related to NSM.

```
#debug ospf nsm interface
#no debug ospf nsm redistribute
```

debug ospf packet

Use this command to specify debugging options for OSPF packets.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|detail}|)

no debug ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|detail}|)
undebug ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|detail}|)
```

Parameters

`hello`	Debug OSPF hello packets.
`dd`	Debug OSPF database.
`ls-request`	Debug OSPF link state requests.
`ls-update`	Debug OSPF link state updates.
`ls-ack`	Debug OSPF link state acknowledgments.
`send`	Debug OSPF sent packets.
`recv`	Debug OSPF received packets.
`detail`	Debug OSPF detailed information.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ospf packet detail
#debug ospf packet dd send detail
#no debug ospf packet ls-request recv detail
```

debug ospf route

Use this command to debug route calculation. Use this command without parameters to turn on all the options.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ospf route ({ase|ia|install|spf}|)


no debug ospf route ({ase|ia|install|spf}|)
undebug ospf route ({ase|ia|install|spf}|)
```

Parameters

`ase`	Debug OSPF external route calculation.
`ia`	Debug OSPF Inter-Area route calculation.
`install`	Debug OSPF route installation.
`spf`	Debug OSPF SPF calculation.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ospf route
#no debug ospf route ia
#debug ospf route install
```

default-information originate

Use this command to create a default external route into an OSPF routing domain.

Use the `no` parameter with this command to disable this feature.

The system acts like an Autonomous System Boundary Router (ASBR) when you use the `default-information originate` command to redistribute routes into an OSPF routing domain. An ASBR does not by default generate a default route into the OSPF routing domain.

When you give the `default-information originate` command, also specify a `route-map` to avoid a dependency on the default network in the routing table.

Command Syntax

```
default-information originate

default-information originate {metric <0-16777214>|metric-type (1|2)|?route-map
  WORD|always}

no default-information originate

no default-information originate {metric|metric-type|?route-map|always}
```

Parameters

`always`	Used to advertise the default route regardless of whether there is a default route.
`metric`	Sets the OSPF metric used in creating the default route.
`<0-16777214>`	Sets the OSPF metric used in creating the default route. The default metric value is 10. The value used is specific to the protocol.
`metric-type`	The external link type associated with the default route advertised into the OSPF routing domain (see RFC 3101).
`1`	Sets OSPF External Type 1 metric.
`2`	Sets OSPF External Type 2 metric (default).
`route-map`	Route map.
`WORD`	Specify the name of route map.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#default-information originate always metric 23 metric-type 2
route-map myinfo

(config)#router ospf 100
(config-router)#no default-information originate metric metric-type route-map
```

default-metric

Use this command to set a default metric for OSPF.

A default metric facilitates redistributing routes with incompatible metrics. If the metrics do not convert, the default metric provides an alternative. Use this command to use the same metric value for all redistributed routes. Use this command in conjunction with the redistribute command.

Use the `no` parameter with this command to return to the default state.

Command Syntax

```
default-metric <1-16777214>


no default-metric

no default-metric <1-16777214>
```

Parameters

`<1-16777214>`	Default metric value.

Default

Built-in, automatic metric translations, as appropriate for each routing protocol.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#default-metric 100
```

distance

Use this command to set OSPF administrative distances.

The administrative distance rates the trustworthiness of a routing information source. A higher distance value means a lower trust rating. For example, an administrative distance of 255 means that the routing information source cannot be trusted and should be ignored.

Use the `no` form of this command to restore the default value (110).

Command Syntax

```
distance <1-255>
distance <1-255> A.B.C.D/M (WORD|)
distance ospf {intra-area <1-255>|inter-area <1-255>|external <1-255>}
no distance <1-255>
no distance <1-255> A.B.C.D/M (WORD|)
no distance ospf
```

Parameters

`<1-255>`	Used alone, this parameter specifies a default administrative distance used when no other specification exists for a routing information source.
`intra-area`	Routes within an area.
`<1-255>`	Distance for all routes within an area
`inter-area`	Routes from one area to another area.
`<1-255>`	Distance for all routes from one area to another area.
`external`	Routes from other routing domains learned by redistribution.
`<1-255>`	Distance for routes from other routing domains learned by redistribution.
`A.B.C.D/M`	Distance for routes to prefixes whose nexthop matches this address.
`WORD`	Name of access list to apply to route updates.

Default

The default distance for each type of route (intra-, inter-, or external) is 110.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#distance ospf inter-area 20 intra-area 10 external 40
```

distribute-list

Use this command to filter networks in routing updates. This command redistributes other routing protocols into the OSPF routing table.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
distribute-list WORD out (kernel|connected|static|rip|bgp|isis|ospf (<1-65535>|))
distribute-list WORD in
no distribute-list WORD out (kernel|connected|static|rip|bgp|isis|ospf (<1-
  65535>|))
no distribute-list WORD in
```

Parameters

`WORD`	Specify the name of the access list.
`in`	Filter incoming routing updates.
`out`	Filter outgoing routing updates.
`kernel`	Specify kernel routes.
`connected`	Specify connected routes.
`static`	Specify static routes.
`rip`	Specify RIP routes.
`bgp`	Specify BGP routes.
`isis`	Specify IS-IS routes.
`ospf`	Specify OSPF process.
`<1-65535>`	Specify OSPF process ID <1-65535>. If not specified, this command redistributes all running OSPF processes.

Command Mode

Router mode

Examples

The following example shows the distribution of BGP routing updates based on the access list `list1` (network 172.10.0.0).

```
#configure terminal
(config)#access-list list1 permit 172.10.0.0/16
(config)#router ospf 100
(config-router)#distribute-list list1 out bgp
(config-router)#redistribute bgp
```

domain-id

Use this command to specify the domain ID for a OSPF bound to VRF.

The routes sent from OSPF to the VPN cloud are sent along with the domain ID. In this way, the domain ID acts as an identification for the route received from each OSPF domain.

Use the `no` form of this command to remove a domain ID.

Command Syntax

```
domain-id ((A.B.C.D (secondary|)) | (type (type-as|type-as4|type-back-comp) value
  HEX_DATA (secondary|))| NULL)
```

```
no domain-id ((A.B.C.D (secondary|)) | (type (type-as|type-as4|type-back-comp)
  value HEX_DATA (secondary|))|NULL)
```

Parameters

`A.B.C.D`	Domain ID in IP address format.
`secondary`	Domain ID is secondary. If not specified the domain ID is primary.
`type`	Domain type:
`type-as`	AS format. Hexadecimal value is 0x0005.
`type-as4`	AS4 format. Hexadecimal value is 0x0205.
`type-back-comp`	Used for backward compatibility. Hexadecimal value is 0x8000.
`value`	Domain ID.
`HEX_DATA`	Domain ID in hexadecimal.
`secondary`	Domain ID is secondary. If not specified the domain ID is primary.
`NULL`	Null domain ID

Default

No domain ID is defined.

Command Mode

Router mode

Examples

The following example shows configuring a primary domain ID in IP address format.

```
#configure terminal
(config)#router ospf 100 vrf IPI
(config-router)#domain-id 12.12.12.12
```

The following example shows configuring a secondary domain ID in IP address format.

```
#configure terminal
(config)#router ospf 100 vrf IPI
(config-router)#domain-id 13.13.13.13 secondary
```

The following example shows configuring a primary domain ID in AS type format.

```
#configure terminal
```

```
(config)#router ospf 100 vrf IPI
(config-router)#domain-id type type-as value 123456abcdef
```

enable db-summary-opt

Use this command to enable the database summary list optimization for OSPFv2.

When this feature is enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor, if the LSA instance in database summary list is the same as or less recent than the listed LSA in the database description packet received from the neighbor.

Use the `no` form of this command to disable database summary list optimization.

Command Syntax

```
enable db-summary-opt

no enable db-summary-opt
```

Parameters

None

Default

Disabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf
(config-router)#enable db-summary-opt
(config-router)#no enable db-summary-opt
```

enable ext-ospf-multi-inst

Use this command to run multiple OSPF instances on a subnet.

Use the `no` parameter with this command to disable OSPF multiple-instance support and reset all OSPF instances to the default instance ID.

Command Syntax

```
enable ext-ospf-multi-inst

no enable ext-ospf-multi-inst
```

Parameters

None

Defaults

Multiple-instance support is disabled. The default instance ID is 0.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#enable ext-ospf-multi-inst
```

fast-reroute keep-all-paths

Use this command to enable fast rerouting on all OSPF interfaces.

Use the `no` parameter with this command to disable fast rerouting.

Command Syntax

```
fast-reroute keep-all-paths
no fast-reroute keep-all-paths
```

Parameters

None

Defaults

Fast rerouting is disabled.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 200
(config-router)#fast-reroute keep-all-paths
```

fast-reroute tie-break

Use this command to set the tiebreaking policy for selecting a fast reroute repair path. You assign a priority to each type of repair path.

Use the `no` parameter with this command to set the tiebreaking policy for a specific type of repair path to its default priority. To set all types of repair paths to their default priorities, do not specify a repair path with the `no` form of this command.

Command Syntax

```
fast-reroute tie-break (primary-path|interface-disjoint|node-protecting|broadcast-
  interface-disjoint) index <1-10>

no fast-reroute tie-break

no fast-reroute tie-break (primary-path|interface-disjoint|node-
  protecting|broadcast-interface-disjoint) index <1-10>
```

Parameters

`primary-path`	Use a path from the Equal-Cost Multipath Path (ECMP) set. An ECMP found during the primary shortest path first (SPF) repair might not be desirable in networks where traffic exceeds the capacity of any single link.
`interface-disjoint`	Do not select point-to-point interfaces that have no alternate next hop for rerouting if the primary gateway fails, thus protecting the interface.
`node-protecting`	Bypass the `primary-path` gateway router which might not protect the router that is the next hop in the primary path.
`broadcast-interface-disjoint`	Do not use the interface if connected to a broadcast network. Repair paths protect links when a repair path and a protected primary path use *different* next-hop interfaces. However, on broadcast interfaces, if the repair path is computed via the same interface as the primary path, but their next-hop gateways are different, the router is protected but the link might not be.
`index`	Tiebreak priority. A lower value has higher preference.
`<1-10>`	Range of priority values.

Defaults

The default priority scheme is:

1. primary-path
2. interface-disjoint
3. node-protecting
4. broadcast-interface-disjoint

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 200
(config-router)#fast-reroute tie-break interface-disjoint index 1
```

host area

Use this command to configure a stub host entry belonging to a particular area.

Using this command, you can advertise specific host routes in the router-LSA as stub link. Since stub host belongs to the specified router, specifying cost is not important.

Use the `no` form of this command to remove the host area configuration.

Command Syntax

```
host A.B.C.D area (A.B.C.D|<0-4294967295>)

host A.B.C.D area (A.B.C.D|<0-4294967295>) cost <0-65535>

no host A.B.C.D area (A.B.C.D|<0-4294967295>)

no host A.B.C.D area (A.B.C.D|<0-4294967295>) cost (<0-65535>|)
```

Parameters

`A.B.C.D`	Specify IP address of the host.
`area`	Set the OSPF area ID
`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`cost`	Specify cost for stub host entry.
`<0-65535>`	Specify cost for stub host entry.

Default

No host entry is configured.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#host 172.16.10.100 area 1
(config-router)#host 172.16.10.101 area 2 cost 10
```

ip ospf authentication

Use this command to send and receive OSPF packets with the specified authentication method on the current interface.

Use the `no` parameter with this command to disable the authentication.

Command Syntax

```
ip ospf authentication (null|message-digest|)
ip ospf A.B.C.D authentication (null|message-digest|)
no ip ospf (A.B.C.D|) authentication
```

Parameters

`A.B.C.D`	The IP address of the interface.
`null`	Use no authentication.
`message-digest`	Use message digest authentication.

Command Mode

Interface mode

Examples

In this example, interface `eth0` is configured to have no authentication. This will override any `text` or `MD5` authentication configured on this interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf authentication null
```

ip ospf authentication-key

Use this command to specify an OSPF authentication password for neighboring routers.

This command creates a password (key) that is inserted into the OSPF header when ZebOS-XP originates packets. Assign a separate password to each network for different interfaces. All neighboring routers on the same network with the same password exchange OSPF routing data.

The key can be used only when authentication is enabled for an area with the `area authentication` command.

Simple password authentication allows a password to be configured for each area. Configure the routers in the same routing domain with the same password.

Use the `no` parameter with this command to remove an OSPF authentication password.

Command Syntax

```
ip ospf (A.B.C.D|) authentication-key LINE
no ip ospf (A.B.C.D|) authentication-key
```

Parameters

`A.B.C.D`	The IP address of the interface.
`authentication-key`	Specify the authentication password.
`LINE`	Specify the authentication password.

Default

Authentication password not specified.

Command Mode

Interface mode

Examples

In the following example, an authentication key `test` is created on interface `eth0` in area `0`. Note that first authentication is enabled for area `0`.

```
#configure terminal
(config)#router ospf 100
(config-router)#network 10.10.10.0/24 area 0
(config-router)#area 0 authentication
(config-router)#exit
(config)#interface eth0
(config-if)#ip ospf 3.3.3.3 authentication-key test
```

ip ospf bfd

Use this command to enable Bidirectional Forwarding Detection (BFD).

Use this command with either the `no` or `disable` parameter to disable BFD.

Command Syntax

```
ip ospf bfd (disable|)
no ip ospf bfd (disable|)
```

Parameters

`disable`	Specify to disable BFD.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf bfd
```

ip ospf cost

Use this command to explicitly specify the cost of the link-state metric in a router-LSA.

The interface cost indicates the overhead required to send packets across an interface. This cost is stated in the Router-LSA's link. The cost is inversely proportional to the bandwidth of an interface. By default, the cost of an interface is calculated based on the bandwidth (10^8/ bandwidth). Use this command to set the cost manually.

Use the `no` parameter with this command to reset the cost to its default value.

Command Syntax

```
ip ospf (A.B.C.D|) cost <1-65535>
no ip ospf (A.B.C.D|) cost
```

Parameters

`A.B.C.D`	The IP address of the interface.
`<1-65535>`	Specify the link-state metric. The default value is 10.

Command Mode

Interface mode

Examples

The following example shows setting the cost as 10 on interface `eth0` for IP address 10.10.10.50.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf 10.10.10.50 cost 10
```

ip ospf database-filter

Use this command to turn on the LSA database-filter for a particular interface.

OSPF floods new LSAs over all interfaces in an area, except the interface on which the LSA arrives. This redundancy ensures robust flooding. However, too much redundancy can waste bandwidth and might lead to excessive link and CPU usage in certain topologies, resulting in destabilizing the network. To avoid this, use this command to block flooding of LSAs over specified interfaces.

Use the `no` parameter with this command to turn off the filter.

Command Syntax

```
ip ospf (A.B.C.D|) database-filter all out
no ip ospf (A.B.C.D|) database-filter
```

Parameters

`A.B.C.D`	The IP address of the interface.

Default

Disabled, all outgoing LSAs are flooded to the interface.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf database-filter all out
```

ip ospf dead-interval

Use this command to set the interval during which the router waits to receive an OSPF hello packet from the neighbor before declaring the neighbor down. This value is advertised in the router's hello packets. It must be a multiple of hello-interval and be the same for all routers on a specific network.

Use the `no` parameter with this command to return to the default time. If you have configured this command specifying the IP address of the interface and want to remove the configuration, use the `no` parameter with the specified IP address (`no ip ospf dead-interval A.B.C.D`).

Command Syntax

```
ip ospf (A.B.C.D|) dead-interval <1-65535>
no ip ospf (A.B.C.D|) dead-interval
```

Parameters

`A.B.C.D`	The IP address of the interface.
`dead-interval`	Specify the interval.
`<1-65535>`	Specify the interval in seconds. The default interval is 40 seconds.

Command Mode

Interface mode

Examples

The following example shows configuring dead-interval for 10 seconds on eth0 interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf dead-interval 10
```

ip ospf demand-circuit

Use this command to enable Hello Suppression and LSA Suppression sent on OSPF interface. Enabling demand circuit on one interface enables hello suppression only for that particular interface.

Note: Hellos and LSAs are suppressed on Point-to-point and Point-to-multipoint links and only LSAs are suppressed for a broadcast link.

Use the no parameter with this command to disable Hello Suppression and LSA Suppression

Command Syntax

```
ip ospf demand-circuit

no ip ospf demand-circuit
```

Parameters

None

Command Mode

Interface mode

Examples

The following example shows configuring demand-circuit on eth1 interface.

```
#configure terminal
(config)#interface eth1
(config-if)#ip ospf demand-circuit

(config-if)#no ip ospf demand-circuit
```

ip ospf disable

Use this command to completely disable OSPF packet processing on an interface.

This command overrides the network command.

Use the `no` option with this command to return to the default setting.

Command Syntax

```
ip ospf disable all
no ip ospf disable all
```

Parameters

None

Command Mode

Interface mode

Usage

Example

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf disable all
```

ip ospf fast-reroute per-prefix candidate disable

Use this command to prohibit the interface from being used as the next hop in a repair path.

Use the `no` option with this command to use the interface as the next hop in a repair path.

Command Syntax

```
ip ospf fast-reroute per-prefix candidate disable
no ip ospf fast-reroute per-prefix candidate disable
```

Parameters

None

Command Mode

Interface mode

Usage

Example

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf fast-reroute per-prefix candidate disable
```

ip ospf flood-reduction

Use this command to Enable flood reduction on an interface. When this command is configured LSA sent out on the interface will be set with DNA bit in the LSA age field. LSA will not be refreshed every refresh interval if there is no change in LSA. Only changed LSA's will be sent out on the interface

Use the `no` option with this command to disable flood reduction on an interface.

Command Syntax

```
ip ospf flood-reduction
no ip ospf flood-reduction
```

Parameters

None

Command Mode

Interface mode

Example

```
#configure terminal
(config)#interface eth1
(config-if)#ip ospf flood-reduction

(config-if)#no ip ospf flood-reduction
```

ip ospf hello-interval

Use this command to specify the interval between hello packets.

The hello-interval is advertised in the hello packets. Configure the same hello-interval for all routers on a specific network. A shorter hello interval ensures faster detection of topological changes but results in more routing traffic.

Use the `no` parameter with this command to return to the default time.

Command Syntax

```
ip ospf (A.B.C.D|) hello-interval <1-65535>
```

```
no ip ospf (A.B.C.D|) hello-interval
```

Parameters

`A.B.C.D`	The IP address of the interface.
`hello-interval`	Specify the interval.
`<1-65535>`	Specify the interval in seconds. The default interval is 10 seconds.

Command Mode

Interface mode

Examples

The following example shows setting the hello-interval for 3 seconds on interface eth0.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf hello-interval 3
```

ip ospf message-digest-key

Use this command to register an MD5 key for OSPF authentication.

Use the `no` parameter with this command to remove an MD5 key.

Message Digest Authentication is cryptographic authentication. A key (password) and key-id are configured on each router. The router uses an algorithm based on the OSPF packet, the key, and the key-id to generate a message digest that is appended to the packet.

Use this command for uninterrupted transitions between passwords. This is helpful for administrators who want to change the OSPF password without disrupting communication. The system begins a rollover process until all the neighbors have adopted the new password. This allows neighboring routers to continue communication while the network administrator is updating them with a new password. The router will stop sending duplicate packets once it detects that all of its neighbors have adopted the new password.

Maintain only one password per interface, removing the old password whenever you add a new one. This prevents the local system from continuing to communicate with the system that is using the old password. Removing the old password also reduces overhead during rollover. All neighboring routers on the same network must have the same password value to enable exchange of OSPF routing data.

Command Syntax

```
ip ospf (A.B.C.D|) message-digest-key <1-255> md5 LINE
no ip ospf (A.B.C.D|) message-digest-key <1-255>
```

Parameters

`A.B.C.D`	IPv4 address of the interface.
`message-digest-key`	Specify a key ID.
`<1-255>`	Specify a key ID.
`md5`	Specify a key (password).
`LINE`	Specify the OSPF password (1-16 characters).

Default

Disabled.

Command Mode

Interface mode

Examples

The following example shows OSPF authentication on the interface eth0 when IP address has not been specified.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf authentication message-digest
(config-if)#ip ospf message-digest-key 1 md5 yourpass
```

The following example shows OSPF authentication on the interface eth0 for the IP address 1.1.1.1. (If the interface has two IP addresses assigned-- 1.1.1.1 & 2.2.2.2, OSPF authentication will be enabled only for the IP address 1.1.1.1)

```
(config)#interface eth0
(config-if)#ip ospf 1.1.1.1 authentication message-digest
(config-if)#ip ospf 1.1.1.1 message-digest-key 2 md5 yourpass
```

ip ospf mtu

Use this command to set MTU size for OSPF to construct packets based on this value. Whenever OSPF constructs packets, it uses interface MTU size as Maximum IP packet size. This command forces OSPF to use the specified value overriding the actual interface MTU size.

This command does not configure the MTU settings in the kernel. OSPF does not recognize MTU size changes made in the kernel until the MTU size is updated through this command.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf mtu <576-65535>
no ip ospf mtu
```

Parameters

`mtu`	Specify an MTU size.
`<576-65535>`	Specify an MTU size.

Default

By default, OSPF uses interface MTU derived from the kernel.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf mtu 1480
```

ip ospf mtu-ignore

Use this command to configure OSPF so that it does not check the MTU size during DD (Database Description) exchange.

By default, during the DD exchange process, OSPF checks the MTU size described in DD packets received from its neighbor. If the MTU size does not match the interface MTU, the neighbor adjacency is not established. Using this command makes OSPF ignore this check and allows establishing of adjacency regardless of MTU size in the DD packet.

Use the `no` form of this command to make OSPF check the MTU size during DD exchange.

Command syntax

```
ip ospf (A.B.C.D|) mtu-ignore

no ip ospf (A.B.C.D|) mtu-ignore
```

Parameters

`A.B.C.D`	IP address of the interface.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-router)#ip ospf mtu-ignore
```

ip ospf network

Use this command to set the OSPF network type.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf network (broadcast|non-broadcast|point-to-multipoint|point-to-point)
ip ospf network point-to-multipoint non-broadcast
no ip ospf network
```

Parameters

`broadcast`	Sets the network type to broadcast.
`non-broadcast`	Sets the network type to NBMA.
`point-to-multipoint`	Sets the network type to point-to-multipoint.
`non-broadcast`	Sets the network type to NBMA.
`point-to-point`	Sets the network type to point-to-point.

Default

Broadcast type

Command Mode

interface mode

Examples

The following example shows setting the network to `point-to-point` type on the `eth0` interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf network point-to-point
```

ip ospf priority

Use this command to set the router priority to determine the designated router (DR) for the network.

A router with the higher router priority becomes the DR. If the priority is the same for two routers, the router with the higher router ID takes precedence.

Only routers with a nonzero priority value are eligible to become the designated or backup designated router. Configure router priority for broadcast or NBMA networks only and not for point-to-point networks.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf (A.B.C.D|) priority <0-255>
no ip ospf (A.B.C.D|) priority
```

Parameters

`A.B.C.D`	The IP address of the interface.
`priority`	Specify the router priority of the interface.
`<0-255>`	Specify the router priority of the interface. The default value is 1.

Default

The default priority is 1.

Command Mode

Interface mode

Examples

The following example shows setting the OSPF priority value to 3 on the `eth0` interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf priority 3
```

ip ospf resync-timeout

Use this command to set the interval after which adjacency is reset if out-of-band re-synchronization has not occurred. The interval period starts from the time a restart signal is received from a neighbor.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf (A.B.C.D|) resync-timeout <1-65535>
```

```
no ip ospf (A.B.C.D|) resync-timeout
```

Parameters

`A.B.C.D`	The IP address of the interface.
`resync-timeout`	Specify the re-synchronization timeout value of the interface.
`<1-65535>`	Specify the re-synchronization timeout value of the interface in seconds.

Command Mode

Interface mode

Examples

The following example shows setting the OSPF re-synchronization timeout value to 65 seconds on the `eth0` interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf resync-timeout 65
```

ip ospf retransmit-interval

Use this command to specify the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface.

After sending an LSA to a neighbor, the router keeps the LSA until it receives an acknowledgement. If the router does not receive an acknowledgement during the retransmit interval, it retransmits the LSA. Set the retransmission interval value conservatively to avoid needless retransmission. The interval should be greater than the expected round-trip delay between two routers.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf (A.B.C.D|) retransmit-interval <5-65535>
```

```
no ip ospf (A.B.C.D|) retransmit-interval
```

Parameters

`A.B.C.D`	The IPv4 address of the interface.
`retransmit-interval`	Specify the interval.
`<5-65535>`	Specify the interval in seconds. The default is 5 seconds.

Command Mode

Interface mode

Examples

The following example shows setting the `ospf retransmit interval` to 6 seconds on the eth0 interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf retransmit-interval 6
```

ip ospf transmit-delay

Use this command to set the estimated time it takes to transmit a link-state-update packet on the interface.

The transmit delay value adds a specified time to the age field of an update. If the delay is not added, the time in which the LSA transmits over the link is not considered. This command is especially useful for low speed links. Add transmission and propagation delays when setting the transmit delay value.

Use the `no` parameter with this command to return to the default value.

Command Syntax

```
ip ospf (A.B.C.D|) transmit-delay <1-65535>
no ip ospf (A.B.C.D|) transmit-delay
```

Parameters

`A.B.C.D`	The IPv4 address of the interface.
`transmit-delay`	Specify the time to transmit a link-state update.
`<1-65535>`	Specify the time in seconds to transmit a link-state update. The default is 1 second.

Command Mode

Interface mode

Examples

The following example shows setting the OSPF transmit delay time to 3 seconds on the `eth0` interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ip ospf transmit-delay 3
```

ip router ospf multi-area

Use this command to enable multi-area adjacency on point-to-point network. Multi-area adjacency establishes adjacency between the Area Border Routers (ABRs). The interface of the ABR where this command is configured, shall be associated with multiple areas.

Use the `no` parameter to disable multi-area adjacency on the given interface on point-to-point network.

Command Syntax

```
ip router ospf <0-65535> multi-area (A.B.C.D|<0-4294967295>)

no ip router ospf <0-65535> multi-area (A.B.C.D|<0-4294967295>)
```

Parameters

`<0-65535>`	OSPF process ID.
`A.B.C.D`	OSPF area ID in IP address format.
`<0-4294967295>`	OSPF area ID as a decimal value.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth1
(config-if)#ip router ospf 0 multi-area 1

(config-if)# no ip router ospf 0 multi-area 1
```

max-concurrent-dd

Use this command to limit the number of Database Descriptors (DD) that can be processed concurrently.

This command is useful when a router's performance is affected from simultaneously bringing up several OSPF adjacencies. This command limits the maximum number of DD exchanges that can occur concurrently per OSPF instance, thus allowing for all of the adjacencies to come up.

Use the `no` option with this command to remove the limit.

Command Syntax

```
max-concurrent-dd <1-65535>

no max-concurrent-dd
```

Parameters

`<1-65535>`	Specify the number of DD processes.

Command Mode

Router mode

Examples

The following example set the `max-concurrent-dd` value to 4.

```
#configure terminal
(config)#router ospf 100
(config-router)#max-concurrent-dd 4
```

maximum-area

Use this command to configure the maximum number of OSPF areas.

Use the `no` parameter with this command to disable the limit.

Command Syntax

```
maximum-area <1-4294967294>
```

```
no maximum-area
```

Parameters

`<1-4294967294>`	Specify the maximum number of OSPF areas.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#maximum-area 5
```

neighbor

Use this command to configure OSPF routers interconnecting to NBMA (Non-Broadcast Multi-Access) networks. Include one neighbor entry for each known non-broadcast network neighbor. Configure the neighbor address on the primary address of the interface.

Use the `no` parameter with this command to remove a configuration.

Command Syntax

```
neighbor A.B.C.D
neighbor A.B.C.D (priority <0-255>|poll-interval <1-2147483647>|cost <1-65535>)
neighbor A.B.C.D (cost <1-65535>)
no neighbor A.B.C.D
no neighbor A.B.C.D {priority (<0-255>|)|poll-interval (<1-2147483647>|)}
no neighbor A.B.C.D (cost (<1-65535>|))
```

Parameters

`A.B.C.D`	Specify the interface IP address of the neighbor.
`priority`	Specify the router priority of the non-broadcast neighbor associated with the specified IP address.This parameter does not apply to point-to-multipoint interfaces.
`<0-255>`	Specify the router priority value of the non-broadcast neighbor associated with the specified IP address. The default is 0.
`poll-interval`	The reduced rate at which routers continue to send hello packets when a neighboring router has become inactive.
`<1-2147483647>`	Dead neighbor polling interval in seconds. Set this value much larger than hello interval. The default is 120 seconds.
`cost`	Specify the link-state metric to this neighbor.
`<1-65535>`	Specify the link-state metric to this neighbor.

Command Mode

Router mode

Examples

This example shows neighbor configured with a priority value and poll interval time.

```
#configure terminal
(config)#router ospf 100
(config-router)#neighbor 1.2.3.4 priority 1 poll-interval 90
(config-router)#neighbor 1.2.3.4 cost 15
```

network

Use this command to enable OSPF routing with a specified area ID (and optionally an instance ID) on interfaces with IP addresses that match the specified network address.

OSPF routing is enabled per IPv4 subnet basis. You define the network address using the prefix length or a subnet mask.

If OSPF multiple-instance support is enabled (using the enable ext-ospf-multi-inst command), different instance IDs can be enabled on the same subnet. By default, the instance ID is 0.

Use the `no` parameter with this command to disable OSPF routing on the interfaces.

Command Syntax

Network address defined using the prefix length:

```
network A.B.C.D/M area (A.B.C.D|<0-4294967295>) (instance-id <0-255>|)
no network A.B.C.D/M area (A.B.C.D|<0-4294967295>) (instance-id <0-255>|)
```

Network address defined using subnet mask:

```
network A.B.C.D A.B.C.D area (A.B.C.D|<0-4294967295>) (instance-id <0-255>|)
no network A.B.C.D A.B.C.D area (A.B.C.D|<0-4294967295>) (instance-id <0-255>|)
```

Parameters

`A.B.C.D/M`	IPv4 network address with prefix length.
`A.B.C.D`	IPv4 network address.
`A.B.C.D`	Subnet mask where the bits on left side are set to 1 to represent the network part and the bits on the right side are set to 0 to represent the host part.
`area`	Set the OSPF area ID
`A.B.C.D`	OSPF area ID in IPv4 address format.
`<0-4294967295>`	OSPF area ID as a decimal value.
`instance-id`	Instance ID.
`<0-255>`	Instance ID. The default is 0.

Default

No network area is configured.

Command Mode

Router mode

Examples

The following the use of the `network` command with OSPF multiple-instance support disabled.

```
#configure terminal
(config-router)#network 10.0.0.0/8 area 3
(config-router)#network 10.0.0.0/8 area 1.1.1.1
```

The following shows the use of the `network` command with OSPF multiple-instance support enabled.

```
(config)#router ospf 100
(config-router)#network 10.0.0.0/8 area 3 instance-id 4
```

ospf abr-type

Use this command to set an OSPF Area Border Router (ABR) type.

Use the `no` parameter with this command to revert the ABR type to the default setting (`cisco).`

Specifying the ABR type allows better functioning in a multi-vendor environment. The ABR types are:

- Cisco (RFC 3509): A router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.
- IBM (RFC 3509): A router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.
- Standard (RFC 2328): A router is considered an ABR if it has more than one area actively attached to it.
- Shortcut (draft-ietf-ospf-shortcut-abr-02): This improves the standard ABR by modifying the calculation of inter-area routes which are installed in non-backbone areas if the non-backbone path is better, thus providing a “shortcut” through these areas. To prevent routing loops, the inter-area routes are re-advertised only if they are associated with the backbone area.

Command Syntax

```
ospf abr-type (cisco|ibm|standard|shortcut)
no ospf abr-type (cisco|ibm|standard|shortcut|)
```

Parameters

`cisco`	Specify an alternative ABR using Cisco implementation. This is the default ABR type.
`ibm`	Specify an alternative ABR using IBM implementation.
`standard`	Specify a standard ABR.
`shortcut`	Specify a shortcut ABR.

Default

ABR type `Cisco`

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#ospf abr-type ibm
```

ospf flood-reduction

Use this command to Enable flood reduction on all OSPF interface. When this command is configured LSA sent out on the OSPF interface will be set with DNA bit in the LSA age field. If there is no change in LSA they will not be refreshed every refresh interval. LSA's will be sent out on the interface only if there is a change in LSA

Use the `no` option with this command to disable flood reduction on all OSPF interfaces.

Command Syntax

```
ospf flood-reduction
```

```
no ospf flood-reduction
```

Parameters

None

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#ospf flood-reduction

(config-router)#no ospf flood-reduction
```

ospf restart grace-period

Use this command to set the grace period for restarting the router.

If graceful restart is enabled, NSM is notified about the grace period. If the OSPF daemon unexpectedly shuts down, NSM sends this value to the OSPF daemon when it comes up again which uses this value to end the graceful state.

Use the `no` parameter with this command to revert to the default.

Command Syntax

```
ospf restart grace-period <1-1800>
```

```
no ospf restart grace-period
```

Parameters

`grace-period`	Specify the grace period.
`<1-1800>`	Specify the grace period in seconds.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ospf restart grace-period 250
```

ospf restart helper

Use this command to configure the helper behavior for graceful restart.

Use the `no` parameter with this command to revert to default.

Command Syntax

```
ospf restart helper {only-reload|only-upgrade|max-grace-period <1-1800>}
ospf restart helper never (router-id A.B.C.D|)
no ospf restart helper (never router-id (A.B.C.D | all) | max-grace-period|)
```

Parameters

`only-reload`	Help only on software reloads.
`only-upgrade`	Help only on software upgrades.
`max-grace-period`	Help only if received grace-period is less than this value.
`<1-1800>`	Help only if received grace-period is less than this value.
`never`	Prevent the neighbor from entering helper mode.
`router-id`	Neighbor to never to act as helper.
`A.B.C.D`	Router ID of neighbor to never to act as helper.
`all`	All neighbors to never to act as helper.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ospf restart helper never router-id 1.1.1.1

#configure terminal
(config)#ospf restart helper only-reload

#configure terminal
(config)#ospf restart helper only-reload max-grace-period 200

#configure terminal
(config)#no ospf restart helper never router-id all
```

ospf router-id

Use this command to specify a router ID for the OSPF process.

Configure each router with a unique router ID. In an OSPF router process which has active neighbors, a new router ID is used at the next reload or when you start the OSPF manually.

Use the `no` parameter with this command to force OSPF to use the previous router ID.

Command Syntax

```
ospf router-id A.B.C.D
router-id A.B.C.D

no ospf router-id
no router-id (A.B.C.D|)
```

Parameters

`A.B.C.D`	Specify the router ID in IPv4 address format.

Command Mode

Router mode

Examples

The following example shows a specified router ID 2.3.4.5.

```
#configure terminal
(config)#router ospf 100
(config-router)#ospf router-id 2.3.4.5
```

overflow database

Use this command to limit the maximum number of LSAs that can be supported by the OSPF instance.

Use the `no` parameter with this command to have an unlimited number of LSAs.

Command Syntax

```
overflow database <0-4294967294> (hard|soft|)
no overflow database
```

Parameters

`<0-4294967294>`	The maximum number of LSAs
`hard`	Shutdown occurs if the number of LSAs exceeds the specified value.
`soft`	Warning message appears if the number of LSAs exceeds the specified value.

Command Mode

Router mode

Examples

The following example shows setting the database overflow to 5 and shutting down in that event.

```
#configure terminal
(config)#router ospf 100
(config-router)#overflow database 5 hard
```

overflow database external

Use this command to limits the number of AS-external-LSAs a router can receive once it is in the wait state.

Use the `no` parameter with this command to revert to default.

Command Syntax

```
overflow database external <0-2147483647> <0-65535>
no overflow database external
```

Parameters

`<0-2147483647>`	The maximum number of LSAs. This value should be the same on all routers in the AS.
`<0-65535>`	The number of seconds the router waits before trying to exit the database overflow state. If this parameter is 0, the router exits the overflow state only after an explicit administrator command.

Command Mode

Router mode

Examples

The following example shows setting the maximum number of LSAs to 5 and the time to recover from overflow state to be 3.

```
#configure terminal
(config)#router ospf 100
(config-router)#overflow database external 5 3
```

passive-interface

Use this command to suppress sending Hello packets on all interfaces or on a specified interface.

This command configures OSPF on simplex Ethernet interfaces. Since a simplex interface represents only one network segment between two devices, configure the transmitting interface as a passive interface. This ensures that OSPF does not send hello packets for the transmitting interface. Both the devices can see each other via the hello packet generated for the receiving interface.

Use the `no` form with this command to resume sending `hello` packets on all interfaces, or on a specified interface.

Command Syntax

```
passive-interface IFNAME
passive-interface (IFNAME A.B.C.D |)
no passive-interface IFNAME
no passive-interface (IFNAME A.B.C.D |)
```

Parameters

`IFNAME`	The name of the interface.
`A.B.C.D`	IP address of the interface.

Command Mode

Router mode

Examples

```
(config)#router ospf 100
(config-router)#passive-interface eth0
```

redistribute

This command redistributes routes from a routing protocol, static route, and kernel route into an OSPF routing table.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
redistribute (kernel|connected|static|rip|bgp|isis|ospf (<1-65535>|)) {metric <0-
  16777214>|metric-type (1|2)|?route-map WORD|tag <0-4294967295>}
```

```
no redistribute (kernel|connected|static|rip|bgp|isis|ospf (<1-65535>|))
  metric|metric-type|?route-map|tag}
```

Parameters

`kernel`	Specify kernel routes.
`connected`	Specify connected routes.
`static`	Specify static routes.
`rip`	Specify RIP routes.
`bgp`	Specify BGP routes.
`isis`	Specify IS-IS routes.
`ospf`	Specify OSPF instance to redistribute a particular OSPF instance into another OSPF instance.
`<1-65535>`	Specify an OSPF process ID
`metric`	Specify the external metric.
`<0-16777214>`	Specify the external metric.
`metric-type`	Specify the external metric-type (see RFC 3101):
`1`	Set OSPF External Type 1 metrics.
`2`	Set OSPF External Type 2 metrics.
`route-map`	Specify a route map reference.
`WORD`	Specify name of the route-map.
`tag`	Tag value to use as a “match” value for controlling redistribution via route maps
`<0-4294967295>`	Specify the route tag.

Command Mode

Router mode

Examples

```
(config)#router ospf 100
(config-router)#redistribute bgp metric 12
```

The following example shows redistributing OSPF instance 2 into OSPF instance 1.

```
#configure terminal
(config)#router ospf 1
```

```
(config-router)#redistribute ospf 2
```

The following example shows redistributing OSPF instance `2` into OSPF instance `1`, with an external metric of `10`, metric type `1`, a route-map named `rmp1`, and an external route tag of `3`.

```
#configure terminal
(config)#router ospf 1
(config-router)#redistribute ospf 2 metric 10 metric-type 1 route-map rmp1 tag
3
```

restart ospf graceful

Use this command to restart OSPF gracefully.

After this command is executed, the router immediately shuts down and have to start the OSPF daemon manually. NSM is notified that OSPF has shut down gracefully. NSM preserves routes installed by OSPF until the grace period expires.

Command Syntax

```
restart ospf graceful (grace-period <1-1800>|)
```

Parameters

`grace-period`	Specify a grace period.
`<1-1800>`	Specify a grace period in seconds.

Command Mode

Privileged Exec mode and Exec mode

Examples

```
#restart ospf graceful grace-period 200
```

router ospf

Use this command to enter router mode and to configure an OSPF routing process.

Specify the process ID to configure multiple instances of OSPF. When running a single instance of OSPF, you do not need to specify a process ID.

Use the `no` parameter with this command to terminate an OSPF routing process.

Command Syntax

```
router ospf
router ospf <1-65535>

no router ospf
no router ospf <1-65535>
```

Parameters

`<1-65535>`	Process ID; should be unique for each routing process.

Default

No routing process defined.

Command Mode

Configure mode

Examples

This example shows the use of the `router ospf` command to enter router mode. Note the change in the prompt.

```
#configure terminal
(config)#router ospf 100
(config-router)#
```

show debugging ospf

Use this command to display the set OSPF debugging option.

Command Syntax

```
show debugging ospf
```

Parameters

None

Command Mode

Privileged Exec mode

Example

This is a sample output from the `show debugging ospf` command. Some lines in this output wrap around, they might not wrap around in the actual display.

```
#show debugging ospf
OSPF debugging status:
  OSPF packet Link State Update debugging is on
  OSPF all events debugging is on
```

show ip ospf

Use this command to display general information about all OSPF routing processes.

Command Syntax

```
show ip ospf (<0-65535>|)
```

Parameters

`<0-65535>`	The ID of the router process for which information will be displayed. If this parameter is specified, only the information for the specified routing process is displayed.

Command Mode

Privileged Exec mode

Examples

```
#show ip ospf 1
 Routing Process "ospf 1" with ID 4.1.1.1
 Process uptime is 1 minute
 Process bound to VRF default
 Conforms to RFC2328, and RFC1583 Compatibility flag is disabled
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 Supports Graceful Restart
 This router is an ASBR (injecting external routing information)
 SPF schedule delay min 0 secs 500 msecs
 SPF schedule delay max 50 secs 0 msecs
 Refresh timer 10 secs
 Number of incomming current DD exchange neighbors 0/5
 Number of outgoing current DD exchange neighbors 0/5
 Initial LSA throttle delay 10 secs 0 msecs
 Minimum hold time for LSA throttle 20 secs 0 msecs
 Maximum wait time for LSA throttle 45 secs 0 msecs
 Minimum LSA arrival 1 secs 0 msecs
 Number of external LSA 5. Checksum 0x010632
 Number of opaque AS LSA 0. Checksum 0x000000
 Number of non-default external LSA 5
 External LSA database is unlimited.
 Number of LSA originated 6
 Number of LSA received 0
 Number of areas attached to this router: 1
    Area 0 (BACKBONE)
        Number of interfaces in this area is 1(1)
        Number of fully adjacent neighbors in this area is 0
        Area has no authentication
        SPF algorithm last executed 00:00:47.558 ago
        SPF algorithm executed 2 times
        Number of LSA 1. Checksum 0x0041e0
```

show ip ospf border-routers

Use this command to display the ABRs and ASBRs for OSPF instances.

Command Syntax

```
show ip ospf (<0-65535>|) border-routers
```

Parameters

`<0-65535>`	The ID of the router process for which information will be displayed.

Command Mode

Privileged Exec mode

Example

This is a sample output from the `show ip ospf border-routers` command.

```
#show ip ospf border-routers
OSPF process 1 internal Routing Table
Codes: i - Intra-area route, I - Inter-area route
i 10.15.0.1 [10] via 10.10.0.1, eth0, ASBR, Area 0.0.0.0
i 172.16.10.1 [10] via 10.10.11.50, eth1, ABR, ASBR, Area 0.0.0.0
```

show ip ospf database brief

Use this command to display a summary of the OSPF database.

Command Syntax

```
show ip ospf database (self-originate|max-age|adv-router A.B.C.D|)
show ip ospf <0-65535> database(self-originate|max-age|adv-router A.B.C.D|)
```

Parameters

`<0-65535>`	The ID of the router process for which information should be displayed.
`self-originate`	Display self-originated link states.
`max-age`	Display LSAs which have reached the max-age (3600 seconds).
`adv-router`	Advertising router link states.
`A.B.C.D`	IPv4 address of advertising router.

Command Mode

Privileged Exec mode

Examples

```
#show ip ospf database

 OSPF Router process 1 with ID (10.10.11.60)
 Router Link States (Area 0.0.0.1)
Link ID         ADV          RouterAge         Seq#CkSum       Link      count
10.10.11.60  10.10.11.60        32            0x80000002       0x472b     1

 OSPF Router process 100 with ID (10.10.11.60)
 Router Link States (Area 0.0.0.0)
Link ID          ADV          RouterAge         Seq#CkSum       Link     count
10.10.11.60  10.10.11.60        219           0x80000001       0x4f5d      0

 OSPF Router process 10 with ID (10.10.11.60)
 Router Link States (Area 0.0.0.2)
Link ID         ADV          RouterAge         Seq#CkSum       Link      count
10.10.11.60 10.10.11.60        1(DNA)            0x80000002       0x472b     1
```

show ip ospf database detail

Use this command to display details of the OSPF database.

Command Syntax

```
show ip ospf database (asbr-summary|external|network|router|summary|nssa-
  external|opaque-link|opaque-area|opaque-as) (self-originate|adv-router A.B.C.D|)

show ip ospf <0-65535> database (asbr-summary|external|network|router|summary)
  (self-originate|adv-router A.B.C.D|)

show ip ospf database (asbr-summary|external|network|router|summary|nssa-
  external|opaque-link|opaque-area|opaque-as) A.B.C.D (self-originate|adv-router
  A.B.C.D|)

show ip ospf <0-65535> database (asbr-summary|external|network|router|summary|nssa-
  external|opaque-link|opaque-area|opaque-as) A.B.C.D (self-originate|adv-router
  A.B.C.D|)
```

Parameters

`<0-65535>`	The ID of the router process for which information should be displayed.
`asbr-summary`	Autonomous System Boundary Router (ASBR) summary LSAs.
`external`	External LSAs.
`network`	Network LSAs.
`router`	Router LSAs.
`summary`	LSA summary information.
`nssa-external`	NSSA external LSAs.
`opaque-link`	Type 9 LSAs which are not flooded beyond the local network.
`opaque-area`	Type 10 LSAs which are not flooded beyond the borders of their area.
`opaque-as`	Type 11 LSAs which are flooded throughout the Autonomous System (AS).
`A.B.C.D`	Link state ID as an IP address.
`self-originate`	Display self-originated link states.
`adv-router`	Advertising router link states.
`A.B.C.D`	IPv4 address of advertising router.

Command Mode

Privileged Exec mode

Examples

This is a sample output from the `show ip ospf database external` command with the `self-originate` option.

```
#show ip ospf database external self-originate

 OSPF Router process 100 with ID (10.10.11.50)

 AS External Link States
  LS age: 298
 Options: 0x2 (*|-|-|-|-|-|E|-)
 LS Type: AS-external-LSA
 Link State ID: 10.10.100.0 (External Network Number)
 Advertising Router: 10.10.11.50
 LS Seq Number: 80000001
 Checksum: 0x7033
 Length: 36
 Network Mask: /24
Metric Type: 2 (Larger than any link state path)
TOS: 0
Metric: 20
Forward Address: 10.10.11.50
External Route Tag: 0
```

The following is a sample output from the `show ip ospf database nssa-external` command with the `adv-router and ip address` option.

```
#show ip ospf  nssa-external adv-router 10.10.11.50
 OSPF Router process 100 with ID (10.10.11.50)
 NSSA-external Link States (Area 0.0.0.0)
 NSSA-external Link States (Area 0.0.0.1 [NSSA])
  LS age: 78
  Options: 0x0 (*|-|-|-|-|-|-|-)
  LS Type: AS-NSSA-LSA
  Link State ID: 0.0.0.0 (External Network Number For NSSA)
  Advertising Router: 10.10.11.50
  LS Seq Number: 80000001
  Checksum: 0xc9b6
  Length: 36
  Network Mask: /0
 Metric Type: 2 (Larger than any link state path)
 TOS: 0
 Metric: 1
 NSSA: Forward Address: 0.0.0.0
 --More--
OSPF Router process 100 with ID (10.10.11.50)
 NSSA-external Link States (Area 0.0.0.0)
 NSSA-external Link States (Area 0.0.0.1 [NSSA])
  LS age: 78
  Options: 0x0 (*|-|-|-|-|-|-|-)
  LS Type: AS-NSSA-LSA
 Link State ID: 0.0.0.0 (External Network Number For NSSA)
```

The following is a sample output from the `show ip ospf database opaque-as` command with the `self-originate` option.

```
#show ip ospf  opaque-as self-originate
 OSPF Router process 100 with ID (10.10.11.50)
 AS-Global Opaque-LSA
  LS age: 325
  Options: 0x2 (*|-|-|-|-|-|E|-)
  LS Type: AS-external Opaque-LSA
  Link State ID: 11.10.9.23 (AS-external Opaque-Type/ID)
  Opaque Type: 11
  Opaque ID: 657687
  Advertising Router: 10.10.11.50
  LS Seq Number: 80000001
  Checksum: 0xb018
 Length: 25
```

The following is a sample output from this command with the link state ID option.

```
#show ip ospf  router 10.10.11.50
 OSPF Router process 100 with ID (10.10.11.50)
 Router Link States (Area 0.0.0.0)
  LS age: 878
  Options: 0x2 (*|-|-|-|-|-|E|-)
  Flags: 0x3 : ABR ASBR
  LS Type: router-LSA
  Link State ID: 10.10.11.50
  Advertising Router: 10.10.11.50
  LS Seq Number: 80000004
  Checksum: 0xe39e
  Length: 36
Number of Links: 1
 Link connected to: Stub Network
 (Link ID) Network/subnet number: 10.10.10.0
 (Link Data) Network Mask: 255.255.255.0
Number of TOS metrics: 0
 TOS 0 Metric: 10
 Router Link States (Area 0.0.0.1)
  LS age: 877
  Options: 0x2 (*|-|-|-|-|-|E|-)
  Flags: 0x3 : ABR ASBR
  LS Type: router-LSA
  Link State ID: 10.10.11.50
  Advertising Router: 10.10.11.50
 LS Seq Number: 80000003
```

The following are the sample outputs from the `show ip ospf database summary` command using the `adv-router` option for Flood reduction in LSA

```
#show ip ospf  summary adv-router 10.10.11.50

 OSPF Router process 100 with ID (10.10.11.50)
 Summary Link States (Area 0.0.0.0)
  LS age: 1(DoNotAge)
  Options: 0x2 (*|-|-|-|-|-|E|-)
  LS Type: summary-LSA
  Link State ID: 10.10.11.0 (summary Network Number)
  Advertising Router: 10.10.11.50
  LS Seq Number: 80000001
  Checksum: 0x36ac
  Length: 28
  Network Mask: /24
 TOS: 0 Metric: 10
Summary Link States (Area 0.0.0.1)
  LS age: 989
  Options: 0x2 (*|-|-|-|-|-|E|-)
LS Type: summary-LSA
  Link State ID: 10.10.11.0 (summary Network Number)
  Advertising Router: 10.10.11.50
  LS Seq Number: 80000001
  Checksum: 0x36ac
  Length: 28
  Network Mask: /24
 TOS: 0 Metric: 10
#show ip ospf database external self-originate
```

```
OSPF Router process 100 with ID (10.10.11.50)

AS External Link States
 LS age: 298
 Options: 0x2 (*|-|-|-|-|-|E|-)
 LS Type: AS-external-LSA
 Link State ID: 10.10.100.0 (External Network Number)
 Advertising Router: 10.10.11.50
 LS Seq Number: 80000001
 Checksum: 0x7033
 Length: 36
 Network Mask: /24
Metric Type: 2 (Larger than any link state path)
TOS: 0
Metric: 20
Forward Address: 10.10.11.50
External Route Tag: 0
```

show ip ospf igp-shortcut-lsp

Use this command to show the IGP shortcut LSP used by OSPF.

Command Syntax

```
show ip ospf igp-shortcut-lsp
```

Parameters

None

Command Mode

Exec mode

Example

```
#show ip ospf igp-shortcut-lsp
 Tunnel-endpoint Tunnel-id Tunnel-metric
 8.8.8.8 101 2
```

show ip ospf igp-shortcut-route

Use this command to show the IGP shortcut route calculated by OSPF.

Command Syntax

```
show ip ospf (<0-65535>|) igp-shortcut-route
```

Parameters

`<0-65535>`	The ID of the router process for which information should be displayed.

Command Mode

Exec mode

Example

```
#show ip ospf igp-shortcut-route
OSPF process 0:
8.8.8.8/32 [2] tunnel-id: 101, 8.8.8.8
15.15.15.15/32 [0] tunnel-id: 101, 8.8.8.8
20.20.15.0/24 [0] tunnel-id: 101, 8.8.8.8
```

show ip ospf interface

Use this command to display interface information for OSPF.

Command Syntax

```
show ip ospf interface (IFNAME|)
```

Parameters

`IFNAME`	Interface name.

Command Mode

Privileged Exec mode and Exec mode

Example

The following is a sample output of this command:

```
#show ip ospf interface eth1
eth1 is up, line protocol is up
 Internet Address 1.1.1.1/24, Area 0.0.0.0, MTU 1500
 Process ID 0, Router ID 33.33.33.33, Network Type BROADCAST, Cost: 10
 Transmit Delay is 1 sec, State Waiting, Priority 1, TE Metric 0
 No designated router on this network
 No backup designated router on this network
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:02
 Neighbor Count is 0, Adjacent neighbor count is 0
 Crypt Sequence Number is 1106347721
 Hello received 0 sent 1, DD received 0 sent 0
 LS-Req received 0 sent 0, LS-Upd received 0 sent 0
 LS-Ack received 0 sent 0, Discarded 0
```

The following is a sample output of this command when DoNotAge option is enabled

```
#show ip ospf interface eth1
eth1 is up, line protocol is up
 Internet Address 1.1.1.1/24, Area 0.0.0.0, MTU 1500
 Process ID 0, Router ID 33.33.33.33, Network Type BROADCAST, Cost: 10
 Transmit Delay is 1 sec, State Waiting, Priority 1, TE Metric 0
 No designated router on this network
 No backup designated router on this network
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:02
 Neighbor Count is 0, Adjacent neighbor count is 0
 Crypt Sequence Number is 1106347721
 Hello received 0 sent 1, DD received 0 sent 0
 LS-Req received 0 sent 0, LS-Upd received 0 sent 0
 LS-Ack received 0 sent 0, Discarded 0
 Reduce LSA flooding
```

If Hello-Suppression is enabled

```
M1#sh ip os interface
p7p1 is up, line protocol is up
  Internet Address 14.1.1.2/24, Area 0.0.0.0, MTU 1500
  Process ID 1, VRF (default), Router ID 2.2.2.2, Network Type
POINTOMULTIPOINT, Cost:
1
  Reduce LSA flooding.
  Transmit Delay is 1 sec,  State Point-To-Point, TE Metric 1
  Timer intervals configured, Hello 30, Dead 120, Wait 120, Retransmit 5
    Hello due in 00:00:03
  Neighbor Count is 1, Adjacent neighbor count is 1
  Suppress hello for 1 neighbor(s)
  Hello received 5 sent 8, DD received 8 sent 6
  LS-Req received 2 sent 2, LS-Upd received 8 sent 9
  LS-Ack received 6 sent 6, Discarded 0
  No authentication
```

show ip ospf multi-area-adjacencies

Use this command to display multi-area adjacency information for OSPF.

Command Syntax

```
show ip ospf (<0-65535>|) multi-area-adjacencies
```

Parameters

`<0-65535>`	The ID of the router process for which information should be displayed.

Command Mode

Privileged Exec mode and Exec mode

Example

The following is a sample output of this command:

```
#show ip ospf 1 multi-area-adjacencies
Multi-area-adjacency on interface eth1 to neighbor 20.20.20.10
Internet Address 20.20.20.11/24, Area 0.0.0.1, MTU 1500
Process ID 1, Router ID 10.10.10.10, Network Type POINTOPOINT, Cost: 10
Transmit Delay is 1 sec, State Point-To-Point
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:02
Neighbor Count is 0, Adjacent neighbor count is 0
Crypt Sequence Number is 1229928206
Hello received 0 sent 513, DD received 0 sent 0
LS-Req received 0 sent 0, LS-Upd received 0 sent 0
LS-Ack received 0 sent 0, Discarded 0
```

show ip ospf neighbor

Use this command to display information on OSPF neighbors. Include the `process ID` parameter with this command to display information about specified instances.

Command Syntax

```
show ip ospf (<0-65535>|) neighbor

show ip ospf (<0-65535>|) neighbor all

show ip ospf (<0-65535>|) neighbor interface A.B.C.D

show ip ospf (<0-65535>|) neighbor A.B.C.D

show ip ospf (<0-65535>|) neighbor A.B.C.D detail

show ip ospf (<0-65535>|) neighbor detail

show ip ospf (<0-65535>|) neighbor detail all
```

Parameters

`<0-65535>`	The ID of the router process for which information should be displayed.
`all`	Include downstatus neighbor.
`interface`	Interface name
`A.B.C.D`	Address of the interface in IPv4 format
`A.B.C.D`	Address of the neighbor in IPv4 format
`detail`	Details of neighbors

Command Mode

Privileged Exec mode and Exec mode

Example

The following are sample outputs are from a variety of `show ip ospf neighbor` commands:

```
#show ip ospf neighbor
OSPF process 1:
Neighbor ID PriState Dead TimeAddressInterface
10.10.10.50 1Full/DR00:00:38 10.10.10.50 eth0
OSPF process 100:
Neighbor ID PriState Dead TimeAddressInterface
10.10.11.50 1Full/Backup 00:00:31 10.10.11.50 eth1

#show ip ospf 1 neighbor
OSPF process 1:
Neighbor ID PriState Dead TimeAddressInterface
10.10.10.50 1Full/DR00:00:38 10.10.10.50 eth0

#show ip ospf neighbor detail
 Neighbor 10.10.10.50, interface address 10.10.10.50
 In the area 0.0.0.0 via interface eth0
 Neighbor priority is 1, State is Full, 5 state changes
 DR is 10.10.10.50, BDR is 10.10.10.10
 Options is 0x42 (*|O|-|-|-|-|E|-)
```

```
     Dead timer due in 00:00:38
     Neighbor is up for 00:53:07
     Database Summary List 0
     Link State Request List 0
     Link State Retransmission List 0
     Crypt Sequence Number is 0
     Thread Inactivity Timer on
     Thread Database Description Retransmission off
```

If Hello-Suppression is enabled

```
    M1#sh ip os neighbor detail
     Neighbor 1.1.1.1, interface address 14.1.1.1
        In the area 0.0.0.0 via interface p7p1
        Neighbor priority is 1, State is Full, 5 state changes
        Hello is suppressed
        DR is 0.0.0.0, BDR is 0.0.0.0
        Options is 0x62 (-|O|DC|-|-|-|E|-)
        Dead timer due in inactive
        Neighbor is up for 00:05:03
        Database Summary List 0
        Link State Request List 0
        Link State Retransmission List 0
        Crypt Sequence Number is 0
        Thread Inactivity Timer off
        Thread Database Description Retransmission off
        Thread Link State Request Retransmission off
        Thread Link State Update Retransmission off
    M1#sh ip os neighbor

    Total number of full neighbors: 3
    OSPF process 1 VRF(default):
    Neighbor ID     Pri   State            Dead Time   Address         Interface
    Instance I
    D
    1.1.1.1         1   Full/ -        inactive   14.1.1.1       p7p1
    0
    3.3.3.3         1   Full/ -        00:01:41   15.1.1.2       p8p1
    0
    3.3.3.3          1   Full/ -         inactive    15.1.1.2       VLINK0
    M1#
```

show ip ospf route

Use this command to display the OSPF routing table.

Command Syntax

```
show ip ospf (<0-65535>|) route ( A.B.C.D |A.B.C.D/M |summary |)
show ip ospf (<0-65535>|) route ( A.B.C.D |A.B.C.D/M |summary | fast-reroute |)
```

Parameters

`<0-65535>`	Router process identifier.
`A.B.C.D`	Single route.
`A.B.C.D/M`	Single exact match route.
`summary`	Route counts.
`fast-reroute`	Fast-reroute routes.

Command Mode

Privileged Exec mode

Examples

The following is a sample output from the `show ip ospf route` command.

```
#show ip ospf route
OSPF process 10:
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
C 50.0.0.0/24 [10] is directly connected, eth1, Area 0.0.0.10
C 60.0.0.0/24 [10] is directly connected, eth3, Area 0.0.0.10
OSPF process 15:
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
C 80.0.0.0/24 [1] is directly connected, eth4, Area 0.0.0.15
```

The following is a sample output from the `show ip ospf route` command with the `<0-65535>` parameter.

```
#show ip ospf 10 route
OSPF process 10:
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
C 50.0.0.0/24 [10] is directly connected, eth1, Area 0.0.0.10
C 60.0.0.0/24 [10] is directly connected, eth3, Area 0.0.0.10
```

show ip ospf virtual-links

Use this command to display virtual link information.

Command Syntax

```
show ip ospf (<0-65535>|) virtual-links (brief|)
```

Parameters

`<0-65535>`	The ID of the router process for which information will be displayed.
`brief`	Display summary of OSPF virtual-links.

Command Mode

Privileged Exec mode and Exec mode

Example

The following is the display of the virtual link information for two routers, one with the virtual link up and one with virtual link down.

```
ospfd#show ip ospf virtual-links
Virtual Link VLINK0 to router 10.10.0.9 is up
 Transit area 0.0.0.1 via interface eth0
 Transmit Delay is 1 sec, State Point-To-Point,
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:02
 Adjacency state Full
Virtual Link VLINK1 to router 10.10.0.123 is down
 Transit area 0.0.0.1 via interface *
 Transmit Delay is 1 sec, State Down,
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in inactive
 Adjacency state Down
```

The following is the display of the virtual link information for two routers, one with the virtual link up and one with virtual link down when flood reduction is enabled

```
ospfd#show ip ospf virtual-links
Virtual Link VLINK0 to router 10.10.0.9 is up
 Transit area 0.0.0.1 via interface eth0
 Transmit Delay is 1 sec, State Point-To-Point,
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:02
 Adjacency state Full
Virtual Link VLINK1 to router 10.10.0.123 is down
 Transit area 0.0.0.1 via interface *
 Transmit Delay is 1 sec, State Down,
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in inactive
 Adjacency state Down

DoNotAge LSA Allowed
```

If Hello-Suppression is enabled

```
M1#sh ip os virtual-links
```

```
Virtual Link VLINK0 to router 3.3.3.3 is up
  Transit area 0.0.0.1 via interface p8p1
  Hello suppression enabled
  DoNotAge LSA allowed
  Local address 15.1.1.1/32
  Remote address 15.1.1.2/32
  Transmit Delay is 1 sec, State Point-To-Point,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in inactive
  No authentication
    Adjacency state Full
M1#
```

show ip protocols

Use this command to display OSPF process parameters and statistics.

Command Syntax

```
show ip protocols
show ip protocols ospf
```

Parameters

None

Command Mode

Privileged Exec mode

Usage

This is an example of the output from the `show ip protocols` command:

```
#show ip protocols
Routing Protocol is "ospf 200"
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is
 Redistributed kernel filtered by filter1
  Incoming update filter list for all interfaces is
  Redistributing: kernel
  Routing for Networks:
 192.30.30.0/24
 192.40.40.0/24
  Routing Information Sources:
 GatewayDistanceLast Update
  Distance: (default is 110)
 AddressMaskDistance List
```

show ip route fast-reroute

Use this command to display routes with alternate next hops.

Command Syntax

```
show ip route fast-reroute
```

Parameters

None

Command Mode

Privileged Exec mode

Usage

```
#show ip route fast-reroute
```

snmp restart ospf

Use this command restart SNMP in OSPF

Command Syntax

```
snmp restart ospf
```

Parameter

None

Command Mode

Configure mode

Examples

```
#snmp restart ospf
```

summary-address

Use this command to summarize or suppress external routes with the specified address range.

Use the `no` option with this command to disable summary address.

An address range is a pairing of an address and a mask that is almost the same as IP network number. For example, if the specified address range is 192.168.0.0/255.255.240.0, it matches 192.168.1.0/24, 192.168.4.0/22, 192.168.8.128/25 and so on.

Redistributing routes from other protocols into OSPF requires the router to advertise each route individually in an external LSA. Use this command to advertise one summary route for all redistributed routes covered by a specified network address and mask. This minimizes the size of the OSPF link state database.

Command Syntax

```
summary-address A.B.C.D/M (not-advertise|tag <0-4294967295>|)
no summary-address A.B.C.D/M (not-advertise|tag (<0-4294967295>|))
```

Parameters

`A.B.C.D/M`	The range of addresses given as IPv4 starting address and a mask.
`not-advertise`	Suppress routes that match the range.
`tag`	Tag value to use as a “match” value for controlling redistribution via route maps.
`<0-4294967295>`	Set a tag value. The default is 0.

Command Mode

Router mode

Examples

The following example uses the `summary-address` command to aggregate external LSAs that match the network 172.16.0.0/24 and assign a tag value of 3.

```
#configure terminal
(config)#router ospf 100
(config-router)#summary-address 172.16.0.0/16 tag 3
```

timers lsa arrival

This command sets the minimum interval to accept the same link-state advertisement (LSA) from OSPF neighbors.

Use the `no` form of this command to restore the default value.

Command Syntax

```
timers lsa arrival <0-600000>
no timers lsa arrival
```

Parameters

`<0-600000>`	The minimum delay in milliseconds between accepting the same LSA from neighbors.

Default

1000 milliseconds

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#timers lsa arrival 5000
```

timers throttle lsa

This command sets the rate-limiting intervals for OSPF link-state advertisement (LSA) generation.

Use the `no` form of this command to restore the default values.

Command Syntax

```
timers throttle lsa all <0-600000> <1-600000> <1-600000>
no timers throttle lsa all
```

Parameters

`<0-600000>`	Start interval: The minimum delay in milliseconds for the generation of LSAs. The first instance of LSA is always generated immediately upon a local OSPF topology change. The generation of the next LSA is not before the start interval.
`<0-600000>`	Hold interval: The hold time in milliseconds. This value is used to calculate the subsequent rate limiting times for LSA generation.
`<0-600000>`	Maximum interval: The maximum wait time in milliseconds between generation of the same LSA.

Defaults

Default start interval: 0 milliseconds

Default hold interval: 5000 milliseconds

Default maximum interval: 5000 milliseconds

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#timers throttle lsa all 200 10000 45000
```

CHAPTER 3 OSPFv3 Commands

This chapter provides an alphabetized reference for each of the OSPFv3 commands. It includes the following commands:

- abr-type
- address-family ipv4 unicast
- area default-cost
- area nssa
- area range
- area stub
- area virtual-link
- auto-cost reference bandwidth
- capability cspf
- capability restart
- clear ipv6 ospf process
- debug ipv6 ospf
- debug ipv6 ospf bfd
- debug ipv6 ospf events
- debug ipv6 ospf ifsm
- debug ipv6 ospf lfa
- debug ipv6 ospf lsa
- debug ipv6 ospf nfsm
- debug ipv6 ospf nsm
- debug ipv6 ospf packet
- debug ipv6 ospf retransmission
- debug ipv6 ospf rib
- debug ipv6 ospf route
- default-information originate
- default-metric
- distance
- distribute-list
- enable db-summary-opt
- exit-address-family
- fast-reroute keep-all-paths
- fast-reroute tie-break
- ipv6 ospf dead-interval
- ipv6 ospf demand-circuit

- ipv6 ospf display route single-line
- ipv6 ospf fast-reroute per-prefix candidate disable
- ipv6 ospf flood-reduction
- ipv6 ospf link-lsa-suppression
- ipv6 ospf mtu-ignore
- ipv6 ospf neighbor
- ipv6 ospf network
- ipv6 ospf priority
- ipv6 ospf restart grace-period
- ipv6 ospf restart helper
- ipv6 ospf retransmit-interval
- ipv6 ospf transmit-delay
- ipv6 router ospf
- ipv6 te-metric
- max-concurrent-dd
- ospfv3 flood-reduction
- passive-interface
- redistribute
- restart ipv6 ospf graceful
- router-id
- router ipv6 ospf
- show debugging ipv6 ospf
- show ipv6 ospf
- show ipv6 ospf database
- show ipv6 ospf interface
- show ipv6 ospf neighbor
- show ipv6 ospf route
- show ipv6 route fast-reroute
- show ipv6 ospf route fast-reroute
- show ipv6 ospfv3 topology
- show ipv6 ospf virtual-links
- show ipv6 vrf
- snmp restart ospf6
- summary-address

abr-type

Use this command to set an OSPFv3 Area Border Router (ABR) type.

Use the `no` parameter with this command to revert the ABR type to the default setting (`cisco`).

Specifying the ABR type allows better functioning in a multi-vendor environment. The ABR types are:

- Cisco (RFC 3509): A router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.
- IBM (RFC 3509): A router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.
- Standard (RFC 2328): A router is considered an ABR if it has more than one area actively attached to it.

Command Syntax

```
abr-type (cisco|ibm|standard)
no abr-type (cisco|ibm|standard|)
```

Parameters

`cisco`	Specify an alternative ABR using Cisco implementation. This is the default ABR type.
`ibm`	Specify an alternative ABR using IBM implementation.
`standard`	Specify a standard ABR.

Default

ABR type `Cisco`

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#abr-type standard
```

address-family ipv4 unicast

Use this command to enter address family mode where you can configure IPv4 unicast addresses for OSPFv3, including:

- Summarizing intra-area IPv4 routes (area range command)
- Create a default external route (default-information originate command)
- Redistributing IPv4 routes (redistribute command)
- Summarizing IPv4 external routes (summary-address command)

RFC 5838 defines the range of instance IDs below to use for each address family in OSPFv3.

Instance ID#	**Address Family**
0 - 31	IPv6 unicast
64 - 95	IPv4 unicast

Multiple router processes can configured per interface, but only one instance per router per interface can be configured. Each instance ID creates a separate OSPFv3 instance with its own neighbor adjacencies, link state database, and SPF computation. A single IPv4 or IPv6 OSPFv3 process running multiple instances on the *same* interface is not supported.

To leave the address family mode and return to the configure mode, use the `exit-address-family` command.

Use the `no` form of this command to remove the address-family configuration.

Command Syntax

```
address-family ipv4 unicast

no address-family
```

Parameters

None

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#address-family ipv4 unicast
```

area default-cost

Use this command to specify the cost for default summary route sent into a stub area. If an area is configured as a stub, the OSPFv3 router originates one type-3 inter-area-prefix-LSA into the stub area. This command changes the metric for this LSA.

Use the `no` parameter with this command to remove the assigned default cost.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) default-cost <0-16777215>
no area (A.B.C.D|<0-4294967295>) default-cost
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`<0-16777215>`	The advertised cost for the default summary route used for a stub or NSSA area. The default is 1.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#area 1 default-cost 10
```

area nssa

Use this command to set an area as a Not-So-Stubby-Area (NSSA). There are no external routes in an OSPF stub area, so you cannot redistribute from another protocol into a stub area. An NSSA allows external routes to be flooded within the area. These routes are then leaked into other areas. However, the external routes from other areas still do not enter the NSSA. You can configure an area to be a stub area or an NSSA, but not both.

This command simplifies administration when connecting a central site using OSPF to a remote site that is using a different routing protocol. You can extend OSPF to cover the remote connection by defining the area between the central router and the remote router as a NSSA.

Use the `no` form of this command to make an area a normal area.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) nssa

area (A.B.C.D|<0-4294967295>) nssa {translator-role (candidate|always)|stability-
  interval <0-2147483647>|no-redistribution|default-information-originate (metric
  <0-16777214>|metric-type <1-2>|metric <0-16777214> metric-type <1-2>|metric-type
  <1-2> metric <0-16777214>|)|no-summary}

area (A.B.C.D|<0-4294967295>) nssa (translate-candidate|translate-always)

no area (A.B.C.D|<0-4294967295>) nssa

no area (A.B.C.D|<0-4294967295>) nssa {translator-role|stability-interval|no-
  redistribution|default-information-originate|no-summary}
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`translator-role`	NSSA-ABR translator role:
`candidate`	Translate NSSA-LSA to Type-5 LSA if router is elected.
`always`	Always translate NSSA-LSA to Type-5 LSA.
`stability-interval`	Stability timer for a NSSA area. If an elected translator determines its services are no longer required, it continues to perform its duties for this time interval. This minimizes excess flushing of translated Type-7 LSAs and provides a more stable translator transition.
`<0-4294967295>`	Stability interval in seconds.
`no-redistribution`	Do not redistribute into the NSSA.
`default-information-originate`	Originate Type-7 default LSA into the NSSA.
`metric`	Specify metric for default routes.
`<0-16777214>`	Specify metric value.

`metric-type`	Specify metric type (see RFC 3101).
`<1-2>`	Specify metric type: 1: Type 1 external route 2: Type 2 external route
`no-summary`	Do not inject inter-area routes into the NSSA.
`translate-candidate`	Translate NSSA-LSA to Type-5 LSA if router is elected.
`translate-always`	Always translate NSSA-LSA to Type-5 LSA.

Command Mode

Router mode

Examples

```
(config)#router ipv6 ospf
(config-router)#area 3 nssa translator-role candidate no-redistribution
default-information-originate metric 34 metric-type 2
```

area range

Use this command to configure the OSPF address range. This command summarizes intra-area routes for an area. The single summary route is then advertised to other areas by the Area Border Routers (ABRs). Routing information is condensed at area boundaries and outside the area. If the network numbers in an area are assigned in a way such that they are contiguous, the ABRs can be configured to advertise a summary route that covers all the individual networks within the area that fall into the specified range.

Use the `no` parameter with this command to remove the assigned area range.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) range X:X::X:X/M
area (A.B.C.D|<0-4294967295>) range A.B.C.D/M
area (A.B.C.D|<0-4294967295>) range X:X::X:X/M (advertise|not-advertise)
area (A.B.C.D|<0-4294967295>) range A.B.C.D/M (advertise|not-advertise)
no area (A.B.C.D|<0-4294967295>) range X:X::X:X/M
no area (A.B.C.D|<0-4294967295>) range A.B.C.D/M
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`X:X::X:X/M`	The area IPv6 range prefix and length.
`A.B.C.D/M`	The area IPv4 range prefix and length.
`advertise`	Advertises this range.
`not-advertise`	Does not advertise this range.

Command Mode

Router mode

Router address-family mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#area 1 range 2000::/3

#configure terminal
(config)#router ipv6 ospf 10
(config-router)#router-id 10.10.10.10
(config-router)#address-family ipv4 unicast
(config-router-af)#area 1 range 10.0.0.0/8
(config-router-af)#exit-address-family
```

area stub

Use this command to define an area as a stub area on all routers. There are two stub area router configuration commands: the `stub` and commands. In all routers attached to the stub area, configure the area by using the `stub` option of the area command. For an area border router (ABR) attached to the stub area, use the `area` command.

Use the `no` form of this command to make an area a normal area.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) stub
area (A.B.C.D|<0-4294967295>) stub no-summary
no area (A.B.C.D|<0-4294967295>) stub
no area (A.B.C.D|<0-4294967295>) stub no-summary
```

Parameters

`A.B.C.D`	OSPF Area ID in IPv4 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`no-summary`	Stops an ABR from sending summary link advertisements into the stub area.

Default

No stub area is defined.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#area 1 stub no-summary
```

area virtual-link

Use this command to configure a link between two backbone areas that are physically separated through other nonbackbone areas.

Use the `no` parameter with this command to remove the virtual link.

In OSPFv3, all non-backbone areas must be connected to a backbone area. If the connection to the backbone is lost, the virtual link repairs the connection.You can configure virtual links between any two backbone routers that have an interface to a common non-backbone area. The protocol treats these two routers joined by a virtual link as if they were connected by an unnumbered point-to-point network.

Configure the `hello-interval` to be the same for all routers attached to a common network. If the `hello-interval` is short, the router detects topological changes faster, but more routing traffic follows.

The `retransmit-interval` is the expected round-trip delay between any two routers in a network. Set the value to be greater than the expected round-trip delay to avoid needless retransmissions.

The `transmit-delay` is the time taken to transmit a link state update packet on the interface. Before transmission, the link state advertisements in the update packet are increased by this amount. Set the transmit-delay to be greater than zero. Also, take into account the transmission and propagation delays for the interface.

Command Syntax

```
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D

area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D (dead-interval <1-65535>|hello-
  interval <1-65535>|retransmit-interval <1-1800>|transmit-delay <1-1800>)

area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D instance-id <0-255>

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D (dead-interval|hello-
  interval|retransmit-interval|transmit-delay)

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D instance-id
```

Parameters

`A.B.C.D`	OSPF Area ID in IP64 address format.
`<0-4294967295>`	OSPF Area ID as a decimal value.
`A.B.C.D`	Specify router ID associated with a virtual link neighbor.
`dead-interval`	The interval in seconds during which no packets are received and after which the router acknowledges a neighboring router as off-line. The default is 40 seconds.
`hello-interval`	The interval in seconds the router waits before it sends a hello packet. The default is 10 seconds.
`retransmit-interval`	The interval in seconds the router waits before it retransmits a packet. The default is 5 seconds.
`transmit-delay`	The interval in seconds the router waits before it transmits a packet. The default value is 1 second.
`<1-65535>`	The timer interval for dead-interval and hello-interval.
`<1-1800>`	The timer interval for retransmit-interval and transmit-delay.
`instance-id`	The OSPFv3 instance.

`<0-255>`	The OSPFv3 instance ID.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#area 1 virtual-link 10.10.11.50 hello 5 dead 10
(config-router)#area 1 virtual-link 10.10.11.50 instance-id 1
(config-router)#area 1 virtual-link 10.10.11.50 fall-over bfd
```

auto-cost reference bandwidth

Use this command to control how OSPFv3 calculates default metrics for the interface.

By default, OSPFv3 calculates the OSPFv3 metric for an interface by dividing the reference bandwidth by the interface bandwidth. The default value for the reference bandwidth is 100Mbps. The auto-cost command is used to differentiate high bandwidth links. For multiple links with high bandwidth, specify a larger reference bandwidth value to differentiate cost on those links.

Use the `no` form of this command to assign cost based only on the interface bandwidth.

Command Syntax

```
auto-cost reference-bandwidth <1-4294967>
```

```
no auto-cost reference-bandwidth
```

Parameters

`<1-4294967>`	The reference bandwidth in Mbps per second. The default is 100 Mbps.

Command Mode

Router mode

Default

100 Mbps

Examples

This example changes the reference bandwidth to 1Gbps to change the Fast Ethernet interface cost from 1 to 10.

```
#configure terminal
(config)#router ipv6 ospf 1
(config-router)#auto-cost reference-bandwidth 1000

(config)#router ipv6 ospf 1
(config-router)#no auto-cost reference-bandwidth
```

capability cspf

Use this command to enable the CSPF (Constrained Shortest Path First) feature for an OSPFv2 or OSPFv3 instance.

Use the `no` parameter with this command to disable CSPF functionality for the OSPFv2 or OSPFv3 instance.

Command Syntax

```
capability cspf
no capability cspf
```

Parameters

None

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#no capability cspf
```

capability restart

Use this command to enable OSPFv3 graceful restart capability. If a router is not restart-enabled, it cannot enter graceful restart mode and act as a helper.

Use the `no` parameter with this command to disable the feature.

Command Syntax

```
capability restart graceful
```

```
no capability restart
```

Parameter

None

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf 100
(config-router)#capability restart graceful

(config)#router ipv6 ospf 100
(config-router)#capability restart
```

clear ipv6 ospf process

Use this command to clear and restart all OSPFv3 routing processes or a given OSPFv3 routing process.

Command Syntax

```
clear ipv6 ospf (WORD|) process
```

Parameters

`WORD`	OSPFv3 process tag.

Command Mode

Privileged Exec Mode

Examples

```
#clear ipv6 ospf ipi process
```

debug ipv6 ospf

Use this command to specify all debugging options for OSPFv3.

Use the `no` form of this command to disable the options.

Command Syntax

```
debug ipv6 ospf (all|bfd|events|ifsm|lsa|nfsm|nsm|packet|retransmission|rib|route)


no debug ipv6 ospf
  (all|bfd|events|ifsm|lsa|nfsm|nsm|packet|retransmission|rib|route)

undebug ipv6 ospf (all|bfd|events|ifsm|lsa|nfsm|nsm|packet|rib|route)

no debug all ipv6 ospf

undebug all ipv6 ospf

no debug all

undebug all
```

Parameters

`all`	Enables all debugging information.
`bfd`	Debug OSPFv3 Bidirectional Forwarding Detection. (see debug ipv6 ospf bfd)
`events`	Debug OSPFv3 events (see debug ipv6 ospf events).
`ifsm`	Debug OSPFv3 Interface State Machines (see debug ipv6 ospf ifsm).
`lsa`	Debug OSPFv3 Link State Advertisements (see debug ipv6 ospf lsa).
`nfsm`	Debug OSPFv3 Neighbor State Machines (see debug ipv6 ospf nfsm).
`nsm`	Debug OSPFv3 NSM information (see debug ipv6 ospf nsm).
`packet`	Debug OSPFv3 packets (see debug ipv6 ospf packet).
`retransmission`	Debug OSPFv3 retransmission information. (see debug ipv6 ospf retransmission)
`rib`	Debug OSPFv3 Routing Information Base.(see debug ipv6 ospf rib)
`route`	Debug OSPFv3 route information (see debug ipv6 ospf route).

Command Mode

Privileged Exec and Configure mode

Examples

```
#debug ipv6 ospf all
```

debug ipv6 ospf bfd

Use this command to specify the debugging options for OSPFv3 Bidirectional Forwarding Detection

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf bfd
no debug ipv6 ospf bfd
undebug ipv6 ospf bfd
```

Parameters

None

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf bfd
```

debug ipv6 ospf events

Use this command to display debug information related to OSPF internal events. Use this command without parameters to turn on all the options.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf events {(abr|asbr|os|router|vlink|nssa)|}


no debug ipv6 ospf events {(abr|asbr|os|router|vlink|nssa)|}
undebug ipv6 ospf events {(abr|asbr|os|router|vlink|nssa)|}
```

Parameters

`abr`	Debug ABR events
`asbr`	Debug ASBR events
`os`	Debug OS interaction events
`router`	Debug other router events
`vlink`	Debug virtual link events
`nssa`	Debug NSSA events

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#no debug ipv6 ospf events abr
#debug ipv6 ospf events asbr
```

debug ipv6 ospf ifsm

Use this command to specify debugging options for OSPFv3 Interface Finite State Machine (IFSM) troubleshooting.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf ifsm ({events|status|timers}|)

no debug ipv6 ospf ifsm ({events|status|timers}|)
undebug ipv6 ospf ifsm ({events|status|timers}|)
```

Parameters

`events`	Debug IFSM event information.
`status`	Debug IFSM status information.
`timers`	Debug IFSM timer information.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf ifsm status
```

debug ipv6 ospf lfa

Use this command to specify the debugging options for OSPFv3 Loop-free Alternate path

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf lfa
no debug ipv6 ospf lfa
```

Parameters

None

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf lfa
```

debug ipv6 ospf lsa

Use this command to specify the debugging options for OSPFv3 Link State Advertisements (LSAs).

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf lsa {(generate|flooding|install|maxage|refresh)|}

no debug ipv6 ospf lsa {(generate|flooding|install|maxage|refresh)|}
undebug ipv6 ospf lsa {(generate|flooding|install|maxage|refresh)|}
```

Parameters

`generate`	Debug LSA generation.
`flooding`	Debug LSA flooding.
`install`	Debug LSA installation.
`maxage`	Debug the maximum age processing.
`refresh`	Debug LSA refresh.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf lsa
```

debug ipv6 ospf nfsm

Use this command to specify debugging options for OSPFv3 Neighbor Finite State Machines (NFSMs).

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf nfsm {(events|status|timers)|}


no debug ipv6 ospf nfsm {(events|status|timers)|}
undebug ipv6 ospf nfsm {(events|status|timers)|}
```

Parameters

`events`	Debug NFSM event information.
`status`	Debug NFSM status information.
`timers`	Debug NFSM timer information.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf nfsm events
#no debug ipv6 ospf nfsm timers
```

debug ipv6 ospf nsm

Use this command to specify the debugging options for OSPFv3 NSM information.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf nsm {(interface|redistribute)|}


no debug ipv6 ospf nsm {(interface|redistribute)|}
undebug ipv6 ospf nsm {(interface|redistribute)|}
```

Parameters

`redistribute`	Debug redistribute.
`interface`	Debug the NSM interface.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf nsm interface
```

debug ipv6 ospf packet

Use this command to specify the packet debugging options for OSPFv3 information.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|detail}|)


no debug ipv6 ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|
  detail}|)
undebug ipv6 ospf packet ({hello|dd|ls-request|ls-update|ls-ack|send|recv|detail}|)
```

Parameters

`hello`	Debug OSPFv3 hello.
`dd`	Debug OSPFv3 database description.
`ls-request`	Debug OSPFv3 link state request.
`ls-update`	Debug OSPFv3 link state update.
`ls-ack`	Debug OSPFv3 link state acknowledgment.
`send`	Debug packets sent
`recv`	Debug packets received.
`detail`	Debug detail information.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf packet ls-request
```

debug ipv6 ospf retransmission

Use this command to specify the debugging options for OSPFv3 retransmission information.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf retransmission
no debug ipv6 ospf retransmission
```

Parameters

None

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf retransmission
```

debug ipv6 ospf rib

Use this command to specify the debugging options for OSPFv3 RIB information.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf rib {(interface|redistribute)|}

no debug ipv6 ospf rib {(interface|redistribute)|}
undebug ipv6 ospf rib {(interface|redistribute)|}
```

Parameters

`redistribute`	Debug redistribute.
`interface`	Debug the NSM interface.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#debug ipv6 ospf rib interface
```

debug ipv6 ospf route

Use this command to specify which route calculation to debug. Use this command without parameters to turn on all the options.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
debug ipv6 ospf route {(ase|ia|install|spf)|}


no debug ipv6 ospf route {(ase|ia|install|spf)|}

undebug ipv6 ospf route {(ase|ia|install|spf)|}
```

Parameters

`ase`	Debug external route calculations.
`ia`	Debug inter-area route calculations.
`install`	Debug the route installation.
`spf`	Debug the SPF calculation.

Command Mode

Privileged Exec mode and Configure mode

Examples

```
#no debug ipv6 ospf route
#debug ipv6 ospf route ia
```

default-information originate

Use this command to create a default external route into an OSPF routing domain.

The system acts like an Autonomous System Boundary Router (ASBR) when you use the `default-information originate` command to redistribute routes into an OSPF routing domain. An ASBR does not by default generate a default route into the OSPF routing domain.

When you give the `default-information originate` command, also specify a `route-map` to avoid a dependency on the default network in the routing table.

Use the `no` parameter with this command to disable this feature.

Command Syntax

```
default-information originate
```

```
default-information originate {metric <0-16777214>|metric-type (1|2)|?route-map
  WORD|always}
```

```
no default-information originate
```

```
no default-information originate {metric|metric-type|?route-map|always}
```

Parameters

`always`	Used to advertise the default route regardless of whether there is a default route.
`metric`	Sets the OSPF metric used in creating the default route.
`<0-16777214>`	Sets the OSPF metric used in creating the default route. The default metric value is 10. The value used is specific to the protocol.
`metric-type`	The external link type associated with the default route advertised into the OSPF routing domain (see RFC 3101).
`1`	Sets OSPF External Type 1 metric.
`2`	Sets OSPF External Type 2 metric (default).
`route-map`	Route map.
`WORD`	Specify the name of route map.

Command Mode

Router mode

Router address-family mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#default-information originate always metric 23 metric-type 2
route-map myinfo

(config)#router ipv6 ospf
(config-router)#no default-information originate metric metric-type route-map
```

default-metric

Use this command to set a default metric for OSPF.

A default metric facilitates redistributing routes with incompatible metrics. If the metrics do not convert, the default metric provides an alternative. Use this command to use the same metric value for all redistributed routes. Use this command in conjunction with the redistribute command.

Use the `no` parameter with this command to return to the default state.

Command Syntax

```
default-metric <1-16777214>
no default-metric
no default-metric <1-16777214>
```

Parameter

`<1-16777214>`	Default metric value.

Default

Built-in, automatic metric translations, as appropriate for each routing protocol.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#default-metric 100
```

distance

Use this command to define OSPFv3 route administrative distances based on route type. This command sets the distance for an entire group of routes rather than a specific route that passes an access list.

The administrative distance rates the trustworthiness of a routing information source. A higher distance value means a lower trust rating. For example, an administrative distance of 254 means that the routing information source cannot be trusted and should be ignored.

Use the `no` form of this command to restore the default value.

Command Syntax

```
distance <1-254>
distance ospfv3 {intra-area <1-254>|inter-area <1-254>|external <1-254>}
no distance <1-254>
no distance ospfv3
```

Parameters

`<1-254>`	Used alone, this parameter specifies a default administrative distance used when no other specification exists for a routing information source.
`intra-area`	Routes within an area.
`<1-254>`	Distance for all routes within an area
`inter-area`	Routes from one area to another area.
`<1-254>`	Distance for all routes from one area to another area.
`external`	Routes from other routing domains learned by redistribution.
`<1-254>`	Distance for routes from other routing domains learned by redistribution.

Command Mode

Router mode

Example

```
#configure terminal
(config)#router ipv6 ospf 100
(config-router)#distance ospfv3 inter-area 20 intra-area 10 external 40
```

distribute-list

Use this command to filter networks in routing updates. This command redistributes other routing protocols into the OSPF routing table.

Use the `no` parameter with this command to disable this function.

Command Syntax

```
distribute-list WORD out ((kernel|connected|static|rip|bgp|isis|ospf (WORD|<1-
  65535>|)))
distribute-list WORD in
no distribute-list WORD out ((kernel|connected|static|rip|bgp|isis|ospf (WORD|<1-
  65535>|)))
no distribute-list WORD in
```

Parameters

`WORD`	Specify the name of the access list.
`in`	Filter incoming routing updates.
`out`	Filter outgoing routing updates.
`kernel`	Specify kernel routes.
`connected`	Specify connected routes.
`static`	Specify static routes.
`rip`	Specify RIP routes.
`bgp`	Specify BGP routes.
`isis`	Specify IS-IS routes.
`ospf`	Specify OSPF routes. If a subparameter is not specified, this command redistributes all running OSPF processes.
`WORD`	Specify the OSPF process tag.
`<1-65535>`	Specify OSPF process ID <1-65535>.

Command Mode

Router mode

Examples

The following example shows the distribution of BGP routing updates based on the access list `list1` (network 172.10.0.0).

```
#configure terminal
(config)#access-list list1 permit 172.10.0.0/16
(config)#router ipv6 ospf 100
(config-router)#distribute-list list1 out bgp
(config-router)#redistribute bgp
```

enable db-summary-opt

Use this command to enable the database summary list optimization for OSPFv3.

When this feature is enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor if the LSA instance in the summary list is the same as or less recent than the LSA in the database description packet received from the neighbor.

Use the `no` form of the command to disable database summary list optimization.

Command Syntax

```
enable db-summary-opt
```

```
no enable db-summary-opt
```

Parameters

None

Default

Disabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf
(config-router)#enable db-summary-opt
(config-router)#no enable db-summary-opt
```

fast-reroute keep-all-paths

Use this command to enable fast rerouting on all OSPFv3 interfaces.

Use the `no` parameter with this command to disable fast rerouting.

Command Syntax

```
fast-reroute keep-all-paths
no fast-reroute keep-all-paths
```

Parameters

None

Defaults

Fast rerouting is disabled.

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf 200
(config-router)#fast-reroute keep-all-paths
```

fast-reroute tie-break

Use this command to set the tie-breaking policy for selecting a fast reroute repair path. You assign a priority to each type of repair path.

Use the `no` parameter with this command to set the tie-breaking policy for a specific type of repair path to its default priority. To set all types of repair paths to their default priorities, do not specify a repair path with the `no` form of this command.

Command Syntax

```
fast-reroute tie-break (primary-path|interface-disjoint|node-protecting|broadcast-
  interface-disjoint) index <1-4>

no fast-reroute tie-break (primary-path|interface-disjoint|node-
  protecting|broadcast-interface-disjoint) index <1-4>

no fast-reroute tie-break
```

Parameters

`primary-path`	When there are multiple loop-free alternate paths. The primary path is selected for an frr if it is node-protecting as well as link-protecting
`interface-disjoint`	Do not select point-to-point interfaces that have no alternate next hop for rerouting if the primary gateway fails, thus protecting the interface.
`node-protecting`	Bypass the `primary-path` gateway router which might not protect the router that is the next hop in the primary path.
`broadcast-interface-disjoint`	Do not use the interface if connected to a broadcast network. Repair paths protect links when a repair path and a protected primary path use *different* next-hop interfaces. However, on broadcast interfaces, if the repair path is computed via the same interface as the primary path, but their next-hop gateways are different, the router is protected but the link might not be.
`index`	Tiebreak priority. A lower value has higher preference.
`<1-4>`	Range of priority values.

Defaults

The default priority scheme is:

1. primary-path
2. interface-disjoint
3. node-protecting
4. broadcast-interface-disjoint

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf 200
(config-router)#fast-reroute tie-break interface-disjoint index 1
```

exit-address-family

Use this command to exit address-family mode and return to router mode.

Command Syntax

```
exit-address-family
```

Parameters

None

Default

Disabled

Command Mode

Router address-family mode

Examples

```
#configure terminal
(config) # router ipv6 ospf 10
(config-router) # router-id 10.10.10.10
(config-router) # address-family ipv4 unicast
(config-router-af) # area 1 range 10.0.0.0/8
(config-router-af) # exit-address-family
```

ipv6 ospf cost

Use this command to specify the link-cost described in LSAs.

The cost (or metric) of an interface in OSPF indicates the overhead required to send packets across a certain interface. The value is taken to describe Link State information, and used for route calculation.

Use the `no` parameter with this command to reset the cost to default.

Command Syntax

```
ipv6 ospf cost <1-65535>
ipv6 ospf cost <1-65535> instance-id <0-255>
no ipv6 ospf cost
no ipv6 ospf cost instance-id <0-255>
```

Parameters

`cost`	Specify the link-state metric.
`<1-65535>`	Specify the link-state metric. The default value is 10.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf cost 20 instance-id 1
```

ipv6 ospf dead-interval

Use this command to set the amount of time that the router waits to receive an OSPF hello packet from the neighbor before declaring the neighbor down.

The dead interval is advertised in hello packets. OSPF compares the dead interval in a received packet to the dead interval configured for the receiving interface. If the intervals do not match, the hello packet is discarded.

Use the `no` parameter with this command to reset the interval to default.

Command Syntax

```
ipv6 ospf dead-interval <1-65535>
ipv6 ospf dead-interval <1-65535> instance-id <0-255>
no ipv6 ospf dead-interval
no ipv6 ospf dead-interval instance-id <0-255>
```

Parameters

`dead-interval`	Specify the interval.
`<1-65535>`	Specify the interval in seconds. The default is 40 seconds.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf dead-interval 20
```

ipv6 ospf demand-circuit

Use this command to enable Hello Suppression and LSA Suppression sent on OSPFv3 interface

Note: Hello’s and LSA’s will be suppressed on Point-to-point and Point-to-multipoint links and only LSA’s will be suppressed for Broadcast link

Use the `no` parameter with this command to disable Hello Suppression and LSA Suppression.

Command Syntax

```
ipv6 ospf demand-circuit (instance-id <0-255>)
no ipv6 ospf demand-circuit  (instance-id <0-255>)
```

Parameters

`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth1
(config-if)#ipv6 ospf demand-circuit

(config-if)#no ipv6 ospf demand-circuit
```

ipv6 ospf display route single-line

Use this command to display the output of the `show ipv6 ospf route` command with each route entry in a single-line.

Use the `no` parameter with this command to revert to default.

Command Syntax

```
ipv6 ospf display route single-line

no ipv6 ospf display route single-line
```

Parameters

None

Default

By default, the `show ipv6 ospf route` command displays routes in multiple lines.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ipv6 ospf display route single-line
```

ipv6 ospf fast-reroute per-prefix candidate disable

Use this command to prohibit the interface from being used as the next hop in a repair path.

Use the `no` option with this command to use the interface as the next hop in a repair path.

Command Syntax

```
ipv6 ospf fast-reroute per-prefix candidate disable (instance-id <0-255>)
no ipv6 ospf fast-reroute per-prefix candidate disable (instance-id <0-255>)
```

Parameters

`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Usage

Example

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf fast-reroute per-prefix candidate disable instance-id 10
```

ipv6 ospf flood-reduction

Use this command to enable DoNotAge option in LSA sent on an OSPFv3 interface.When this command is configured, router can send/receive LSA with DNA option set and process them on the interface.

Use the `no` parameter with this command to disable DoNotAge option in LSA sent on an OSPFv3 interface.

Command Syntax

```
ipv6 ospf flood-reduction (instance-id <0-255>)

no ipv6 ospf flood-reduction (instance-id <0-255>)
```

Parameters

`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)# interface eth1
(config-if)#ipv6 ospf flood-reduction

(config-if)# no ipv6 ospf flood-reduction
```

ipv6 ospf hello-interval

Use this command to specify the interval between `hello` packets.

The hello interval is advertised in the hello packets. An OSPF router compares the hello interval in a received packet to the interval configured for the receiving interface. If this interval does not match, the hello packet is discarded. A shorter hello interval ensures faster detection of topological changes, but results in more routing traffic.

Use the `no` parameter with this command to reset the interval to default.

Command Syntax

```
ipv6 ospf hello-interval <1-65535>

ipv6 ospf hello-interval <1-65535> instance-id <0-255>

no ipv6 ospf hello-interval

no ipv6 ospf hello-interval instance-id <0-255>
```

Parameters

`hello-interval`	Specify the interval.
`<1-65535>`	Specify the interval in seconds. The default is 10 seconds.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf hello-interval 5 instance-id 1
```

ipv6 ospf link-lsa-suppression

Use this command to enable or disable link LSA (type 8) suppression. A type 8 LSA gives information about link-local addresses and a list of IPv6 addresses on the link.

If enabled and the interface type is *not* broadcast or NBMA, the router does not send type 8 link LSAs. This implies that other routers on the link determine the router's next-hop address using a mechanism other than the type 8 link LSA. This feature is implicitly disabled if the interface type is broadcast or NBMA.

Command Syntax

```
ipv6 ospf link-lsa-suppression (enable|disable)
ipv6 ospf link-lsa-suppression (enable|disable) instance-id <0-255>
```

Parameters

`enable`	Enable type 8 link LSA suppression
`disable`	Disable type 8 link LSA suppression (default).
`<0-255>`	Interface instance identifier.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf link-lsa-suppression enable
```

ipv6 ospf mtu-ignore

Use this command to configure OSPF so that it does not check the MTU size during DD (Database Description) exchange.

By default, during the DD exchange process, OSPF checks the MTU size described in DD packets received from its neighbor. If the MTU size does not match the interface MTU, the neighbor adjacency is not established. Using this command makes OSPF ignore this check and allows establishing of adjacency regardless of MTU size in the DD packet.

Use the `no` form of this command to make OSPF check the MTU size during DD exchange.

Command syntax

```
ipv6 ospf mtu-ignore
```

```
no ipv6 ospf mtu-ignore
```

Parameters

None

Command Mode

Interface mode

Examples

```
#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
(config)#int eth1
(config-if)#ipv6 ospf mtu-ignore
```

ipv6 ospf neighbor

Use this command to connect OSPFv3 routers to non-broadcast multi-access (NBMA) networks.

One neighbor entry must be included for each known NBMA neighbor. The neighbor address must be a link-local address.

Note: For point-to-multipoint interfaces, the `cost` parameter is the only applicable option.

Use the `no` parameter with this command to remove a configuration.

Command Syntax

```
ipv6 ospf neighbor X:X::X:X (instance-id <0-255>|)

ipv6 ospf neighbor X:X::X:X {cost <1-65535>} (instance-id <0-255>|)

ipv6 ospf neighbor X:X::X:X {poll-interval <0-4294967295>|priority <0-255>}
  (instance-id <0-255>|)

no ipv6 ospf neighbor X:X::X:X ({cost <1-65535>}|{poll-interval <0-
  4294967295>|priority <0-255>}|) (instance-id <0-255>|)
```

Parameters

`X:X::X:X`	Specify a neighbor IP address.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.
`cost`	Cost of the interface. This parameter does not apply to NBMA networks.
`<1-65535>`	Cost of the interface. The default is 10.
`poll-interval`	Dead neighbor polling interval.
`<0-4294967295>`	Dead neighbor polling interval in seconds. It is recommended to set this value much higher than the hello interval. The default is 120 seconds.
`priority`	Specify a priority. This parameter does not apply to point-to-multipoint interfaces.
`<0-255>`	Specify a priority <0-255>. The default is 1.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf neighbor 2000:500::1 cost 2 instance-id 3
```

ipv6 ospf network

Use this command to set an OSPFv3 network type.

Use the `no` option with this command to return to the default value.

Command Syntax

```
ipv6 ospf network (broadcast|non-broadcast|point-to-multipoint (non-
  broadcast|)|point-to-point) (instance-id <0-255>|)
```

```
no ipv6 ospf network (broadcast|non-broadcast|point-to-multipoint (non-
  broadcast|)|point-to-point) (instance-id <0-255>|)
```

Parameters

`broadcast`	Sets the network type to broadcast.
`non-broadcast`	Sets the network type to NBMA.
`point-to-multipoint`	Sets the network type to point-to-multipoint.
`non-broadcast`	Sets the network type to NBMA.
`point-to-point`	Sets the network type to point-to-point.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Default

Broadcast type

Command Mode

Interface mode

Examples

The following example shows how to set the network to point-to-point type on the eth0 interface.

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf network point-to-point
```

ipv6 ospf priority

Use this command to set the router priority for determining the designated router (DR) for the network.

A router with the higher router priority becomes the DR. If the priority is the same for two routers, the router with the higher router ID takes precedence.

Only routers with a nonzero priority value are eligible to become the designated or backup designated router. Configure router priority for broadcast or NBMA networks only and not for point-to-point networks.

Use the `no` parameter with this command to reset the value to default.

Command Syntax

```
ipv6 ospf priority <0-255>

ipv6 ospf priority <0-255> instance-id <0-255>

no ipv6 ospf (A.B.C.D) priority

no ipv6 ospf priority instance-id <0-255>
```

Parameters

`priority`	Specify the router priority of the interface.
`<0-255>`	Specify the router priority of the interface. The default is 1.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Default

The default priority is 1.

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf priority 127
```

ipv6 ospf restart grace-period

Use this command to enable the graceful restart feature and set the grace period for restarting the router.

If graceful restart is enabled, NSM is notified about the grace period. If the OSPF daemon unexpectedly shuts down, NSM sends this value to the OSPF daemon when it comes up again which uses this value to end the graceful state.

Use the `no` parameter with this command to revert to the default grace period.

Command Syntax

```
ipv6 ospf restart grace-period <1-1800>
no ipv6 ospf restart grace-period
```

Parameters

`grace-period`	Specify the grace period.
`<1-1800>`	Specify the grace period in seconds.

Default

The default grace period is 120 seconds.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ipv6 ospf restart grace-period 250
```

ipv6 ospf restart helper

Use this command to configure the helper behavior for graceful restart.

Use the `no` parameter with this command to revert to the default.

Command Syntax

```
ipv6 ospf restart helper {only-reload|only-upgrade|max-grace-period <1-1800>}

ipv6 ospf restart helper never (router-id A.B.C.D|)

no ipv6 ospf restart helper

no ipv6 ospf restart helper never

no ipv6 ospf restart helper {only-reload|only-upgrade|max-grace-period|never
  router-id (A.B.C.D|all)}
```

Parameters

`only-reload`	Help only on software reloads.
`only-upgrade`	Help only on software upgrades.
`max-grace-period`	Help only if received grace-period is less than this value.
`<1-1800>`	Help only if received grace-period is less than this value.
`never`	Prevent the neighbor from entering helper mode.
`router-id`	Router of neighbor to never to act as helper.
`A.B.C.D`	Router ID of neighbor to never to act as helper.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ipv6 ospf restart helper never router-id 1.1.1.1

#configure terminal
(config)#ipv6 ospf restart helper only-reload

#configure terminal
(config)#ipv6 ospf restart helper only-reload max-grace-period 200

#configure terminal
(config)#no ipv6 ospf restart helper never
```

ipv6 ospf retransmit-interval

Use this command to set the interval between retransmission of Link State Update packets. This interval is also used to retransmit DD packets and Link State Request packets.

After sending an LSA to a neighbor, the router keeps the LSA on the LS-retransmission list until it receives an acknowledgement. If the router does not receive an acknowledgment from the neighbor during the retransmit interval, it sends the LSA to the neighbor again.

Use the `no` parameter with this command to reset the interval to the default value.

Command Syntax

```
ipv6 ospf retransmit-interval <1-1800>

ipv6 ospf retransmit-interval <1-1800> instance-id <0-255>

no ipv6 ospf retransmit-interval

no ipv6 ospf retransmit-interval instance-id <0-255>
```

Parameters

`retransmit-interval`	Specify the interval.
`<1-1800>`	Specify the interval in seconds. The default is 5 seconds.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf retransmit-interval 3
```

ipv6 ospf transmit-delay

Use this command to set the estimated time it takes to transmit a Link State Update packet over the interface. The transmit-delay value is added to the LS age of LSAs and is advertised through this interface whenever the LSAs are transmitted.

Use the `no` parameter with this command to reset the delay to the default value.

Command Syntax

```
ipv6 ospf transmit-delay <1-1800>

ipv6 ospf transmit-delay <1-1800> instance-id <0-255>

no ipv6 ospf transmit-delay

no ipv6 ospf transmit-delay instance-id <0-255>
```

Parameters

`transmit-delay`	Specify the time to transmit a link-state update.
`<1-1800>`	Specify the time in seconds to transmit a link-state update. The default is 1 second.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 ospf transmit-delay 2
```

ipv6 router ospf

Use this command to enable OSPFv3 routing on an interface.

Specify the process ID to configure multiple instances of OSPFv3. When running a single instance of OSPFv3, you do not need to specify a instance ID.

When OSPFv3 receives a packet, it checks if the instance ID in the packet matches the instance ID of the receiving interface.

Use the `no` parameter with this command to disable OSPFv3 routing on an interface.

Command Syntax

```
ipv6 router ospf area (A.B.C.D|<0-4294967295>)
ipv6 router ospf area (A.B.C.D|<0-4294967295>) instance-id <0-255>
ipv6 router ospf area (A.B.C.D|<0-4294967295>) tag WORD
ipv6 router ospf area (A.B.C.D|<0-4294967295>) tag WORD instance-id <0-255>
ipv6 router ospf tag WORD area (A.B.C.D|<0-4294967295>)
ipv6 router ospf tag WORD area (A.B.C.D|<0-4294967295>) instance-id <0-255>
no ipv6 router ospf area (A.B.C.D|<0-4294967295>)
no ipv6 router ospf area (A.B.C.D|<0-4294967295>) instance-id <0-255>
no ipv6 router ospf area (A.B.C.D|<0-4294967295>) tag WORD
no ipv6 router ospf area (A.B.C.D|<0-4294967295>) tag WORD instance-id <0-255>
no ipv6 router ospf tag WORD area (A.B.C.D|<0-4294967295>)
no ipv6 router ospf tag WORD area (A.B.C.D|<0-4294967295>) instance-id <0-255>
```

Parameters

`area`	OSPF Area ID in IPv4 address format.
`A.B.C.D`	OSPF area ID in IP address format.
`<0-4294967295>`	OSPF area ID as a decimal value.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.
`tag`	Tag value to use as a “match” value for controlling redistribution via route maps.
`WORD`	Set the tag value.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 router ospf area 1 tag IPI instance-id 1
```

ipv6 te-metric

Use this command to set the traffic engineering metric for an interface.

The traffic engineering metric is used in OSPF-TE Link State Advertisements. If the traffic engineering metric is not set, the ipv6 ospf cost value for an interface is used in OSPF-TE Link State Advertisements.

Use the `no` parameter with this command to unset the traffic engineering metric for this interface.

Command Syntax

```
ipv6 te-metric <1-65535>
ipv6 te-metric <1-65535> instance-id <0-255>
no ipv6
no ipv6 te-metric instance-id <0-255>
```

Parameters

`te-metric`	Specify the TE metric.
`<1-65535>`	Specify the TE metric value. The default is 0.
`instance-id`	Specify the instance.
`<0-255>`	Specify the instance ID.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#ipv6 te-metric 6
```

max-concurrent-dd

Use this command to limit the number of Database Descriptors (DD) that can be processed concurrently.

This command is useful when a router's performance is affected from simultaneously bringing up several OSPFv3 adjacencies. This command limits the maximum number of DD exchanges that can occur concurrently per OSPFv3 instance, thus allowing for all of the adjacencies to come up.

Use the `no` option with this command to remove the limit.

Command Syntax

```
max-concurrent-dd <1-65535>
```

```
no max-concurrent-dd
```

Parameters

`<1-65535>`	Specify the number of DD processes.

Command Mode

Router mode

Examples

The following example set the `max-concurrent-dd` value to 4.

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#max-concurrent-dd 4
```

ospfv3 flood-reduction

Use this command is used to enable DoNotAge option in LSA sent on all OSPFv3 interfaces. When this command is configured, router can send/receive LSA with DNA option set and process them. This is applicable to all network types.

Use the `no` option with this command disable DoNotAge option in LSA sent on all OSPFv3 interfaces.

Command Syntax

```
ospfv3 flood-reduction
```

```
no ospfv3 flood-reduction
```

Parameters

None

Command Mode

Router mode

Examples

The following example set the `max-concurrent-dd` value to 4.

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#ospfv3 flood-reduction

(config-router)#no ospfv3 flood-reduction
```

passive-interface

Use this command to suppress sending Hello packets on all interfaces, or on a specified interface.

This command configures OSPFv3 on simplex Ethernet interfaces. Since a simplex interface represents only one network segment between two devices, configure the transmitting interface as a passive interface. This ensures that OSPFv3 does not send hello packets for the transmitting interface. Both the devices can see each other via the hello packet generated for the receiving interface.

Use the `no` form with this command to resume sending `hello` packets on all interfaces, or on a specified interface.

Command Syntax

```
passive-interface (IFNAME |)
no passive-interface (IFNAME |)
```

Parameters

`IFNAME`	Specify an interface name

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#passive-interface eth0
```

redistribute

Use this command to import routes from other routing protocols, or from another OSPF instance, into OSPFv3 AS-external-LSAs.

OSPFv3 advertises routes learned from other routing protocols or from other OSPF instances, including static or connected routes. Each injected prefix is put into the AS-external-LSA with a specified metric and metric-type.

Use the `no` parameter with this command to stop redistribution.

Command Syntax

```
redistribute (kernel|connected|static|rip|bgp|isis|ospf (WORD|<1-65535>|)) {metric
  <0-16777214>|metric-type (1|2)|?route-map WORD|tag <0-4294967295>}

no redistribute(kernel|connected|static|rip|bgp|isis|ospf (WORD|))
```

Parameters

`kernel`	Specify kernel routes.
`connected`	Specify connected routes.
`static`	Specify static routes.
`rip`	Specify RIP routes.
`bgp`	Specify BGP routes.
`isis`	Specify IS-IS routes.
`ospf`	Specify OSPF routes.
`WORD`	Specify an OSPFv3 Process Tag
`<1-65535>`	Specify an OSPF process identifier
`metric`	Specify the external metric.
`<0-16777214>`	Specify the external metric.
`metric-type`	Specify the external metric-type (see RFC 3101):
`1`	Set OSPF External Type 1 metric.
`2`	Set OSPF External Type 2 metric.
`route-map`	Specify a route map reference.
`WORD`	Specify name of the route-map.
`tag`	Tag value to use as a “match” value for controlling redistribution via route maps
`<0-4294967295>`	Specify the route tag.

Command Mode

Router mode

Router address-family mode

Examples

The following example shows redistribution of BGP routes into the OSPFv3 routing table, with the metric as 10.

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#redistribute bgp metric 10 metric-type 1
```

The following example shows redistribution of static IPv4 routes into the OSPFv3 routing table.

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#address-family ipv4 unicast
(config-router-af)#redistribute static
(config-router-af)#exit-address-family
```

restart ipv6 ospf graceful

Use this command to restart OSPFv3 gracefully.

After this command is executed, the router immediately shuts down. NSM is notified that OSPF has shut down gracefully. NSM preserves routes installed by OSPF until the grace period expires.

Command Syntax

```
restart ipv6 ospf graceful (grace-period <1-1800>|)
```

Parameters

`grace-period`	Specify a grace period.
`<1-1800>`	Specify a grace period in seconds.

Command Mode

Privileged Exec mode and Exec mode

Examples

```
#restart ipv6 ospf graceful grace-period 200
```

router-id

Use this command to specify a router ID for the OSPFv3 process.

Configure each router with a unique router-id. In an OSPFv3 router process that has active neighbors, a new router-id is used at the next reload or when you start the OSPFv3 manually.

Use the `no` form of this command to force OSPFv3 to stop the routing functionality.

Command Syntax

```
router-id A.B.C.D
no router-id (A.B.C.D|)
```

Parameters

`A.B.C.D`	Specify the router ID in IPv4 address format.

Command Mode

Router mode

Examples

The following example shows a fixed router ID `43.3.3.3`

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#router-id 43.3.3.3
```

router ipv6 ospf

Use this command to initiate OSPFv3 routing process and enter Router mode to configure OSPFv3 routing process. For making the OSPFv3 routing process functional, you must specify OSPFv3 process tag in router mode and enable OSPFv3 on at least one interface. OSPFv3 is only enabled on interfaces where OSPFv3 process tag matches the tag specified using ipv6 router ospf area command in Interface mode.

Use the `no` parameter with this command to remove OSPFv3 process.

Command Syntax

```
router ipv6 ospf
router ipv6 ospf WORD
router ipv6 vrf ospf WORD
no router ipv6 ospf
no router ipv6 ospf WORD
no router ipv6 vrf ospf WORD
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.
`vrf`	Enable an IPv6 VRF routing process

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#router ipv6 ospf IPI
(config-router)#
```

show debugging ipv6 ospf

Use this command to display the OSPFv3 debugging options.

Command Syntax

```
show debugging ipv6 ospf
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Examples

```
#show debugging ipv6 ospf

OSPFv3 debugging status:
 OSPFv3 all packet debugging is on
 OSPFv3 all NFSM debugging is on
#
```

show ipv6 ospf

Use this command to display global and area information about OSPFv3.

Command Syntax

```
show ipv6 ospf (WORD|)
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.

Command Mode

Privileged Exec mode and Exec Mode

Example

```
#show ipv6 ospf
Routing Process "OSPFv3 0" with ID 1.2.3.4
SPF schedule delay 5 secs, Hold time between SPFs 10 secs Minimum LSA interval
5 secs,
Minimum LSA arrival 1 secs Number of external LSA 3. Checksum Sum 0x2CD6F
Number of areas
in this router is 1
Area BACKBONE(0)
Number of interfaces in this area is 1
SPF algorithm executed 3 times
Number of LSA 4. Checksum Sum 0x2A6AC
```

show ipv6 ospf database

Use this command to display information in the OSPFv3 Link State database.

Command Syntax

```
show ipv6 ospf database
show ipv6 ospf database (self-originate|max-age|adv-router A.B.C.D|)
show ipv6 ospf database (router|network|inter-prefix|inter-router|external|nssa-
  external|link|intra-prefix|te|grace)
show ipv6 ospf database (router|network|inter-prefix|inter-router|external|nssa-
  external|link|intra-prefix|te|grace) (self-originate|adv-router A.B.C.D|)
show ipv6 ospf database (router|network|inter-prefix|inter-router|external|nssa-
  external|link|intra-prefix|te|grace) A.B.C.D (self-originate|adv-router A.B.C.D|)
show ipv6 ospf WORD database
show ipv6 ospf WORD database (router|network|inter-prefix|inter-
  router|external|nssa-external|link|intra-prefix|te|grace)
show ipv6 ospf WORD database (router|network|inter-prefix|inter-
  router|external|nssa-external|link|intra-prefix|te|grace) adv-router A.B.C.D
```

Parameters

`self-originate`	Self-originated link states
`max-age`	LSAs in MaxAge list
`adv-router`	Advertising router as an IP address.
`A.B.C.D`	Router ID of the advertising router.
`router`	Router LSAs.
`network`	Network LSAs.
`inter-prefix`	Inter-Area-Prefix LSAs.
`inter-router`	Inter-Area-Router LSAs.
`external`	AS external LSAs.
`nssa-external`	NSSA LSAs.
`link`	Link LSAs.
`intra-prefix`	Intra-Area-Prefix LSAs.
`te`	Intra-area TE LSAs.
`grace`	Grace LSAs.
`A.B.C.D`	Link state ID as an IP address.
`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.

Command Mode

Privileged Exec mode and Exec Mode

Example

This is a sample output from the `show ipv6 ospf database grace` command displaying the database summary for a specific LSA in the OSPFv3 database:

```
#show ipv6 ospf database grace
OSPFv3 Router with ID (45.45.45.1) (Process *null*)

 Grace-LSA (Interface eth1)
  LS age: 2
  LS Type: Grace LSA
  Link State ID: 0.0.0.3
  Advertising Router: 99.99.99.1
  LS Seq Number: 0x80000001
  Checksum: 0x9046
  Length: 36

#show ipv6 ospf database
Link ID         ADV Router        Age           Seq#            Checksum Link
count
0.0.0.4         192.168.56.101  953 (DNA) 0x80000004  0xf078      1
```

show ipv6 ospf interface

Use this command to display OSPFv3 interface information.

Command Syntax

```
show ipv6 ospf interface
show ipv6 ospf interface IFNAME
```

Parameters

`IFNAME`	The name of the interface.

Command Mode

Privileged Exec mode and Exec mode

Usage

This is a sample output from the `show ipv6 ospf interface` command displaying the OSPFv3 interface information:

```
#show ipv6 ospf interface
eth0 is up, line protocol is up
  Interface ID 3, Instance ID 0, Area 0.0.0.0
  IPv6 Link-Local Address fe80::248:54ff:fec0:f32d/10
 Router ID 1.2.3.4, Network Type BROADCAST, Cost: 10
 Transmit Delay is 1 sec, State Backup, Priority 1
 Designated Router (ID) 5.6.7.8
Interface Address fe80::203:47ff:fe4c:776e
 Backup Designated Router (ID) 1.2.3.4
Interface Address fe80::248:54ff:fec0:f32d
 Timer interval configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:01
 Neighbor Count is 1, Adjacent neighbor count is 1
```

If Hello Suppression is enabled

```
RTR_B#show ipv6 ospf interface
eth1 is up, line protocol is up
  Interface ID 3
  IPv6 Prefixes
    fe80::5054:ff:fef3:f166/64 (Link-Local Address)
    2001::2/64
  OSPFv3 Process (1), Area 0.0.0.0, Instance ID 66
    Router ID 2.2.2.2, Network Type P2MP-NBMA, Cost: 1, TE Metric: 1
    Reduce LSA Flooding
    Transmit Delay is 1 sec, State Point-To-Point, Priority 1
    Timer interval configured, Hello 30, Dead 120, Wait 120, Retransmit 5
      Hello due in 00:00:32
    Neighbor Count is 1, Adjacent neighbor count is 1
    Suppress hello for 1 neighbor(s)
    Hello received 2 sent 3, DD received 4 sent 6
    LS-Req received 1 sent 1, LS-Upd received 7 sent 4
    LS-Ack received 0 sent 3, Discarded 0
```

show ipv6 ospf neighbor

Use this command to display information about an OSPFv3 neighbor.

Command Syntax

```
show ipv6 ospf neighbor
show ipv6 ospf WORD neighbor
show ipv6 ospf neighbor INTERFACE
show ipv6 ospf WORD neighbor INTERFACE
show ipv6 ospf neighbor INTERFACE detail
show ipv6 ospf WORD neighbor INTERFACE detail
show ipv6 ospf neighbor detail
show ipv6 ospf WORD neighbor detail
show ipv6 ospf neighbor A.B.C.D
show ipv6 ospf WORD neighbor A.B.C.D
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.
`INTERFACE`	Display the name of the Interface
`A.B.C.D`	Neighbor IP address.
`detail`	Details of neighbors

Command Mode

Privileged Exec mode and Exec Mode

Example

This is a sample output from the show ipv6 ospf neighbor command displaying information about the OSPFv3 neighbor.

```
#show ipv6 ospf neighbor
OSPFv3 Process (*null*)
Neighbor ID Pri State Dead Time Interface Instance ID
5.6.7.8 1 Full/DR 00:00:38 eth0 0
```

If Hello Suppression is enabled

```
RTR_B#
RTR_B#show ipv6 ospf neighbor
OSPFv3 Process (1)
Neighbor ID     Pri   State          Dead Time   Interface  Instance ID
1.1.1.1           1   Full/ -        inactive    eth1       0
4.4.4.4           1   Full/DR        00:00:40    eth2       0
4.4.4.4           1   Full/ -        inactive    VLINK1     0
RTR_B#

RTR_B#
RTR_B#show ipv6 ospf neighbor detail
```

```
Neighbor 1.1.1.1, interface address fe80::5054:ff:feb3:d3bc
   In the area 0.0.0.0 via interface eth1
   Neighbor priority is 1, State is Full, 7 state changes
   Hello is suppressed
   DR is 0.0.0.0 BDR is 0.0.0.0
   Options is 0x000133 (AF|*|*|DC|R|-|-|E|V6)
   Dead timer due in inactive
   Database Summary List 0
   Link State Request List 0
```

show ipv6 ospf route

Use this command to display the IPv6 routing table for OSPFv3.

Command Syntax

```
show ipv6 ospf route
show ipv6 ospf WORD route
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.

Command Mode

Privileged Exec mode and Exec mode

Example

The routes can be displayed in two ways. One shows each routing entry in a single-line, the other in multi-line. By default, the routing table is displayed in the multi-line format, for a single line display use the ipv6 ospf display route single-line. The following is a sample output for a routing display in single-line and multi-line formats:

```
#show ipv6 ospf route
Destination Metric Next-hop
3ffe:1:1::/48 10 directly connected, eth0
3ffe:2:1::/48 10 directly connected, eth0
3ffe:2:2::/48 10 directly connected, eth0
3ffe:3:1::/48 10 directly connected, eth0
3ffe:3:2::/48 10 directly connected, eth0
3ffe:3:3::/48 10 directly connected, eth0
E2 3ffe:100:1::1/128 10/20 via fe80::203:47ff:fe4c:776e, eth0
E2 3ffe:100:2::1/128 10/20 via fe80::203:47ff:fe4c:776e, eth0
E2 3ffe:100:3::1/128 10/20 via fe80::203:47ff:fe4c:776e, eth0
IA 3ffe:101:1::/48 20 via fe80::203:47ff:fe4c:776e, eth0
IA 3ffe:101:2::/48 20 via fe80::203:47ff:fe4c:776e, eth0
IA 3ffe:101:3::/48 20 via fe80::203:47ff:fe4c:776e, eth0

#show ipv6 ospf route
Destination Metric
Next-hop Interface
3ffe:1:1::/48 10
-- eth0
3ffe:2:1::/48 10
-- eth0
3ffe:2:2::/48 10
-- eth0
3ffe:3:1::/48 10
-- eth0
3ffe:3:2::/48 10
-- eth0
3ffe:3:3::/48 10
-- eth0
E2 3ffe:100:1::1/128 10/20
fe80::203:47ff:fe4c:776e eth0
```

show ipv6 route fast-reroute

Use this command to display loop-free alternate routes with alternate next hops.

Command Syntax

```
show ipv6 route fast-reroute
```

Parameters

None

Command Mode

Privileged Exec mode

Usage

```
#show ipv6 route fast-reroute
```

show ipv6 ospf route fast-reroute

Use this command to display Loop-free alternate routes in OSPFv3 table with alternate next hops.

Command Syntax

```
show ipv6 ospf route fast-reroute
```

Parameters

None

Command Mode

Privileged Exec mode

Usage

```
#show ipv6 ospf route fast-reroute
```

show ipv6 ospfv3 topology

Use this command to display information about OSPFv3 topology for each area.

Command Syntax

```
show ipv6 ospfv3 topology
show ipv6 ospfv3 WORD topology
show ipv6 ospfv3 topology area (A.B.C.D|<0-4294967295>)
show ipv6 ospfv3 WORD topology area (A.B.C.D|<0-4294967295>)
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.
`area`	OSPFv3 area ID
`A.B.C.D`	OSPFv3 Area ID in IPv4 address format.
`<0-4294967295>`	OSPFv3 Area ID as a decimal value.

Command Mode

Privileged Exec mode and Exec Mode

Example

```
#show ipv6 ospfv3 topology
OSPFv3 paths to Area (0.0.0.0) routers
Router ID Bits Metric Next-Hop Interface
1.2.3.4 --
5.6.7.8 E 10 5.6.7.8 eth0
```

show ipv6 ospf virtual-links

Use this command to display information about OSPFv3 virtual-links.

Command Syntax

```
show ipv6 ospf virtual-links

show ipv6 ospf WORD virtual-links
```

Parameters

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.

Command Mode

Privileged Exec mode and Exec Mode

Example

```
#show ipv6 ospf virtual-links
Virtual Link VLINK1 to router 5.6.7.8 is up
Transit area 0.0.0.1 via interface eth0, instance ID 0
Local address 3ffe:1234:1::1/128
Remote address 3ffe:5678:3::1/128
Transmit Delay is 1 sec, State Point-To-Point,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:01
Adjacency state Up
```

If Hello Suppression is enabled

```
RTR_B#show ipv6 ospf virtual-links
Virtual Link VLINK1 to router 4.4.4.4 is up
  Transit area 0.0.0.1 via interface eth2, instance ID 0
  Hello suppression Enabled
  DoNotAge LSA allowed
  Local address 2002::1/128
  Remote address 2002::2/128
  Transmit Delay is 1 sec, State Point-To-Point,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in inactive
    Adajcency state Full
RTR_B#
RTR_B#
```

show ipv6 vrf

Use this command to list information about VRFs.

Command Syntax

```
show ipv6 vrf
```

Parameter

None

Command Mode

Exec mode and Privileged Exec mode

Examples

The following is a sample output of the `show ipv6 vrf` command displaying VRF information:

```
#show ipv6 vrf
Name                Interfaces

qa                  eth0
you                 eth1
ipi                 eth2
```

snmp restart ospf6

Use this command restart SNMP in OSPFv3

Command Syntax

```
snmp restart ospf6
```

Parameter

None

Command Mode

Configure mode

Examples

```
#snmp restart ospf6
```

summary-address

Use this command to summarize or suppress external routes with the specified address range.

An address range is a pairing of a starting address and a mask that is almost the same as IP network number. For example:

- If the specified IPV6 address range is 2020:100:100:2000::/53, it matches 2020:100:100:2222::/64, 2020:100:100:2666::/64 and so on.
- If the specified IPV4 address range is 192.168.0.0/255.255.240.0, it matches 192.168.1.0/24, 192.168.4.0/22, 192.168.8.128/25 and so on.

Redistributing routes from other protocols into OSPF requires the router to advertise each route individually in an external LSA. Use this command to advertise one summary route for all redistributed routes covered by a specified network address and mask. This minimizes the size of the OSPF link state database.

Use the `no` form this command to remove summary addresses.

Command Syntax

```
summary-address X:X::X:X/M (not-advertise|tag <0-4294967295>|)
summary-address A.B.C.D/M (not-advertise|tag <0-4294967295>|)
no summary-address X:X::X:X/M
no summary-address A.B.C.D/M
no summary-address X:X::X:X/M (not-advertise|tag (<0-4294967295>|))
no summary-address A.B.C.D/M (not-advertise|tag (<0-4294967295>|))
```

Parameters

`X:X::X:X/M`	The range of addresses given as IPv6 starting address and a mask.
`A.B.C.D/M`	The range of addresses given as IPv4 starting address and a mask.
`not-advertise`	Suppress routes that match the range.
`tag`	Tag value to use as a “match” value for controlling redistribution via route maps.
`<0-4294967295>`	Set a tag value. The default is 0.

Command Mode

Router mode

Router address-family mode

Examples

The following example uses the `summary-address` command to aggregate external LSAs that match the network 172.16.0.0/24 and assign a tag value of 3.

```
#configure terminal
(config)#router ipv6 ospf
(config-router)#summary-address 2020:100:100:2000::/53 tag 3
```

CHAPTER 4

OSPF VPN Commands

This chapter provides an alphabetized reference of the OSPF VPN commands. It includes the following commands:

- capability vrf-lite on page 206
- router ospf vrf on page 207
- show ip vrf on page 208

capability vrf-lite

Use this command to enable the `vrf-lite` capability for an OSPF instance.

Use the `no` parameter with this command to disable the same for an OSPF instance.

Command Syntax

```
capability vrf-lite

no capability vrf-lite
```

Parameters

None

Default

Disabled

Command Mode

Router mode

Example

```
#configure terminal
(config)#router ospf 100
(config-router)#capability vrf-lite
(config)#router ospf 100
(config-router)#no capability vrf-lite
```

router ospf vrf

Use this command to specify a VRF instance in OSPF. To use this command, you must first create a VRF Name in the NSM using the `ip vrf` command. Associate the same name with the OSPF instance using this command.

Command Syntax

```
router ospf <1-65535> WORD
```

Parameters

`<1-65535>`	Routing process ID; should be unique for each routing process.
`WORD`	Name of the VRF to associate with this OSPF instance.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#router ospf 100 ipi
(config-router)#
```

show ip vrf

Use this command to list information about VRFs.

Command Syntax

```
show ip vrf
show ip vrf WORD
```

Parameter

`WORD`	Specify the VRF name.

Command Mode

Exec mode and Privileged Exec mode

Examples

The following is a sample output of the `show ip vrf` command displaying the VRF information and the process IDs of OSPF instances:

```
#show ip vrf
Name                     OSPF PID             Interface List
------------------------ -------------------- ----------------------
qa                       3                    eth0
you                      4                    eth1
ipi                      5                    eth2
```

The following is a sample output of the `show ip vrf NAME` command displaying VRF information for VRF instance named `ipi`.

```
#show ip vrf ipi
VRF ipi; (id=3); OSPF PID is 5
```

CHAPTER 5 CSPF-TE Commands

This chapter provides an alphabetized reference for each of the CSPF-TE commands. It includes the following commands:

- capability te
- cspf default-retry-interval
- cspf tie-break
- debug cspf
- show cspf ipv6 lsp
- show cspf lsp
- show debugging cspf
- show debugging ipv6 cspf
- show ip ospf te-database
- show ipv6 ospf te-database

capability te

Use this command to enable the traffic engineering feature for an OSPFv2 or OSPFv3 instance. ZebOS-XP generates traffic engineering LSAs for each link for which it is configured.

Use the `no` parameter form of command to disable the traffic engineering feature.

Command Syntax

OSPFv2:

```
capability (te|traffic-engineering)
```

```
no capability (te|traffic-engineering)
```

OSPFv3:

Note: This command is not supported for ZebIC releases.

```
capability te
```

```
no capability te
```

Parameters

None

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#capability te

#configure terminal
(config)#router ipv6 ospf
(config-router)#no capability te
```

cspf default-retry-interval

Use this command to set the default route computation retry interval for an OSPFv2 or OSPFv3 instance. This value is used for route recomputation (in the case of computation failures) and no retry interval is specified for a given LSP.

Use the `no` parameter with this command to unset default route computation retry interval.

Note: OSPFv3 command is not supported for ZebIC releases.

Command Syntax

```
cspf default-retry-interval <1-3600>
no cspf default-retry-interval
```

Parameter

`default-retry-interval`	The retry interval.
`<1-3600>`	The retry interval in seconds. The default is 10 seconds.

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#cspf default-retry-interval 720

#configure terminal
(config)#router ipv6 ospf
(config-router)#cspf default-retry-interval 720
```

cspf tie-break

Use this command to set the tie-break method for an OSPFv2 or OSPFv3 instance. This selects a link (during route computation) when more than one candidate link satisfies all the route constraints and the associated cost and hop limit link attributes are equal.

Use the `no` parameter with this command to unset tie-break method.

Note: OSPFv3 command is not supported for ZebIC releases.

Command Syntax

```
cspf tie-break (random|least-fill|most-fill)
no cspf tie-break
```

Parameters

`random`	Pick any path at random. This method places an equal number of LSPs on each link without taking into account the available bandwidth ratio. This is the default tie-break method.
`least-fill`	Pick the path with the largest minimum available bandwidth ratio. This method equalizes the reservation on each link.
`most-fill`	Pick the path with the smallest minimum available bandwidth ratio. This method uses one link until it is completely full and then uses the next link.

Default

By default, the tie-break method is set to `random`.

Default

Enabled

Command Mode

Router mode

Examples

```
#configure terminal
(config)#router ospf 100
(config-router)#cspf tie-break least-fill

#configure terminal
(config)#router ipv6 ospf
(config-router)#no cspf tie-break
```

debug cspf

Use this command to enable the CSPF debugging options in OSPFv2.

Use the `no` parameter with this command to disable debugging.

Command Syntax

```
debug cspf events
debug cspf hexdump

no debug cspf events
undebug cspf events
no debug cspf hexdump
undebug cspf hexdump
```

Parameters

`events`	Debug CSPF event information.
`hexdump`	Debug CSPF message hex dumps.

Command Mode

Exec and Privileged Exec modes

Examples

Following is a sample output section from this command. Some of the lines in this sample display have wrapped, please note that in the actual output the lines may not wrap.

```
#debug cspf hexdump

#debug cspf events

#terminal monitor

#2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_recv: Delete message received
from client 2
2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_process: Client = 2, lspid =
0x8000
2002/03/19 15:17:29 OSPF: cspf_api_msg_request_recv: Route request message
received from client 2
2002/03/19 15:17:29 OSPF: cspf_api_msg_request_process: Client = 2, request
type = 1, ingress = 192.40.40.3, egress = 192.20.20.1, lspid = 0x8000
2002/03/19 15:17:29 OSPF: cspf_compute_route: lspid = 0x8000, setup priority =
7, ingress = 192.40.40.3, egress = 192.20.20.1, hop limit constraint = 255,
bandwidth constraint = 125000.000000, include mask = 0x0, exclude mask = 0x0,
path constraint count = 0
....
2002/03/19 15:17:34 OSPF: cspf_process_network_lsa_vertex: Vertex id =
192.20.20.2, dest addr = 192.20.20.1
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_recv: LSP Established
message received from client 2
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_process: Client = 2, lspid
= 0x8000, metric = 0
```

show cspf ipv6 lsp

Use this command to display information about all the LSPs stored in the CSPF database for all OSPFv3 instances.

Note: This command is not supported for ZebIC releases.

Command Syntax

```
show cspf ipv6 lsp
```

Command mode

Exec and Privileged Exec mode

Parameters

None

Example

Following is a sample output from the `show cspf ipv6 lsp` command.

```
#show cspf ipv6 lsp
   Lsp Id          : 0x650065
   Ingress         : 2001:5152::1
   Egress          : 2001:5154::1
   Ext Tunnel ID   : 2001:5152::1
   LSP Type        : 0
   Client ID       : 3
   State           : 2
   Setup Priority  : 7
   Hold Priority   : 0
   Hop Limit       : 255
   Include Mask    : 0x0
   Exclude Mask    : 0x0
   LSP Metric      : 0
   Computed ERO    :
       3ffe:1::2
       3ffe:2::2
```

show cspf lsp

Use this command to display information about all the LSPs stored in CSPF for OSPFv2.

Command Syntax

```
show cspf lsp
```

Parameters

None

Command Mode

Exec and Privileged Exec modes

Example

Following is a sample output from the `show cspf lsp` command.

```
#show cspf lsp
Lsp Id             : 0xbfe0
   Client ID       : 2
   State           : 2
   Ingress         : 192.40.40.3
   Egress          : 192.20.20.1
   Setup Priority  : 7
   Hold Priority   : 0
   Bandwidth       : 10.000 Kbits/s
   Hop Limit       : 255
   Retry Interval  : 5
   Retry Limit     : 3
   LSP Metric      : 20
   Computed ERO    :
       192.40.40.2
       192.20.20.1
```

show debugging cspf

Use this command to display the CSPF debugging options in OSPFv2.

Command Syntax

```
show debugging cspf
```

Parameters

None

Command Mode

Exec and Privileged Exec modes

Example

Following is a sample output section from the `show debugging cspf` command. Some of the lines in this sample display have wrapped, please note that in the actual output the lines may not wrap.

```
#show debugging cspf
CSPF debugging status:
CSPF events debugging is on

#terminal monitor
#2002/03/27 17:09:21 OSPF: cspf_api_msg_delete_recv: Delete message received
from client 2
2002/03/27 17:09:21 OSPF: cspf_api_msg_delete_process: Client = 2, lspid =
0x8000
2002/03/27 17:09:21 OSPF: cspf_api_msg_request_recv: Route request message
received from client 2
...
2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id =
192.10.10.9, dest addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id =
192.20.20.2, dest addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_api_msg_established_recv: LSP Established
message received from client 2
2002/03/27 17:09:21 OSPF: cspf_api_msg_established_process: Client = 2, lspid
= 0x8000, metric = 0
```

show debugging ipv6 cspf

Use this command to display the CSPF debugging options in OSPFv3.

Note: This command is not supported for ZebIC releases.

Command Syntax

```
show debugging ipv6 cspf
```

Parameters

None

Command Mode

Exec and Privileged Exec modes

Example

```
#show debugging ipv6 cspf

CSPF debugging status:
#
```

show ip ospf te-database

Use this command to display traffic engineering (TE) information in OSPFv2.

Command Syntax

```
show ip ospf (<0-65535>|) te-database
```

Parameter

`<0-65535>`	Display the process ID number.

Command Mode

Exec and Privileged Exec modes

Example

Following is a sample output from the `show ip ospf te-database` command.

```
#show ip ospf te-database
LS Age                        : 2
Options                       : 0x2
LS Type                       : 10 (Area-Local Opaque-LSA)
Opaque  Type                  : 1
Instance                      : 0xffff
Advertising Router            : 192.10.10.1
LS Sequence Number            : 0x8000005a
LS Checksum                   : 0xfb4f
Length                        : 28
Router Address                : 192.10.10.1
-----------------------------------------------------------------
LS Age                        : 2
Options                       : 0x2
LS Type                       : 10 (Area-Local Opaque-LSA)
Opaque  Type                  : 1
Instance                      : 0x3
Advertising Router            : 192.10.10.1
LS Sequence Number            : 0x8000002e
LS Checksum                   : 0x3ef
Length                        : 124
Link Type                     : Multiaccess
Link ID                       : 192.20.20.2
Local Interface Addresses     :        192.20.20.1
Remote Interface Addresses    :      192.20.20.2
Te Metric                     : 10
Max Bandwidth                 : 10000.000 Kbits/s
Max Reservable Bandwidth      : 1000.000 Kbits/s
Available Bandwidth           :
    Priority 0                : 1000.000 Kbits/s
    Priority 1                : 1000.000 Kbits/s
    Priority 2                : 1000.000 Kbits/s
    Priority 3                : 1000.000 Kbits/s
    Priority 4                : 1000.000 Kbits/s
    Priority 5                : 1000.000 Kbits/s
```

show ipv6 ospf te-database

Use this command to display traffic engineering (TE) information in OSPFv3.

Note: This command is not supported for ZebIC releases.

Command Syntax

```
show ipv6 ospf (WORD|) te-database
```

Parameter

`WORD`	Tag value to use as a “match” value for controlling redistribution via route maps.

Command Mode

Privileged Exec mode

Example

Following is a sample output from the `show ipv6 ospf te-database` command.

```
#show ipv6 ospf te-database
LS Age                         : 12
LS Type                        : 10 (Intra-Area-Te-LSA)
Instance                       : 0x3
Advertising Router             : 4.4.4.4
LS Sequence Number             : 0x8000004d
LS Checksum                    : 0xf58a
Length                         : 164
Router Address                 : 2001:5152::1
-----------------------------------------------------------------
LS Age                         : 12
LS Type                        : 10 (Intra-Area-Te-LSA)
Instance                       : 0x3
Advertising Router             : 4.4.4.4
LS Sequence Number             : 0x8000004d
LS Checksum                    : 0xf58a
Length                         : 164
Link Type                      : Multiaccess
Neighbor Interface ID          : 135450284
Neighbor Router ID             : 4.4.4.4
Local Interface Addresses      :  3ffe:1::1
Remote Interface Addresses     :
              ::
Te Metric                      : 0
Max Bandwidth                  : 100000.000 Kbits/s
Max Reservable Bandwidth       : 100000.000 Kbits/s
Available Bandwidth            :
    Priority 0                 : 100000.000 Kbits/s
    Priority 1                 : 100000.000 Kbits/s
    Priority 2                 : 100000.000 Kbits/s
    Priority 3                 : 100000.000 Kbits/s
    Priority 4                 : 100000.000 Kbits/s
    Priority 5                 : 100000.000 Kbits/s
    Priority 6                 : 100000.000 Kbits/s
    Priority 7                 : 100000.000 Kbits/s
```

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