



Citrix[®] ADC Routing

OSPF Command Reference

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About This Command Reference

Network administrators and application developers who install and configure ZebOS® IP routing software should use this Command Reference.

This Reference contains the following information:

- An overview of the ZebOS Command Line Interface.
- The complete command reference for ZebOS Open Shortest Path First (OSPF) protocol.

Users can use a telnet session to log onto the OSPF daemon and use the CLI described in this Command Reference to issue commands to configure and to get information about the OSPF daemon.

Command Line Interface Primer

The ZebOS® Command Line Interface (CLI) is a text-based facility conforming to industry standards. Many of the commands may be used in scripts to automate configuration tasks. Each CLI command is usually associated with a specific function or a common function performing a specific task. Multiple users can telnet and issue commands using the Exec mode and the Privileged Exec mode. For ZebOS versions prior to 7.4, only one user is allowed to use the Configure mode at a time. For ZebOS versions 7.4 and later, multiple users are allowed to simultaneously use the Configure mode.

The IMI (Integrated Management Interface) Shell gives users and administrators the ability to issue commands to several daemons from a single telnet session.

Definitions

token	A non-character, non-numeric symbol: {}, {}, (), <>, , ?, >, .., =
parameter	An UPPERCASE term for which the user substitutes input.
keyword	A lowercase term that the user types exactly as shown.

Command Line Interface Help

The ZebOS CLI contains a text-based help facility. Access this help by typing in a full or partial command string then typing a question mark "?". The ZebOS CLI displays the command keywords or parameters along with a short description.

For example, at the CLI command prompt, type

```
ZebOS> show ? (the CLI does not display the question mark).
```

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

```
ZebOS# show
  debugging      Debugging functions (see also 'undebug')
  history        Display the session command history
  ip             IP information
```

memory	Memory statistics
route-map	route-map information
running-config	running configuration
startup-config	Contents of startup configuration
version	Displays ZebOS version

If the ? is typed in the middle of a keyword, ZebOS CLI displays help for that keyword only.

```
ZebOS> show de? (the CLI does not display the question mark).
debugging Debugging functions (see also 'undebug')
```

If the ? is typed in the middle of a keyword but the incomplete keyword matches several other keywords, ZebOS displays help for all matching keywords.

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

Syntax Help

Command Completion

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

```
ZebOS> sh
```

Press TAB. The CLI shows:

```
ZebOS> show
```

If the command or parameter partial spelling is ambiguous, the ZebOS CLI displays the choices that match the abbreviation. Type `show i` and press TAB. The CLI shows:

```
ZebOS> show i
interface ip isis
ZebOS> show i
```

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

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

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

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

The CLI displays the only parameter associated with this command, the `IFNAME` parameter. For more information on the output modifiers and output redirection, see the *Special Tokens for Show Commands* section.

Command Abbreviations

The ZebOS CLI accepts abbreviations for commands. For example,

```
sh in eth0
```

is an abbreviation for the `show interface` command.

Command Line Errors

Any unknown spelling variation causes the command line parser to display in response to the ?, the error `Unrecognized command`. The parser re-displays the command as last entered. When the user presses the enter key after typing an invalid command, the parser displays:

```
ZebOS(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 it displays this message:

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

Some commands are too long for the display line and can wrap in mid-parameter or mid-keyword:

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

Command Reference Primer

Typographic Conventions

The following table lists typographic conventions for command syntax descriptions.

Convention	Name	Description	Example
Monospaced font	Command	Represents command strings entered on a command line and sample source code.	<code>show ip ospf</code>
Proportional font	Description	Gives specific details about a parameter.	<code>advertise</code> Advertises this range
UPPERCASE	Variable parameter	Indicates user input. Values to be entered according to the descriptions that follow. Each uppercased token expands into one or more other tokens.	<code>area</code> AREAID <code>range</code> ADDRESS
lowercase	Keyword parameter	Indicates keywords. Values to be entered exactly as shown in the command description.	<code>show ip ospf</code>
	Vertical bar	Delimits choices; One to be selected from the list. Not to be entered as part of the command.	<code>A.B.C.D <0-4294967295></code>
()	Parentheses	Encloses optional parameters. None or only one to be chosen. Not to be entered as part of the command.	<code>(A.B.C.D <0-4294967295>)</code>
{ }	Braces	Encloses optional parameters. None, one or more than one to be chosen. Not to be entered as part of the command.	<code>{priority <0-255 poll-interval <1-65535>}</code>
[]	Square brackets	Encloses optional parameters. Choose one. Not to be entered as part of the command.	<code>[parm2 parm2 parm3]</code>
?	Question mark	Used with the square brackets to limit the immediately following token to one occurrence. Not to be entered as part of the command.	<code>[parm1 parm2]?parm3</code> expands to <code>parm1 parm3 parm1 parm2</code> (with <code>parm3</code> occurring once)
< >	Angle brackets	Enclose a numeric range, endpoints inclusive. Not to be entered as part of the command.	<code><0-65535></code>
=	Equal sign	Separates the variable from explanatory text. Not to be entered as part of the command.	<code>PROCESSID = <0-65535></code>
.	Dot (period)	Allows the repetition of the element that immediately follows it multiple times. Not to be entered as part of the command.	.AA:NN can be expanded to: <code>1:01 1:02 1:03</code> .
A.B.C.D	IP address	An IPv4-style address.	<code>10.0.11.123</code>
X:X::X:X	IP address	An IPv6-style address.	3ffe:506::1 , where the <code>::</code> represents all 0s for those address components not explicitly given.
LINE	End-of-line input token	Indicates user input of any string, including spaces. No other parameters may be entered after input for this token.	<code>string of words</code>

Convention	Name	Description	Example
WORD	Single token	Indicates user input of any contiguous string (excluding spaces).	<code>singlewordnospaces</code>
IFNAME	Single token	Indicates the name of an interface.	<code>eth0</code>

Format used for Command Description

command name

Description of the command. What the command does and when should it be used.

Command Syntax

```
sample command name mandatory-parameters (OPTIONAL-PARAMETERS)
```

Default

The status of the command before it is executed. Is it enabled or disabled by default.

Command Mode

Name of the command mode in which this command is to be used. Such as, Exec, Privilege Exec, Configure mode and so on.

Usage

This section is optional. It describes the usage of a specific command and the interactions between parameters. It also includes appropriate sample outputs for `show` commands.

Example

Used if needed to show the complexities of the command syntax.

Related Commands

This section is optional and lists those commands that are of immediate importance.

Equivalent Commands

This section is optional and lists commands that accomplish the same function.

Validation Commands

This section is optional and lists commands that can be used to validate the effects of other commands.

Command Negation

Some commands can be negated by using a `no` keyword.

In the following area virtual-link command, the `no` keyword is optional, This means that the entire syntax can be negated. Depending on the command or the parameters, command negation can mean the disabling of one entire feature for the router or the disabling of that feature for a specific ID, interface or address.

```
(no) area AREAADDRESSID virtual-link ROUTERID (AUTHENTICATE|MSGD|INTERVAL)
```

In the following example, negation is for the base command only. The negated form does not take any parameter.

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

Variable Parameter expansion

For the `area virtual-link` command,

```
(no) area AREAADDRESSID virtual-link ROUTERID (AUTHENTICATE|MSGD|INTERVAL)
```

the `AREAADDRESSID` parameter is replaced by either an IP address or a number in the given range:

```
AREAADDRESSID=A.B.C.D|<0-4294967295>
```

and `ROUTERID` by an IP address. The minimum command then is:

```
area 10.10.0.11 virtual-link 10.10.0.12
```

The parameters in the string `(AUTHENTICATE|MSGD|INTERVAL)` are optional, and only one may be chosen. Each one can be replaced by more keywords and parameters. One of these parameters, `MD5`, is replaced by the following string:

```
MD5= [message-digest-key <1-255> md5 MD5_KEY]
```

with `MD5_KEY` replaced by a 1-16 character string.

Other Conventions



This warning symbol indicates that you must be cautious as you might risk losing data or damaging your hardware.

Show Command Tokens

Two tokens modify the output of the show commands. Use the ? after typing the command to display:

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

Note: These tokens are available only through the IMI shell; they are unavailable to users who telnet to daemons.

Output Modifiers

Type the | (vertical bar) to use Output modifiers.

```
begin      Begin with the line that matches
exclude    Exclude lines that match
include    Include lines that match
redirect   Redirect output
```

Begin

The begin parameter displays the output beginning with the first line containing a token matching the input string (everything typed after the begin token).

```
ZebOS# 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
line vty 0 4
  login
!
end
```

Exclude

The exclude parameter excludes all lines of output that contain the input string. In the following output all lines containing the word “include” are excluded:

```
ZebOS# 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
  Label switching is disabled
  No Virtual Circuit configured
  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
```

Include

The include parameter includes only those lines of output that contain the input string. In the output below, all lines containing the word "input" are included:

```
ZebOS# 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
```

Redirect

The redirect parameter puts the lines of output into the indicated file.

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

Output Redirection

The output redirection token > allows the user to specify a target file for the lines of output.

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

Common Command Modes

The commands available for each protocol are separated into several modes (nodes) arranged in a hierarchy; The Exec mode is the lowest. Each mode has its own special commands; in some modes, commands from a lower level are available.

Note: Multiple users can telnet and issue commands using the Exec mode and the Privileged Exec mode. For ZebOS versions earlier than 7.4, only one user is allowed to use the Configure mode at a time. For ZebOS versions 7.4 and later, multiple users are allowed to simultaneously use the Configure mode.

Exec Mode Also called the `View` mode, is the base mode from where users can perform basic commands like `show`, `exit`, `quit`, `help`, `list`, and `enable`. All ZebOS daemons have this mode.

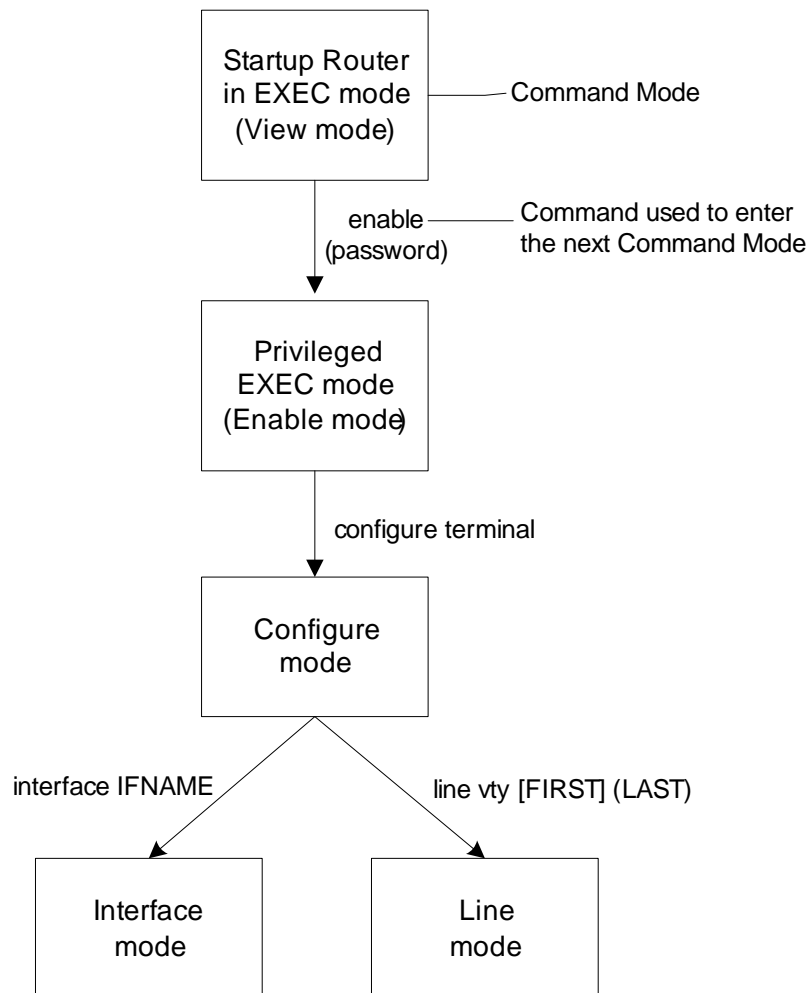
Privileged Exec Mode Also called the `Enable` mode, allows users to run `debug`, `write` (for saving and viewing the configuration) and `show` commands.

Configure Mode Also called `Configure Terminal` mode, this mode serves as a gateway into the `Interface`, `Router`, `Line`, `Route Map`, `Key Chain` and `Address Family` modes.

Interface Mode Is used to configure protocol-specific settings for a particular interface. Any attribute configured in this mode overrides an attribute configured in the `Router` mode.

Line Mode Makes the `access-class` commands available.

This diagram displays the common command mode tree.



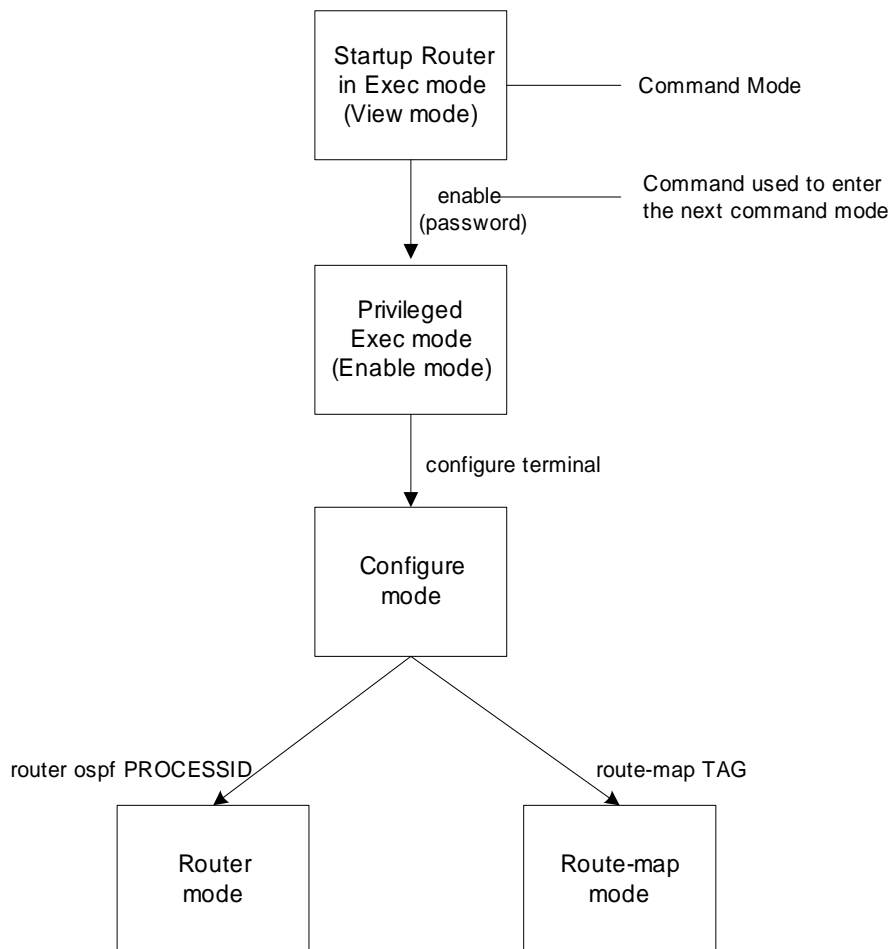
OSPF Command Modes

Router Sometimes referred to as `configure router` mode, this mode is available for the MPLS, BGP, OSPF, and RIP protocols only and makes available router and routing commands.

Line This mode is used for access-class commands. It is available for the BGP, OSPF, and RIP protocols only.

Route-map This mode is used to set route metric, route-length and cost data. It is available for the BGP, OSPF, and RIP protocols only.

The following diagram shows the complete OSPF daemon command mode tree. For information about Exec, Privileged Exec, Configure and Interface modes please refer to the ZebOS daemon command modes mentioned earlier in this chapter.



Following is a description of the parameters used in the above mentioned commands.

PROCESSID = < 0-65535 >

TAG = WORD (deny | permit) <1-65535>

deny Route-map denies set operations

permit Route-map permits set operations

<1-65535> Sequence to insert to / delete from existing route-map entry.

Commands Common to Multiple Protocols

See the *ZebOS NSM Command Reference* for information about using these commands in multiple protocol daemons.

Command Name	Use this command to
access-class	filter a connection based on an IP access list, for IPv4 networks
access-list	configure an access-list for filtering packets.
access-list extended	configure an extended access-list for filtering packets.
access-list standard	configure a standard access-list for filtering packets.
banner	toggle the displaying of the banner text.
clear ip prefix-list	clear the IP prefix-list.
configure terminal	enter the <code>Configure Terminal</code> mode.
copy running-config startup-config	copy the current running configuration to the startup configuration file.
description	provide interface-specific information.
disable	exit <code>Privileged Exec</code> mode.
enable	enter the <code>Privileged Exec</code> mode.
enable password	change the password for the <code>enable</code> command.
end	leave the current mode.
exec-timeout	set command interpreter wait interval.
exit	leave the current mode, or logout of the session.
help	display online text assistance.
hostname	set or change network server name.
ip prefix-list	create an entry for a prefix list.
ipv6 access-class	filter connection based on an IP access list for IPv6 networks.
ipv6 access-list	configure an access-list for filtering frames.
ipv6 prefix-list	create an entry for an IPv6 prefix list.
line vty	enter <code>Line</code> mode.
list	list all commands for a mode.
log file	specify the file that collects logging information.
log record-priority	specify the logging of the priority of a message.
log stdout	begin logging information to the standard output.

Command Name	Use this command to
log syslog	begin logging information to the system log.
log trap	limit logging to a specified level or type.
login	set a password prompt and enable password checking.
match as-path	match an autonomous system path access list.
match community	specify the community to be matched.
match extcommunity	specify the extended community to be matched.
match interface	define the interface match criterion.
match ip address	specify the match address of route.
match ip address prefix-list	specify to match entries of prefix-lists.
match ip next-hop	specify a next-hop address to be matched in a route-map.
match ip next-hop prefix-list	specify the next-hop IP address match criterion, using the prefix-list.
match ipv6 address	specify the match IPv6 address of route.
match ipv6 address prefix-list	match entries of IPv6 prefix-lists.
match ipv6 next-hop	specify a next-hop IPv6 address to be matched by the route-map.
match metric	match a metric of a route.
match origin	match origin code.
match route-type	match specified external route type.
match tag	match the specified tag value.
password	specify a network password.
quit	leave the current mode.
route-map	enter the route-map mode and to permit or deny match/set operations.
service advanced-vty	set the VTY session to <code>Privileged Exec</code> mode instead of the <code>Exec</code> mode (which is the default).
service password-encryption	specify encryption of passwords.
service terminal-length	set the terminal length for VTY sessions.
set aggregator	set the AS number for the route map and router ID.
set as-path	modify an autonomous system path for a route.
set atomic-aggregate	set an atomic aggregate attribute.
set comm-list delete	delete matching communities from inbound or outbound updates.
set community	set the communities attribute.

Command Name	Use this command to
set community-additive	add a community to the already existing communities.
set dampening	set route-flap dampening parameters.
set extcommunity	set an extended community attribute.
set ip next-hop	set the specified next-hop value.
set ipv6 next-hop	set a next hop-address.
set metric	set a metric value for a route.
set metric-type	set the metric type for the destination routing protocol.
set next-hop	specify the next-hop address.
set origin	set the origin code.
set originator-id	set the originator ID attribute.
set tag	set specified tag value.
set vpnv4 next-hop	set a VPNv4 next-hop address.
set weight	set weights for the routing table.
show access-list	display the list of IP access lists.
show cli	display the CLI tree of the current mode.
show list	display a list of all commands in the current mode.
show history	display all commands used in a session.
show ip prefix-list	display the prefix list entries.
show memory all	display the memory reports for all protocols.
show memory free	display the statistics of free memory for all protocol.
show memory summary	display the summary of memory subsystem statistics.
show route-map	display user readable route-map information.
show running-config	display the current configuration.
show startup-config	display the startup configuration (from storage).
show version	display the current ZebOS version.
terminal length	set the number of lines in a terminal display.
terminal monitor	display debugging on a monitor.
who	display other VTY connections.
write file and write memory	write the current configuration file.
write terminal	display current configurations to the VTY terminal.

CHAPTER 2 OSPF Commands

This chapter provides an alphabetized reference for each of the OSPF Commands.

area authentication

Use this command to enable authentication for an OSPF area.

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

Command Syntax

```
area AREAID authentication (message-digest)
no area AREAID authentication
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
message-digest Enables MD5 authentication on the area specified by AREAID.
```

Default

Null authentication

Command Mode

Router mode

Usage

Specifying the area authentication sets the authentication to `Type 1` authentication or the `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 MD5 password.

Examples

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

Related Commands

`ip ospf authentication-key`, `ip ospf message-digest-key`

area default-cost

Use this command to specify a cost for the default summary route sent into a stub or NSSA area.

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

Command Syntax

```
area AREAID default-cost <0-16777215>
no area AREAID default-cost
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
default-cost Indicates the cost for the default summary route used for a stub or NSSA area .
Default value of cost is 1.
```

Command Mode

Router mode

Usage

The `default-cost` option 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.

Examples

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

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

Related Commands

area nssa, area stub

area filter-list

Use this command to configure filters to advertise summary routes on Area Border Routers (ABR).

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

Command Syntax

```
area AREAID filter-list TYPE WORD DIRECTION
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
TYPE = access|prefix
access Use access-list to filter summary.
prefix Use prefix-list to filter summary.
WORD Name of an access-list or prefix-list.
DIRECTION = in|out
in Filter routes from the other areas to this area.
out Filter routes from this area to the other areas.
```

Command Mode

Router mode

Usage

This command is used to suppress particular intra-area from/to area to/from the other areas. You can use this command in conjunction with either the access-list or prefix-list command.

Examples

```
ZebOS# configure terminal
ZebOS(config)# access-list 1 deny 172.22.0.0/8
ZebOS(config)# router ospf 100
ZebOS(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.

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

Command Syntax

```
area AREAID multi-area-adjacency IFNAME neighbor A.B.C.D
no area AREAID multi-area-adjacency IFNAME (neighbor A.B.C.D)
AREAID = A.B.C.D|<0-4294967293>
IFNAME An alphanumeric string that is the interface name.
A.B.C.D Neighbor's IP address.
```

Command Mode

Router mode

Usage

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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 1
ZebOS(config)# router-id 10.10.10.10
ZebOS(config-router)# area 1 multi-area-adjacency eth1 neighbor 20.20.20.10
ZebOS(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).

Use the `no` parameter with this command to remove this designation.

Command Syntax

```
area AREAID nssa (OPTIONS)
no area AREAID nssa (OPTIONS)
```

AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.

OPTIONS = {TRANSLATOR|no-redistribution|DEFAULT-ORIGINATE|no-summary}

TRANSLATOR = translator-role ROLE
translator-role Specify NSSA-ABR translator-role.
ROLE = candidate|never|always
candidate Router may translate NSSA-LSA to Type-5 LSA if it is elected.
never Router never translate NSSA-LSA.
always Router always translate NSSA-LSA to Type-5 LSA.

no-redistribution Do not redistribute external route into NSSA.

DEFAULT-ORIGINATE = default-information-originate {metric <0-16777214>|metric-type <1-2>}
default-information-originate Originate Type-7 default LSA into NSSA.
metric <0-16777214> Specify metric value.
metric-type <1-2> Specify external metric type.

no-summary Do not inject inter-area route into NSSA.

no-redistribution No redistribution into this NSSA area

translator-role NSSA-ABR translator role

Default

No NSSA area is defined.

Command Mode

Router mode

Usage

There are no external routes in an OSPF stub area, so you cannot redistribute from another protocol into a stub area. A NSSA allows external routes to be flooded within the area. These routes are then leaked into other areas. Although, the external routes from other areas still do not enter the NSSA.

You can either configure an area to be a stub area or an NSSA, not both.

Use the `area nssa` command to simplify administration if you are 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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# area 0.0.0.51 nssa
ZebOS(config-router)# area 3 nssa translator-role candidate no-redistribution
default-information-originate metric 34 metric-type 2
```

Related Commands

`area default-cost`

area range

Use this command to summarize OSPF routes at an area boundary.

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

Command Syntax

```
area AREAID range ADDRESS (advertise|not-advertise)
no area AREAID range

AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
ADDRESS= 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

Usage

The `area range` command is used to summarize 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.

Examples

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

area shortcut

Use this command to configure the short-cutting mode of an area.

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

Command Syntax

```
area AREAID shortcut (default|enable|disable)
no area AREAID shortcut (enable|disable)

AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer 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

Usage

Area shortcut enables traffic to go through the non-backbone area with a lower metric; regardless of the ABR router being attached to the backbone area or not.

Examples

```
area 1 shortcut default
area 52 shortcut disable
no area 42 shortcut enable
```

Related Commands

`ospf abr-type shortcut`

area stub

Use this command to define an area as a stub area.

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

Command Syntax

```
(no) area AREAID stub (no-summary)
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer 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

Usage

Configures the `area stub` command on all routers in the 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 require learning about summary LSAs from other areas. The area can be defined as a totally stubby area by configuring the Area Border Router of that area using the `area stub no-summary` command.

Examples

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

```
ZebOS(config-router)# area 1 stub
```

Related Commands

area default-cost

area virtual-link

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

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

Command Syntax

```
(no) area AREAID virtual-link A.B.C.D (AUTH_KEY|MSG_KEY)
```

```
(no) area AREAID virtual-link A.B.C.D authentication (message-digest|null)
(AUTH_KEY|MSG_KEY)
```

```
(no) area AREAID virtual-link A.B.C.D (authentication) INTERVAL
```

AREAID = A.B.C.D|<0-4294967295>

A.B.C.D OSPF Area ID in IPv4 address format.

<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.

A.B.C.D = The IP address associated with a virtual link neighbor.

MSG_KEY = message-digest-key KEYID md5 .LINE

message-digest-key Set the message digest key

KEYID <1-255> Specify the Key ID.

md5 Specify using of the md5 algorithm

LINE Authentication password of 16 characters

AUTH_KEY = authentication-key KEY

KEY An 8 character password

authentication Enable authentication on this virtual link

message-digest Use message-digest authentication.

null = Use null authentication to override password or message digest.

INTERVAL= {dead-interval <1-65535>|hello-interval <1-65535>|retransmit-
interval <1-3600>|transmit-delay <1-3600>}

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.

Command Mode

Router mode

Usage

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.

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. To configure virtual link, include both the transit area ID and the corresponding virtual link neighbor's router ID in the virtual link neighbor. To see the router ID use the `show ip ospf` command.

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.

Examples

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

Related Commands

area authentication, show ip ospf, show ip ospf virtual-links

auto-cost reference bandwidth

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

Use the `no` parameter with this command to assign cost, based only on the interface bandwidth.

Command Syntax

```
auto-cost reference-bandwidth <1-4294967>
no auto-cost reference-bandwidth
```

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

Command Mode

Router mode

Usage

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.

Examples

```
ZebOS# configure terminal
```

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

Related Commands

ip ospf cost

capability opaque

Use this command to enable opaque-LSAs.

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

Command Syntax

```
(no) capability opaque
```

Default

Enabled

Command Mode

Router mode

Usage

Opaque-LSAs are Type 9, 10 and 11 LSAs that deliver information used by external applications.

Examples

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

capability restart

Use this command to enable OSPF graceful restart or restart signaling features.

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

Command Syntax

```
(no) capability restart [graceful|signaling]
    graceful Specify enabling OSPF graceful restart feature.
    signaling Specify enabling OSPF signaling restart feature.
```

Default

Enabled

Command Mode

Router mode

Examples

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

```
ZebOS(config-router)# capability restart graceful
```

clear ip ospf process

Use this command to clear and restart the OSPF routing process. Specify the Process ID to clear one particular OSPF process. When no Process ID is specified, this command clears all running OSPF processes.

Command Syntax

```
clear ip ospf process
```

```
clear ip ospf PROCESSID process
```

PROCESSID = <0-65535> Specifies the Routing Process ID.

Command Mode

Privileged Exec Mode

Examples

```
ZebOS# clear ip ospf process
```

compatible rfc1583

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

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

Command Syntax

```
(no) compatible rfc1583
```

Default

By default, OSPF is rfc 2328 compatible.

Command Mode

Router mode

Usage

Prior to RFC 2328, OSPF was compliant with RFC 1583, that specified method for calculating the metric 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. `Compatible rfc1583` command addresses this issue and allows the selective disabling of compatibility with RFC 2328.

Examples

```
ZebOS# configure terminal
```

```
ZebOS(config)# router ospf 100
```

```
ZebOS(config-router)# compatible rfc1583
```

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

```
(no) debug ospf events (abr|asbr|lsa|nssa|os|router|vlink)
abr shows ABR events
asbr shows ASBR events
lsa shows LSA events
nssa shows NSSA events
os shows OS interaction events
router shows other router events
vlink shows virtual link events
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf event` command enables the display of debug information related to OSPF internal events.

Examples

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

Related Commands

log file

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

```
(no) debug ospf ifsm (status|events|timers)
events Displays IFSM event information
status Displays IFSM status information
timers Displays IFSM timer information
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf ifsm` command enables the display of debug information related to the Interface Finite State Machine (IFSM).

Examples

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

Related Commands

log file

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

```
(no) debug ospf lsa (flooding|generate|install|maxage|refresh)
    flooding Displays LSA flooding.
    generate Displays LSA generation.
    install Show LSA installation.
    maxage Shows maximum age of the LSA in seconds.
    refresh Displays LSA refresh.
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf lsa` command enables the display of debug information related to internal operations of LSAs.

Examples

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

Related Commands

log file

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

```
(no) debug ospf nfsm (events|status|timers)
    events Displays NSM event information.
    status Displays NSM status information.
    timers Displays NSM timer information.
```

Command Mode

Privileged Exec mode Configure mode

Usage

The `debug ospf n fsm` command enables the display of debug information related to the Neighbor Finite State Machine (NFSM).

Examples

```
ZebOS# debug ospf n fsm events
ZebOS# no debug ospf n fsm timers
```

Related Commands

log file

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

```
(no) debug ospf nsm (interface|redistribute)
      interface Specify NSM interface information.
      redistribute Specify NSM redistribute information.
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf nsm` command enables the display of debug information related to the Network Services Module (NSM).

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

Related Commands

log file

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

```
(no) debug ospf packet PARAMETERS
      PARAMETERS = dd|detail|hello|ls-ack|ls-request|ls-update|recv|send
      dd Specifies debugging for OSPF database descriptions.
      detail Sets the debug option to detailed information.
```

`hello` Specifies debugging for OSPF hello packets.
`ls-ack` Specifies debugging for OSPF link state acknowledgments.
`ls-request` Specifies debugging for OSPF link state requests.
`ls-update` Specifies debugging for OSPF link state updates.
`recv` Specifies the debug option set for received packets.
`send` Specifies the debug option set for sent packets.

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf packet` command enables the display of debug information related to the sending and receiving of packets.

Examples

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

Related Commands

log file

debug 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

```
(no) debug ospf route (ase|ia|install|spf)
  ia    Specifies the debugging of Inter-Area route calculation
  ase   Specifies the debugging of external route calculation
  install Specifies the debugging of route installation
  spf   Specifies the debugging of SPF calculation
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ospf route` command enables the display of debug information related to route-calculation.

Examples

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

Related Commands

log file

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.

Command Syntax

```
default-information originate {always|METRIC|METRICTYPE|ROTEMAP}
no default-information originate
```

`always` Used to advertise the default route regardless of whether there is a default route.

`METRIC = metric <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.

`METRICTYPE = metric-type 1|2` Sets the OSPF external link type for default routes.

- 1 Sets OSPF External Type 1 metrics.
- 2 Sets OSPF External Type 2 metrics.

`ROTEMAP = route-map WORD`

`WORD =` Specifies the name of route-map. It is a string comprised of any characters, numbers or symbols.

Command Mode

Router mode

Usage

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 use the `default-information originate` command, also specify the `route-map map-name` option to avoid a dependency on the default network in the routing table.

The `metric-type` is an external link type associated with the default route advertised into the OSPF routing domain. The value of the external route could be either Type 1 or 2; the default is the Type 2.

Examples

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

Related Commands

route-map

default-metric

Use this command to set default metric values for the OSPF routing protocol.

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

Command Syntax

```
default-metric <1-16777214>
no default-metric
<1-16777214> Default metric value appropriate for the specified routing protocol.
```

Default

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

Command Mode

Router mode

Usage

A default metric facilitates redistributing routes even with incompatible metrics. If the metrics do not convert, the default metric provides an alternative and enables the redistribution to continue. Default-metric command is used to cause the current routing protocol to use the same metric value for all redistributed routes. Use this command in conjunction with the `redistribute` command.

Examples

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

Related commands

redistribute

distance

Use this command to define OSPF route administrative distances based on route type.

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

Command Syntax

```
distance <1-255> |ROUTEPARAMETER
no distance ospf

<1-255> = OSPF administrative distance.
ROUTEPARAMETER= ospf {ROUTE1|ROUTE2|ROUTE3}
ROUTE1= external <1-255> Sets the distance for routes from other routing domains, learned by
redistribution.
ROUTE2= inter-area <1-255> Sets the distance for all routes from one area to another area.
ROUTE3= intra-area <1-255> Sets the distance for all routes within an area.
<1-255> Distance for external, intra-area or inter-area routes.
```

Default

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

Command Mode

Router mode

Usage

The administrative distance rates the trustworthiness of a routing information source. The distance could be any integer from 0 to 255. A higher distance value indicates a lower trust rating. For example, an administrative distance of 255 indicates that the routing information source cannot be trusted and should be ignored.

Use this command to set the distance for an entire group of routes, rather than a specific route that passes an access list.

Examples

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

distribute-list

Use this command to filter networks in routing updates.

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

Command Syntax

```
distribute-list LISTNAME out ROUTE
no distribute-list LISTNAME
```

LISTNAME Specifies the name of the access list.

out Indicates that outgoing advertised routes will be cleared.

ROUTE = `bgp|ospf (WORD)|connected|isis|kernel|rip|static`

bgp Specifies BGP routes.

ospf Specifies OSPF routes.

WORD Specifies OSPF route name.

connected Specifies connected routes.

isis Specifies IS-IS routes.

kernel Specifies kernel routes.

rip Specifies RIP routes.

static Specifies static routes.

Command Mode

Router mode

Usage

Use this command when redistributing other routing protocols into the OSPF routing table.

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# access-list list1 permit 172.10.0.0 0.0.255.255
ZebOS(config)# router ospf 100
ZebOS(config-router)# distribute-list list1 out bgp
ZebOS(config-router)# redistribute bgp
```

Related Commands

redistribute

domain-id

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

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

Command Syntax

```
(no) domain-id A.B.C.D (secondary)
```

```
(no) domain-id type TYPE value VALUE (secondary)
```

A.B.C.D OSPF domain ID in IP address format

TYPE domain ID value type. Can be one of the following:

type-as AS format. Hex value is 0x0005.

type-as4 AS4 format. Hex value is 0x0205.

type-back-comp Used for backward compatibility. Hex value is 0x8000.

VALUE 6-byte hex domain ID value

secondary When specified, the domain ID is considered secondary. If not specified the domain ID is considered primary.

Default

No domain ID is defined.

Command Mode

Router mode

Usage

Use this command to specify the domain ID for a particular OSPF instance bound to VRF. The routes sent from OSPF to the VPN cloud are sent along with the configured domain ID. In this way, the domain ID acts as an identification for the route received from each OSPF domain.

Examples

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

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

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

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

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

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

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

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100 vrf IPI
ZebOS(config-router)# domain-id type type-as value 12abcdef3456 secondary
```

enable db-summary-opt

Use this command to enable the database summary list optimization for OSPFv2. The default setting is disabled.

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

Command Syntax

```
(no) enable db-summary-opt
```

Command Mode

Router mode

Usage

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.

Examples

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

enable ext-ospf-multi-inst

Use this command to enable OSPF multiple-instance support to allow multiple OSPF instances to run on a subnet.

Use the `no` parameter with this command to disable OSPF multiple-instance support.

Command Syntax

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

Default

Multiple-instance support is disabled.

Command Mode

Configure mode

Usage

The `enable ext-ospf-multi-inst` command functions only if the `--enable-ext-ospf-multi-inst` option is enabled when compiling ZebOS. If this feature is already in use, and no `enable ext-ospf-multi-inst` is executed, all OSPF instances will be reset to the default instance IDs. The default instance ID is 0.

Examples

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

host area

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

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

Command Syntax

```
(no) host A.B.C.D area AREAID (COST)
      A.B.C.D Specifies IP address of the host.
      AREAID = A.B.C.D|<0-4294967295>
              A.B.C.D OSPF Area ID in IPv4 address format.
              <0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
      COST = cost <0-65535> Specifies cost for stub host entry.
```

Default

No host entry is configured.

Command Mode

Router mode

Usage

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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# host 172.16.10.100 area 1
ZebOS(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.

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

Command Syntax

```
ip ospf (A.B.C.D) authentication (message-digest|null)
no ip ospf (A.B.C.D) authentication
      A.B.C.D The IP address of the interface.
      message-digest Use the message digest authentication.
      null Use no authentication. It overrides password or message-digest authentication of the interface.
```

Command Mode

Interface mode

Usage

This command enables OSPF packet to use authentication on the current interface.

Examples

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

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

Related Commands

`ip ospf authentication-key`, `area authentication`, `ip ospf message-digest-key`

ip ospf authentication-key

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

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
    A.B.C.D The IP address of the interface.
    LINE Specifies the authentication password. String by the end of line will be taken.
```

Default

Authentication password not specified.

Command Mode

Interface mode

Usage

This command creates a password (key) that is inserted into the OSPF header when ZebOS software originates routing protocol 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. Use the `area authentication` command to enable authentication.

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

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.

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

Related Commands

area authentication, ip ospf authentication.

ip ospf cost

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

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

Command Syntax

```
ip ospf (A.B.C.D) cost COST
```

```
no ip ospf (A.B.C.D) cost
```

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

COST = <1-65535> Specifies the link-state metric. The default value is 10.

Command Mode

Interface mode

Usage

The interface cost indicates the overhead required to send packets across a certain 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 ($10^8/\text{bandwidth}$); use this `ip ospf cost` command to set the cost manually.

Examples

The following example shows setting ospf cost as 10 on interface eth0 for IP address 10.10.10.50

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ip ospf 3.3.3.3 cost 10
```

Related Commands

show ip ospf interface, auto-cost

ip ospf database-filter

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

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
```

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

all Filter all LSAs

out Outgoing LSAs

Default

Disabled, all outgoing LSAs are flooded to the interface.

Command Mode

Interface mode

Usage

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 the database-filter command to block flooding of LSAs over specified interfaces.

Examples

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

ip ospf dead-interval

Use this command to set the interval during which no hello packets are received and after which a neighbor is declared dead.

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 INTERVAL
no ip ospf (A.B.C.D) dead-interval
```

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

INTERVAL = <1-65535> Specifies the interval in seconds. The default interval is 40 seconds.

Command Mode

Interface mode

Usage

The dead-interval is the amount of time that 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.

Examples

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

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

Related Commands

ip ospf hello-interval, show ip ospf interface

ip ospf disable all

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

Command Syntax

```
ip ospf disable all
    all All functionality
```

Command Mode

Interface mode

Usage

This command overrides the `network area` command and disables the processing of packets on the specific interface.

Example

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

ip ospf hello-interval

Use this command to specify the interval between hello packets.

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

Command Syntax

```
ip ospf (A.B.C.D) hello-interval INTERVAL
no ip ospf (A.B.C.D) hello-interval
    A.B.C.D The IP address of the interface.
    INTERVAL = <1-65535> Specifies the interval in seconds. The default interval is 10 seconds.
```

Command Mode

Interface mode

Usage

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.

Examples

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

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

Related Commands

ip ospf dead-interval, show ip ospf interface

ip ospf message-digest-key

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

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

Command Syntax

```
ip ospf A.B.C.D message-digest-key KEYID md5 .LINE
```

```
no ip ospf A.B.C.D message-digest-key KEYID
```

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

KEYID = <1-255> Specifies a key ID.

md5 Use the MD5 algorithm.

LINE 1-16 characters that specify the OSPF password. String by the end of line will be taken.

Default

Disabled.

Command Mode

Interface mode

Usage

Message Digest Authentication is a 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 gets 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 will prevent 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.

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ip ospf authentication message-digest
ZebOS(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)

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ip ospf 1.1.1.1 authentication message-digest
ZebOS(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.

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

Command Syntax

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

Default

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

Command Mode

Interface mode

Usage

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 allows an administrator to configure the MTU size recognized by the OSPF protocol. It does not configure the MTU settings on the kernel. OSPF will not recognize MTU size configuration changes made to the kernel until the MTU size is updated through the CLI.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(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.

Use the `no` parameter with this command to make sure that OSPF checks MTU size during DD exchange.

Command syntax

```
ip ospf (A.B.C.D) mtu-ignore
no ip ospf (A.B.C.D) mtu-ignore
    A.B.C.D IP address of the interface.
```

Command Mode

Interface mode

Usage

By default, during DD exchange process, OSPF checks the MTU size described in DD packets received from the 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.

Examples

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

ip ospf network

Use this command to configure the OSPF network type to a type different from the default for the media.

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

Command Syntax

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

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.
point-to-point Sets the network type to point-to-point.
```

Default

Broadcast type.

Command Mode

interface mode

Usage

Use the `ip ospf network` command to force interface network type as a specified type. Depending on the network type, OSPF changes the behavior of the sending packet and describes link in LSAs.

Examples

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

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

ip ospf priority

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

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

Command Syntax

```
ip ospf (A.B.C.D) priority PRIORITY
no ip ospf (A.B.C.D) priority

A.B.C.D The IP address of the interface.
PRIORITY = <0-255> Specifies the Router Priority of the interface. Default value is 1.
```

Default

The default priority is 1.

Command Mode

Interface mode

Usage

Set the priority to help determine the OSPF Designated Router (DR) for a network. If two routers attempt to become the DR, the router with the higher router priority becomes the DR. If the router priority is the same for two routers, the router with the higher router ID takes precedence.

Only routers with nonzero router priority values are eligible to become the designated or backup designated router.

Configure router priority for multiaccess networks only and not for point-to-point networks.

Examples

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

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

Related Commands

`ip ospf network`

Equivalent Commands

`ospf priority`

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
    A.B.C.D The IP address of the interface.
    <1-65535> Specifies 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.

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(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.

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

Command Syntax

```
ip ospf A.B.C.D retransmit-interval INTERVAL
no ip ospf A.B.C.D retransmit-interval
    A.B.C.D The IP address of the interface.
    INTERVAL = <1-65535> Specifies the interval in seconds. The default interval is 5 seconds.
```

Command Mode

Interface mode

Usage

After sending an LSA to a neighbor, the router keeps the LSA until it receives an acknowledgement. In case the router does not receive an acknowledgement during the set time (the retransmit interval value) 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.

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(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.

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

Command Syntax

```
ip ospf A.B.C.D transmit-delay DELAY
no ip ospf A.B.C.D transmit-delay
    A.B.C.D The IP address of the interface.
    DELAY = <1-65535> Specifies the time, in seconds, to transmit a link-state update. The default interval is 1 second.
```

Command Mode

Interface mode

Usage

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.

Examples

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

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

max-concurrent-dd

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

Command Syntax

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

Command Mode

Router mode

Usage

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.

Examples

The following example set the max-concurrent-dd value to 4 that will allow processing of only 4 DD processes at a time.

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

neighbor

Use this command to configure OSPF routers interconnecting to NBMA networks.

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

Command Syntax

```
(no) neighbor A.B.C.D (COST) {PRIORITY|POLL-INTERVAL}
A.B.C.D Specifies the interface IP address of the neighbor.
PRIORITY = priority <0-255> Specifies the 8-bit number indicating the router priority value of the
non-broadcast neighbor associated with the specified IP address. The default value is 0. This
keyword does not apply to point-to-multipoint interfaces.
POLL-INTERVAL = poll-interval <1-65535> Dead neighbor polling interval in seconds. It is
recommended to set this value much higher than the hello interval. The default value is 120 seconds.
COST = cost <1-65535> Specifies the link-state metric to this neighbor.
```

Command Mode

Router mode

Usage

To configure neighbor on NBMA network manually use the `neighbor` command and include one neighbor entry for each known nonbroadcast network neighbor. Configure the neighbor address on the primary address of the interface.

Poll interval is the reduced rate at which routers continue to send hello packets, when a neighboring router has become inactive. Set the poll interval to be much larger than hello interval.

Examples

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

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

network area

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.

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

Command Syntax

```
(no) network NETWORKADDRESS area AREAID (instance-id <0-225>)
```

```
no network
```

```
NETWORKADDRESS = A.B.C.D/M|A.B.C.D X.Y.Z.W
```

```
A.B.C.D/M IPv4 network address with prefix length.
```

```
A.B.C.D IPv4 network address.
```

```
X.Y.Z.W Wildcard mask.
```

```
AREAID = A.B.C.D|<0-4294967295>
```

```
A.B.C.D OSPF Area ID in IPv4 address format.
```

```
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
```

```
instance-id Interface instance ID
```

```
<0-225> Instance ID range. Default is 0.
```

Default

No network area is configured.

Command Mode

Router mode

Usage

OSPF routing can be enabled per IPv4 subnet basis. Network address can be defined using the prefix length or a wild card mask. A wild card mask is comprised of consecutive 0 as network bits and consecutive 1 as host bits.

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.

Examples

The following shows using the `network` command with OSPF multiple-instance support disabled.

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# network 10.0.0.0/8 area 3
ZebOS(config-router)# network 10.0.0.0/8 area 1.1.1.1
```

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

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(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`).

Command Syntax

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

`cisco` Specifies an alternative ABR using Cisco implementation (RFC 3509). This is the default ABR type.

`ibm` Specifies an alternative ABR using IBM implementation (RFC 3509).

`shortcut` Specifies a Shortcut ABR (draft-ietf-ospf-shortcut-abr-02.txt).

`standard` Specifies a standard behavior ABR (RFC 2328).

Default

ABR type `Cisco`

Command Mode

Router mode

Usage

Specifying the ABR type allows better functioning between different implementations. This command is specially useful in a multi-vendor environment. The different ABR types are:

Cisco ABR Type: By this definition, a router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.

Standard ABR Type: By this definition, a router is considered an ABR if it has more than one area actively attached to it.

IBM ABR Type: By this definition, 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.

Shortcut ABR Type: The Shortcut ABR improves over the Standard ABR behavior by modifying the calculation of inter-area routes. It is allowed to install inter-area routes through 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.

Examples

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

```
ZebOS(config-router)# ospf abr-type ibm
```

Related Commands

area short-cut

ospf restart grace-period

Use this command to configure the Grace Period for restarting the router.

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

Note: This command is available only when configuration option `--enable-restart` is enabled when compiling ZebOS.

Command Syntax

```
(no) ospf restart grace-period <1-1800>
      <1-1800> Specifies the grace period in seconds.
```

Command Mode

Configure mode

Usage

Use this command to enable the `OSPF Graceful Restart` feature on OSPF daemon. If this command is configured, NSM is notified about the Grace Period. In case, OSPF daemon unexpectedly shuts down, NSM sends this value to the OSPF daemon when it comes up again. OSPF daemon uses this value to end the `Graceful` state.

Examples

```
ZebOS# configure terminal
ZebOS(config)# ospf graceful-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.

Note: This command is available only when configuration option `--enable-restart` is enabled when compiling ZebOS.

Command Syntax

```
ospf restart helper never router-id A.B.C.D
      router-id Router ID of neighbor to never to act as helper
      A.B.C.D Router ID in IPv4 address format
ospf restart helper POLICY
      POLICY = only-reload|only-upgrade|max-grace-period <1-1800>
              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
no ospf restart helper never router-id A.B.C.D|all
```

`router-id` Router ID of neighbor to never to act as helper
A.B.C.D Router ID in IPv4 address format
`all` All router IDs

`no ospf restart helper POLICY`

POLICY = `only-reload|only-upgrade|max-grace-period <1-1800>`

- `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

Command Mode

Configure mode

Usage

Use the `never` parameter with the `ospf restart helper` command to prevent the neighbor from entering Helper mode.

Use the POLICY parameters with the `ospf restart helper` command to configure certain local policies on the helper. If the configured policies are satisfied, only a router can act as helper.

Use the `never router-id all` parameter with the `no ospf restart helper` command to remove all neighbor IDs from the never router ID list.

Examples

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

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

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

ZebOS# configure terminal
ZebOS(config)# no ospf restart helper never

ZebOS# configure terminal
ZebOS(config)# no ospf restart helper router-id all

ZebOS# configure terminal
ZebOS(config)# no ospf restart helper only-upgrade only-reload
```

ospf router-id

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

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

Command Syntax

```
ospf router-id IPADDRESS
no ospf router-id
```

IPADDRESS Specifies the router ID in IPv4 address format.

Command Mode

Router mode

Usage

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.

Examples

The following example shows a specified router ID 2.3.4.5.

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

Related Commands

show ip ospf

overflow database

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

Use the `no` parameter with this command to have no limit on the maximum number of LSAs.

Command Syntax

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

<0-0-4294967294> 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

Usage

Use `hard` with this command if a shutdown is required if the number of LSAs exceeds the specified number. Use `soft` with this command if a shutdown is not required, but a warning message is required, if the number of LSAs exceeds the specified number.

Examples

The following example shows setting the database overflow to 5, and a shutdown to occur, if the number of LSAs exceeds 5.

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

overflow database external

Use this command to configure the size of the external database and the time the router waits before it tries to exit the overflow state.

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

Command Syntax

```
overflow database external MAXLSAS RECOVERTIME
no overflow database external
```

`MAXLSAS = <0-2147483647>` The maximum number of LSAs. Note that this value should be the same on all routers in the AS.

`RECOVERTIME = <0-65535>` the number of seconds the router waits before trying to exit the database overflow state. If this parameter is 0, router exits the overflow state only after an explicit administrator command.

Command Mode

Router mode

Usage

Use this command to limit the number of AS-external-LSAs a router can receive, once it is in the wait state. It takes the number of seconds specified as the `RECOVERTIME` to recover from this state.

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(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.

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

Command Syntax

```
passive-interface (INTERFACENAME) (A.B.C.D)
```

`INTERFACENAME` = The name of the interface.

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

Command Mode

Router mode

Usage

The `passive-interface` command is used to configure OSPF on simplex Ethernet interfaces. Since the simplex interfaces represent 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.

Using the `passive-interface` command without the optional parameters puts all interfaces into passive mode. Using the `no passive-interface` command without the optional parameters removes all interfaces from passive mode.

Examples

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

redistribute

Use this command to redistribute routes from other routing protocols, static routes and kernel routes into an ospf routing table.

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

Command Syntax

```
redistribute PROTOCOL {METRIC|METRIC-TYPE|ROUTE-MAP|TAG}
no redistribute PROTOCOL

PROTOCOL = (bgp|isis|rip|connected|static|kernel)
    bgp Specifies BGP routes.
    isis Specifies IS-IS routes.
    rip Specifies RIP routes.
    connected Specifies connected routes.
    static Specifies static routes.
    kernel Specifies kernel routes.

METRIC = metric <0-16777214> Specifies the external metric.
METRIC-TYPE = metric-type (1|2) Specifies the external metric-type.
ROUTE-MAP = route-map WORD Specifies name of the route-map.
TAG = tag <0-4294967295> Specifies the external route tag.
```

Command Mode

Router mode

Usage

Use the `redistribute` command to inject routes, learnt from other routing protocols, into the OSPF domain to generate AS-external-LSAs.

Examples

The following example shows redistribution of bgp routes into ospf routing table, with metric as 12.

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

redistribute ospf

Use this command to redistribute a particular OSPF instance into another OSPF instance, or optionally redistribute a particular OSPF instance into another OSPF instance by setting metrics, route maps, and tags.

Use the `no` parameter with this command to negate the distribution of a particular OSPF instance.

Command Syntax

```
redistribute ospf <1-65535> {METRIC METRIC-TYPE ROUTE-MAP TAG}
no redistribute ospf <1-65535>
    METRIC = metric <0-16777214> Specifies the external metric.
    METRIC-TYPE = metric-type (1|2) Specifies the external metric-type.
    ROUTE-MAP = route-map WORD Specifies name of the route-map.
    TAG = tag <0-4294967295> Specifies the external route tag.
```

Command Mode

Router mode

Usage

Use the `redistribute ospf` command to inject routes, learnt from other OSPF instances, into this OSPF instance to generate AS-external-LSAs.

Examples

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

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

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

restart ospf graceful

Use this command to force restarting OSPF as Graceful Restart.

Note: This command is available only when configuration option `--enable-restart` is enabled when compiling ZebOS.

Command Syntax

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

Command Mode

Privileged Exec mode and Exec mode

Usage

After this command is executed, router immediately shuts down. It is notified to NSM that OSPF has shutdown as Graceful and NSM preserves routes installed by OSPF until grace-period expires.

Examples

```
ZebOS# 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 with this command to configure multiple instances.

Use the `no` parameter with this command to terminate an OSPF routing process. Use the `no` parameter with the process ID parameter, to terminate and delete a specific OSPF routing process.

Command Syntax

```
(no) router ospf
```

```
(no) router ospf PROCESSID
```

PROCESSID = <1-65535> Any positive integer identifying a routing process. The process ID should be unique for each routing process.

Default

No routing process defined.

Command Mode

Configure mode

Usage

Process ID of OSPF is an optional parameter. When running a single instance of OSPF, you may or may not specify the Process ID but for running multiple instances of OSPF you must specify the Process ID.

Examples

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

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

router-id

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

Use the `no` parameter with this command to force OSPF to use the previous OSPF router-id behavior.

Command Syntax

```
router-id IPADDRESS
```

```
no router-id
```

IPADDRESS Specifies the router ID in IPv4 address format.

Command Mode

Router mode

Usage

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

Examples

The following example shows a fixed router ID 10.10.10.60

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# router-id 10.10.10.60
```

Related Commands

show ip ospf

show debugging ospf

Use this command to display the set OSPF debugging option.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show debugging ospf
```

Command Mode

Privileged Exec mode

Usage

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.

```
ZebOS# show debugging ospf
OSPF debugging status:
  OSPF packet Link State Update debugging is on
  OSPF all events debugging is on
ZebOS# te mo
ZebOS# 2002/05/09 14:08:11 OSPF: RECV[LS-Upd]: From 10.10.10.70 via eth0:10.10.10.50
(10.10.10.10 -> 224.0.0.5)
2002/05/09 14:08:11 OSPF: LSA[10.10.10.10:10.10.10.70]: instance(0x8139cd0) created
with Link State Update
2002/05/09 14:08:11 OSPF: RECV[LS-Upd]: From 10.10.10.70 via eth0:10.10.10.50
(10.10.10.10 -> 224.0.0.5)
2002/05/09 14:12:33 OSPF: SEND[LS-Upd]: Begin send queue
2002/05/09 14:12:33 OSPF: SEND[LS-Upd]: # of LSAs 1, destination 224.0.0.5
2002/05/09 14:12:33 OSPF: SEND[LS-Upd]: End send queue
2002/05/09 14:12:33 OSPF: SEND[LS-Upd]: To 224.0.0.5 via eth0:10.10.10.50.
```

Examples

```
ZebOS# show debugging ospf
```

show ip ospf

Use this command to display general information about all OSPF routing processes. Include the process ID parameter with this command to display information about specified instances.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf
```

```
show ip ospf PROCESSID
```

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

Command Mode

Privileged Exec mode

Usage

The following are sample outputs from the `show ip ospf` command with and without the `process ID` parameter. Notice that the first output (without process ID), shows information about both instances and the second output shows information only about the instance specified by the process ID.

```
ZebOS# show ip ospf
```

```
Routing Process "ospf 1" with ID 10.10.11.60
Process uptime is 46 minutes
Conforms to RFC2328, and RFC1583Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
This router is an ASBR (injecting external routing information)
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 1. Checksum Sum 0xBC1E
Number of non-default external LSA 1
External LSA database is unlimited.
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 1
    Area has no authentication
    SPF algorithm last executed 00:46:27.935 ago
    SPF algorithm executed 2 times
    Number of LSA 5. Checksum Sum 0x026a20
```

```
Routing Process "ospf 100" with ID 10.10.11.146
Process uptime is 0 minute
Conforms to RFC2328, and RFC1583Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 0. Checksum Sum 0x0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
  Area 1
```

```
Number of interfaces in this area is 1(1)
Number of fully adjacent neighbors in this area is 0
Number of fully adjacent virtual neighbors through this area is 0
Area has no authentication
SPF algorithm executed 0 times
Number of LSA 1. Checksum Sum 0x00e3e2
```

ZebOS# **show ip ospf 100**

```
Routing Process "ospf 100" with ID 10.10.11.146
Process uptime is 0 minute
Conforms to RFC2328, and RFC1583Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 0. Checksum Sum 0x0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
  Area 1
    Number of interfaces in this area is 1(1)
    Number of fully adjacent neighbors in this area is 0
    Number of fully adjacent virtual neighbors through this area is 0
    Area has no authentication
    SPF algorithm executed 0 times
    Number of LSA 1. Checksum Sum 0x00e3e2
```

Examples

```
ZebOS# show ip ospf
ZebOS# show ip ospf 100
```

Related Commands

router ospf

show ip ospf multi-area-adjacencies

Use this command to display multi-area adjacency information for all OSPF instances, or for a particular OSPF instance.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf (<0-65535>) multi-area-adjacencies
<0-65535> OSPF instance ID
```

Command Mode

Privileged Exec mode and Exec mode

Example

```
ZebOS# show ip ospf 1 multi-area-adjacencies
```

Usage

The following is a sample output of this command:

```
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 border-routers

Use this command to display the ABRs and ASBRs for all OSPF instances. Include the process ID parameter with this command to view data about specified instances.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf border-routers
show ip ospf PROCESSID border-routers
PROCESSID = <0-65535> The ID of the router process for which information will be displayed.
```

Command Mode

Privileged Exec mode

Usage

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

ZebOS# **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
```

Examples

```
ZebOS# show ip ospf border-routers
ZebOS# show ip ospf 721 border-routers
```

show ip ospf database

Use this command to display a database summary for OSPF information. This command displays BGP tags for prefixes. Include the process ID parameter with this command to display information about specified instances.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database(self-originate|max-age)
```

```
show ip ospf PROCESSID database (self-originate|max-age)
```

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

self-originate Displays self-originated link states.

max-age Displays LSAs in MaxAge list. It maintains the list of the all LSAs in the database which have reached the max-age which is 3600 seconds.

Command Mode

Privileged Exec mode

Usage

The following are sample outputs from the `show ip ospf database` command with and without the `process ID` parameter. Notice that the first output (without process ID), shows database information about both the instances and the second and third outputs show database information only about the instances specified by the process ID. The last two displays show the use of the `self-originate` and `max-age` parameters.

```
ZebOS# 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 Router	Age	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 Router	Age	Seq#	CkSum	Link count
10.10.11.60	10.10.11.60	219	0x80000001	0x4f5d	0

```
ZebOS# show ip ospf 1 database
```

```
OSPF Router process 1 with ID (10.10.11.60)
```

```
Router Link States (Area 0.0.0.1)
```

Link ID	ADV Router	Age	Seq#	CkSum	Link count
10.10.11.60	10.10.11.60	43	0x80000002	0x472b	1

```
ZebOS# show ip ospf 100 database
```

```
OSPF Router process 100 with ID (10.10.11.60)
```

```
Router Link States (Area 0.0.0.0)
```

Link ID	ADV Router	Age	Seq#	CkSum	Link count
---------	------------	-----	------	-------	------------

```
10.10.11.60      10.10.11.60      244 0x80000001 0x4f5d 0
```

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

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

```
Router Link States (Area 0.0.0.1 [NSSA])
Link ID      ADV Router      Age  Seq#      CkSum  Link count
10.10.11.50  10.10.11.50    20  0x80000007 0x65c3 2
```

```
Area-Local Opaque-LSA (Area 0.0.0.1 [NSSA])
Link ID      ADV Router      Age  Seq#      CkSum  Opaque ID
67.1.4.217  10.10.11.50    37  0x80000001 0x2129 66777
```

```
AS-Global Opaque-LSA
Link ID      ADV Router      Age  Seq#      CkSum  Opaque ID
67.1.4.217  10.10.11.50    37  0x80000001 0x2daa 66777
```

```
ZebOS# show ip ospf database max-age
```

```
OSPF Router process 100 with ID (3.3.3.4)
```

```
MaxAge Link States:
```

```
Link type: 7
```

```
Link State ID: 37.37.37.0
```

```
Advertising Router: 3.3.3.1
```

```
LSA lock count: 6
```

```
Link type: 7
```

```
Link State ID: 10.0.0.0
```

```
Advertising Router: 3.3.3.1
```

```
LSA lock count: 6
```

Examples

```
ZebOS# show ip ospf database external 1.2.3.4 self-originate
```

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

```
ZebOS# show ip 1 ospf database max-age
```

```
ZebOS# show ip 100 ospf database router adv-router 2.3.4.5
```

show ip ospf database asbr-summary

Use this command to display information about the Autonomous System Boundary Router (ASBR) summary LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database asbr-summary (A.B.C.D)(self-originate|ADVROUTER)
```

```
ADVROUTER = adv-router A.B.C.D
```

```
adv-router Displays all the LSAs of the specified router.
```

```
A.B.C.D A link state ID (as an IP address).
```

```
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# show ip ospf database asbr-summary 1.2.3.4 self-originate
ZebOS# show ip ospf database asbr-summary self-originate
ZebOS# show ip ospf database asbr-summary 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database external

Use this command to display information about the external LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database external (A.B.C.D)(self-originate|ADVROUTER)
    ADVROUTER = adv-router A.B.C.D
                adv-router Displays all the LSAs of the specified router.
                A.B.C.D A link state ID (as an IP address).
                self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# 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
```

Examples

```
ZebOS# show ip ospf database external 1.2.3.4 self-originate
ZebOS# show ip ospf database external self-originate
ZebOS# show ip ospf database external 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database network

Use this command to display information about the network LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database network (A.B.C.D)(self-originate|ADVROUTER)
ADVROUTER = adv-router A.B.C.D
adv-router Displays all the LSAs of the specified router.
A.B.C.D A link state ID (as an IP address).
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

The following is a sample output from the `show ip ospf database network` command, with and without the `adv-router` option selected:

```
ZebOS# show ip ospf database network
      OSPF Router process 200 with ID (192.30.30.2)
      Net Link States (Area 0.0.0.0)

LS age: 1175
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: network-LSA
Link State ID: 192.10.10.9 (address of Designated Router)
Advertising Router: 192.30.30.3
LS Seq Number: 80000002
Checksum: 0xdfb1
Length: 32
Network Mask: /24
      Attached Router: 192.20.20.1
      Attached Router: 192.30.30.3

LS age: 1327
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: network-LSA
Link State ID: 192.20.20.2 (address of Designated Router)
Advertising Router: 192.20.20.2
LS Seq Number: 8000000d
Checksum: 0xbce6
Length: 32
Network Mask: /24
      Attached Router: 192.20.20.1
```

```
    Attached Router: 192.20.20.2
LS age: 1278
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 192.30.30.3 (address of Designated Router)
Advertising Router: 192.30.30.3
Advertising Router: 192.30.30.3
LS Seq Number: 80000001
Checksum: 0x0556
Length: 32
Network Mask: /24
    Attached Router: 192.30.30.2
    Attached Router: 192.30.30.3
LS age: 1436
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 192.40.40.2 (address of Designated Router)
Advertising Router: 192.20.20.2
LS Seq Number: 8000000e
Checksum: 0xf173
Length: 32
Network Mask: /24
    Attached Router: 192.20.20.2
    Attached Router: 192.30.30.2
```

ZebOS# **show ip ospf database network adv-router 192.30.30.3**

```
    OSPF Router process 200 with ID (192.30.30.2)
        Net Link States (Area 0.0.0.0)
LS age: 1387
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 192.10.10.9 (address of Designated Router)
Advertising Router: 192.30.30.3
LS Seq Number: 80000001
Checksum: 0xe1b0
Length: 32
Network Mask: /24
    Attached Router: 192.20.20.1
    Attached Router: 192.30.30.3
LS age: 1648
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 192.30.30.3 (address of Designated Router)
Advertising Router: 192.30.30.3
LS Seq Number: 8000000f
Checksum: 0xe864
Length: 32
Network Mask: /24
    Attached Router: 192.30.30.2
    Attached Router: 192.30.30.3
```


Examples

```
ZebOS# show ip ospf database network 1.2.3.4 self-originate
ZebOS# show ip ospf database network self-originate
ZebOS# show ip ospf database network 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database nssa-external

Use this command to display information about the NSSA external LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database nssa-external (A.B.C.D)(self-originate|ADVROUTER)
ADVROUTER = adv-router A.B.C.D
adv-router Displays all the LSAs of the specified router.
A.B.C.D A link state ID (as an IP address).
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# show ip ospf database 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)
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
    External Route Tag: 0
        NSSA-external Link States (Area 0.0.0.1 [NSSA])
```

Examples

```
ZebOS# show ip ospf database nssa-external 1.2.3.4 self-originate
ZebOS# show ip ospf database nssa-external self-originate
ZebOS# show ip ospf database nssa-external 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database opaque-area

Use this command to display information about the area-local (link state type 10) scope LSAs. Type-10 Opaque LSAs are not flooded beyond the borders of their associated area.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database opaque-area (A.B.C.D)(self-originate|ADVROUTER)
    ADVROUTER = adv-router A.B.C.D
        adv-router Displays all the LSAs of the specified router.
        A.B.C.D A link state ID (as an IP address).
        self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# show ip ospf database opaque-area self-originate
    OSPF Router process 100 with ID (10.10.11.50)
        Area-Local Opaque-LSA (Area 0.0.0.0)
            LS age: 262
            Options: 0x2 (*|-|-|-|-|E|-)
            LS Type: Area-Local Opaque-LSA
            Link State ID: 10.0.25.176 (Area-Local Opaque-Type/ID)
            Opaque Type: 10
            Opaque ID: 6576
            Advertising Router: 10.10.11.50
```

```
LS Seq Number: 80000001
Checksum: 0xb413
Length: 26
```

Examples

```
ZebOS# show ip ospf database opaque-area 1.2.3.4 self-originate
ZebOS# show ip ospf database opaque-area self-originate
ZebOS# show ip ospf database opaque-area 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database opaque-as

Use this command to display information about the link-state type 11 LSAs. This type of link-state denotes that the LSA is flooded throughout the Autonomous System (AS).

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database opaque-as (A.B.C.D)(self-originate|ADVROUTER)
ADVROUTER = adv-router A.B.C.D
adv-router Displays all the LSAs of the specified router.
A.B.C.D A link state ID (as an IP address).
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# show ip ospf database 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
```

Examples

```
ZebOS# show ip ospf database opaque-as 1.2.3.4 self-originate
ZebOS# show ip ospf database opaque-as self-originate
ZebOS# show ip ospf database opaque-as 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database opaque-link

Use this command to display information about the link-state type 9 LSAs. This type denotes a link-local scope. The LSAs are not flooded beyond the local network.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database opaque-link (A.B.C.D)(self-originate|ADVROUTER)
ADVROUTER = adv-router A.B.C.D
adv-router Displays all the LSAs of the specified router.
A.B.C.D A link state ID (as an IP address).
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

The following is a sample output from the `show ip ospf database opaque-link` command, with a link-state selected.

```
ZebOS# show ip ospf database opaque-link 10.0.220.247

OSPF Router process 100 with ID (10.10.11.50)

      Link-Local Opaque-LSA (Link hme0:10.10.10.50)
LS age: 276
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: Link-Local Opaque-LSA
Link State ID: 10.0.220.247 (Link-Local Opaque-Type/ID)
Opaque Type: 10
Opaque ID: 56567
Advertising Router: 10.10.11.50
LS Seq Number: 80000001
Checksum: 0x744e
Length: 26

      Link-Local Opaque-LSA (Link hme1:10.10.11.50)
```

Examples

```
ZebOS# show ip ospf database opaque-link 1.2.3.4 self-originate
ZebOS# show ip ospf database opaque-link self-originate
ZebOS# show ip ospf database opaque-link 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database router

Use this command to display information only about the router LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database router (A.B.C.D)(self-originate|ADVROUTER)
  ADVROUTER = adv-router A.B.C.D
    adv-router Displays all the LSAs of the specified router.
    A.B.C.D A link state ID (as an IP address).
    self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

The following is a sample output from the `show ip ospf database router` command, with the ip address selected.

```
ZebOS# show ip ospf database 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
Checksum: 0xee93
Length: 36
  Number of Links: 1
  Link connected to: Stub Network
    (Link ID) Network/subnet number: 10.10.11.0
    (Link Data) Network Mask: 255.255.255.0
```

```
Number of TOS metrics: 0
TOS 0 Metric: 10
```

Examples

```
ZebOS# show ip ospf database router 1.2.3.4 self-originate
ZebOS# show ip ospf database router self-originate
ZebOS# show ip ospf database router 1.2.3.4 adv-router 2.3.4.5
```

show ip ospf database summary

Use this command to display information about the summary LSAs.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf database summary (A.B.C.D)(self-originate|ADVROUTER)
ADVROUTER = adv-router A.B.C.D
adv-router Displays all the LSAs of the specified router.
A.B.C.D A link state ID (as an IP address).
self-originate Displays self-originated link states.
```

Command Mode

Privileged Exec mode

Usage

The following are the sample outputs from the `show ip ospf database summary` command, using the `self-originate`, `adv-router` and `ip address` options.

```
ZebOS# show ip ospf database summary 10.10.10.0
OSPF Router process 100 with ID (10.10.11.50)
    Summary Link States (Area 0.0.0.0)
    Summary Link States (Area 0.0.0.1)
LS age: 1124
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: summary-LSA
Link State ID: 10.10.10.0 (summary Network Number)
Advertising Router: 10.10.11.50
LS Seq Number: 80000001
Checksum: 0x41a2
Length: 28
Network Mask: /24
    TOS: 0 Metric: 10
```

```
ZebOS# show ip ospf database summary self-originate
OSPF Router process 100 with ID (10.10.11.50)
    Summary Link States (Area 0.0.0.0)
LS age: 1061
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: 1061
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: 1061
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: summary-LSA
Link State ID: 10.10.10.0 (summary Network Number)
Advertising Router: 10.10.11.50
LS Seq Number: 80000001
Checksum: 0x41a2
Length: 28
Network Mask: /24
    TOS: 0 Metric: 10
ZebOS# show ip ospf database 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: 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
        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
```

Examples

```
ZebOS# show ip ospf database summary 1.2.3.4 self-originate
ZebOS# show ip ospf database summary self-originate
ZebOS# show ip ospf database summary 1.2.3.4 adv-router 2.3.4.5
```

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
```

Command Mode

Exec mode

Example

```
ZebOS# 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 igp-shortcut-route
```

Command Mode

Exec mode

Example

```
ZebOS# 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.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf interface IFNAME
```

IFNAME An alphanumeric string that is the interface name.

Command Mode

Privileged Exec mode and Exec mode

Usage

The following is a sample output of this command:

```
ZebOS# 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
```

Examples

```
ZebOS# show ip ospf interface eth0
```

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.

To modify the lines displayed, use the `|` (output modifier token); to save the output to a file, use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf neighbor A.B.C.D|all|DETAIL|INTERFACE
```

```
show ip ospf PROCESSID neighbor A.B.C.D|all|DETAIL|INTERFACE
```

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

A.B.C.D = A.B.C.D (detail) Neighbor ID.

all = Include downstatus neighbor

DETAIL = detail (all) Detail of all neighbors

INTERFACE = Interface (A.B.C.D)

A.B.C.D = Address of the interface

Command Mode

Privileged Exec mode and Exec mode

Usage

The following are sample outputs from the `show ip ospf neighbor` command with and without the `process ID` parameter. Notice that the first output (without process ID), shows database information about both the instances and the second output shows database information only about the instance specified by the process ID. The last display shows the use of the `detail` parameter.

```
ZebOS# show ip ospf neighbor
```

```
OSPF process 1:
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
10.10.10.50	1	Full/DR	00:00:38	10.10.10.50	eth0

```
OSPF process 100:
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
10.10.11.50	1	Full/Backup	00:00:31	10.10.11.50	eth1

```
ZebOS#show ip ospf 1 neighbor
```

```
OSPF process 1:
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
10.10.10.50	1	Full/DR	00:00:38	10.10.10.50	eth0

```
ZebOS# show ip ospf 100 neighbor
```

```
OSPF process 100:
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
10.10.11.50	1	Full/Backup	00:00:31	10.10.11.50	eth1

```
ZebOS# 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
  Thread Link State Request Retransmission off
  Thread Link State Update Retransmission on
```

```
Neighbor 10.10.11.50, interface address 10.10.11.50
  In the area 0.0.0.0 via interface eth1
  Neighbor priority is 1, State is Full, 5 state changes
  DR is 10.10.11.10, BDR is 10.10.11.50
  Options is 0x42 (*|O|-|-|-|E|-)
  Dead timer due in 00:00:31
```

```

Neighbor is up for 00:26:50
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
Thread Link State Request Retransmission off
Thread Link State Update Retransmission on

```

Examples

```

ZebOS# show ip ospf neighbor detail
ZebOS# show ip ospf neighbor 1.2.3.4
ZebOS# show ip ospf neighbor myifname detail all

```

show ip ospf route

Use this command to display the OSPF routing table. Include the `process ID` parameter with this command to display the OSPF routing table for specified instances.

To modify the lines displayed, use the `|` (output modifier token); to save the output to a file, use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```

show ip ospf route
show ip ospf PROCESSID route

```

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

Command Mode

Privileged Exec mode

Usage

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

```

ZebOS# 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 `PROCESSID` parameter.

```

ZebOS# 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

Examples

```
ZebOS# show ip ospf route
```

show ip ospf virtual-links

Use this command to display virtual link information.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip ospf virtual-links
```

Command Mode

Privileged Exec mode and Exec mode

Usage

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
```

Examples

```
ZebOS# show ip ospf virtual-links
```

show ip protocols

Use this command to display OSPF process parameters and statistics.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ip protocols
```

There are no arguments or keywords for this command.

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# 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:
    Gateway          Distance          Last Update
  Distance: (default is 110)
    Address          Mask              Distance List
```

Examples

```
ZebOS# show ip protocols
```

summary-address

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

Command Syntax

```
summary-address A.B.C.D/M (not-advertise)(tag <0-4294967295>)
```

A.B.C.D/M = The range of addresses given as IPv4 starting address and a mask indicating the range.

not-advertise Suppresses external routes.

tag <0-4294967295> The default tag value is 0.

Command Mode

Router mode

Usage

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 `summary address` command to advertise one summary route for all redistributed routes covered by a specified network address and mask. This helps decrease the size of the OSPF link state database.

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.

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

te-metric

This command sets traffic engineering metric for an interface.

Use the `no` parameter with this command to unset traffic engineering metric for this interface

Command Syntax

```
(no) te-metric <1-65535>
      <1-65535> The te-metric value. The default value is 0.
```

Command Mode

Interface mode

Usage

The `te-metric` is used in OSPF-TE Link State Advertisements. If the `te-metric` value is not set, `ospf cost` value for an interface is used in TE LSA.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# te-metric 6
```

Related Commands

capability te

timers spf

Use this command to adjust route-calculation timers.

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

Command Syntax

```
timers spf SPF-DELAY SPF-HOLDTIME
no timers spf SPF-DELAY SPF-HOLDTIME

SPF-DELAY= <0-2147483647> Specifies the delay between receiving a change to SPF calculation. The
default spf-delay value is 5 seconds
SPF-HOLDTIME= <0-2147483647> Specifies hold time between consecutive SPF calculations. The
default spf-holdtime value is 10 seconds.
```

Command Mode

Router mode

Usage

The `timer spf` command configures the delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF). This command also configures the hold time between two consecutive SPF calculations.

Examples

```
timers spf 5 10
```

timers spf exp

Use this command to adjust route-calculation timers using exponential back-off delays.

Use the `no` parameter with this command to return to the default exponential back-off timer values.

Command Syntax

```
timers spf exp MIN_HOLDTIME MAX_HOLDTIME
no timers spf exp
```

`MIN_HOLDTIME` = <0-2147483647> Specifies the minimum delay between receiving a change to SPF calculation in milliseconds. The default SPF minimum hold-time delay value is 50 milliseconds.

`MAX_HOLDTIME` = <0-2147483647> Specifies the maximum delay between receiving a change to SPF calculation in milliseconds. The default SPF maximum hold-time delay value is 50 seconds.

Command Mode

Router mode

Usage

The `timers spf exp` command configures the minimum and maximum delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF).

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# timers spf exp 5 10
```

undebg ospf events

Use this command to disable debugging options for OSPF event troubleshooting. Use this command without parameters to disable all the options.

Command Syntax

```
undebg ospf event (abr|asbr|lsa|nssa|os|router|vlink)
```

`abr` disables debugging of ABR events

`asbr` disables debugging of ASBR events

`lsa` disables debugging of LSA events

`nssa` disables debugging of NSSA events

`os` disables debugging of OS interaction events

`router` disables debugging of other router events

`vlink` disables debugging of virtual link events

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf event abr
```

undebug ospf ifsm

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

Command Syntax

```
undebug ospf ifsm (status|events|timers)
    events Disables debugging of IFSM event information
    status Disables debugging of IFSM status information
    timers Disables debugging of IFSM timer information
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf ifsm events
```

undebug ospf lsa

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

Command Syntax

```
undebug ospf lsa (generate|flooding|install|maxage|refresh)
    generate Disables debugging of the LSA generation.
    flooding Disables debugging of the LSA flooding.
    install Disables debugging of the LSA installation.
    maxage Disables debugging of maximum age of the LSA in seconds.
    refresh Disables debugging of LSA refresh.
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf lsa refresh
```

undebug ospf n fsm

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

Command Syntax

```
undebug ospf n fsm (status|events|timers)
```

`status` Disable the logging of NFSM status information.

`events` Disable the logging of NFSM event information.

`timers` Disable the logging of NFSM timer information.

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf nfsm events
```

undebug ospf nsm

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

Command Syntax

```
undebug ospf nsm (interface|redistribute)
```

`interface` Disable logging of NSM interface information.

`redistribute` Disable logging of NSM redistribute information.

Command Mode

Privileged Exec mode

Usage

```
ZebOS# undebug ospf nsm interface
```

undebug ospf packet

Use this command to disable debugging options for OSPF packets.

Command Syntax

```
undebug ospf packet PARAMETERS
```

```
PARAMETERS = dd|detail|hello|ls-ack|ls-request|ls-update|recv|detail
```

`dd` Disable debugging for OSPF database descriptions.

`detail` Disable the setting of the debug option set to detailed information.

`hello` Disable debugging for OSPF hello packets.

`ls-ack` Disable debugging for OSPF link state acknowledgments.

`ls-request` Disable debugging for OSPF link state requests.

`ls-update` Disable debugging for OSPF link state updates.

`send` Disable the debug option set for sent packets.

`recv` Disable the debug option set for received packets.

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf packet ls-request recv detail
```

undebug ospf route

Use this command to disable route calculation for OSPF debugging. Use this command without parameters to disable all the options.

Command Syntax

```
undebug ospf route (ase|ia|install|spf)
  ia      Disable the debugging of Inter-Area route calculation
  ase     Disable the debugging of external route calculation
  install Disable the debugging of route installation
  spf     Disable the debugging of SPF calculation
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ospf route install
```

CHAPTER 3 OSPFv3 Commands

This chapter provides an alphabetized reference for each of the OSPFv3 commands.

abr-type

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

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

Command Syntax

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

`cisco` Specifies an alternative ABR using Cisco implementation (RFC 3509). This is the default ABR type.

`ibm` Specifies an alternative ABR using IBM implementation (RFC 3509).

`standard` Specifies a standard behavior ABR (RFC 2328).

Default

ABR type `Cisco`

Command Mode

Router mode

Usage

Specifying the ABR type allows better functioning between different implementations. This command is specially useful in a multi-vendor environment. The different ABR types are:

Cisco ABR Type: By this definition, a router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.

Standard ABR Type: By this definition, a router is considered an ABR if it has more than one area actively attached to it.

IBM ABR Type: By this definition, 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.

Examples

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

area default-cost

Use this command to specify the cost for default summary route sent into a stub area.

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

Command Syntax

```
area AREAID default-cost <0-16777215>
```

```
no area AREAID default-cost
```

```
AREAID = A.B.C.D|<0-4294967295>
```

```
A.B.C.D OSPF Area ID in IPv4 address format.
```

```
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
```

```
<0-16777215> Indicates the cost for the default summary route used for a stub area. Default default-cost value is 1.
```

Command mode

Router mode

Usage

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.

Examples

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

Related Commands

area stub, area no-summary

area range

Use this command to configure the OSPFv3 IPv6 address range.

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

Command Syntax

```
(no) area AREAID range X:X::X:X/M (advertise | not-advertise)
```

```
AREAID = A.B.C.D|<0-4294967295>
```

```
A.B.C.D = OSPFv3 Area ID in IPv4 address format
```

```
<0-4294967295> = OSPFv3 Area ID as a decimal value
```

```
range = Summarize routes matching address/mask (border route)
```

```
X:X::X:X/M = Area range for IPv6 prefix
```

```
advertise = Advertise this range (default)
```

```
not-advertise = Do not advertise this range
```

Command Mode

Router mode

Usage

The area range command is used to summarize 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.

Examples

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

area stub

Use this command to define an area as a stub area.

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

Command Syntax

```
(no) area AREAID stub (no-summary)
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer 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

Usage

Configures the `area stub` command on all routers in the 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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# area 1 stub
```

Related Commands

`area default-cost`

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 break the virtual-link.

Command Syntax

```
area AREAID virtual-link A.B.C.D (INTERVAL)
no area AREAID virtual-link A.B.C.D (INTERVAL|INSTID)
AREAID = A.B.C.D|<0-4294967295>
```

A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.

INTERVAL = dead-interval|hello-interval|retransmit-interval|transmit-delay
VALUE
VALUE = <1-65535> The number of seconds in the delay or interval.

dead-interval The interval during which no packets are received and after which the router considers neighboring router as off-line. The default is 40 seconds.

hello-interval The interval the router waits before it sends a Hello packet. The default is 10 seconds.

retransmit-interval The interval the router waits before it retransmit a packet. The default is 5 seconds.

transmit-delay The delay to be added to LS age when an LSA is transmitted.

INSTID = instance-id <0-255>
<0-255> Specifies interface instance ID. The default value is 0.

Command Mode

Router mode

Usage

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. To configure virtual link, include both the transit area ID and the corresponding virtual link neighbor's router ID in the virtual link neighbor. To see the router ID use the `show ip ospf` command.

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.

`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.

`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.

Examples

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

Related commands

`show ipv6 ospf virtual-links`

auto-cost reference bandwidth

Use this command to control how OSPFv3 calculates default metrics for the interface by changing the reference bandwidth.

Use the `no` parameter with this command to assign cost based only on the interface bandwidth.

Command Syntax

```
auto-cost reference-bandwidth <1-4294967>
no auto-cost reference-bandwidth
    <1-4294967> The reference bandwidth in terms of Mbits per second. The default reference bandwidth is
    100 Mbps.
```

Command Mode

Router mode

Default

100 Mbps

Usage

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.

Examples

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

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

Related Commands

`ipv6 ospf cost`

capability restart

Use this command to enable OSPFv3 graceful restart capability.

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

Note: This command is available only when the `--enable-restart` configuration option is enabled when compiling ZebOS.

Command Syntax

```
(no) capability restart
```

Default

Enabled

Command Mode

Router mode

Usage

By default, the restart capability is enabled (if compiled with `--enable-restart`). If a router is not restart-capable, it cannot enter Graceful Restart mode and act as a helper.

Examples

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

capability te

Use this command to enable the ZebOS Traffic Engineering feature. The ZebOS process generates TE LSAs for each link it is configured for.

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

Command Syntax

```
(no) capability te
```

Default

Disabled

Command Mode

Router mode

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# capability te
```

Related Commands

ipv6 te-metric

clear ipv6 ospf process

Use this command to clear and restart the OSPFv3 routing process. If no WORD is specified, all OSPFv3 processes are cleared.

Command Syntax

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

Command Mode

Privileged Exec Mode

Examples

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

debug ipv6 ospf events

Use this command to specify debugging options for OSPFv3 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

```
(no) debug ipv6 ospf events (abr|asbr|os|router|vlink)
abr shows ABR events
asbr shows ASBR events
os shows OS interaction events
router shows other router events
vlink shows virtual link events
```

Command Mode

Privileged Exec mode and Configure mode

Usage

The `debug ipv6 ospf events` command enables the display of debug information related to OSPF internal events.

Examples

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

Related Commands

log file

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

```
(no) debug ipv6 ospf ifsm (status|events|timers)
status Displays IFSM status information
events Displays IFSM event information
timers Displays IFSM timer information
```

Command Mode

Privileged Exec mode and Configure mode

Examples

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

Related Commands

log file

debug ipv6 ospf lsa

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

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

Command Syntax

```
(no) debug ipv6 ospf lsa (flooding|generate|install|maxage|refresh)
    flooding Displays LSA flooding.
    generate Displays LSA generation.
    install Show LSA installation.
    maxage Shows maximum age of the LSA in seconds.
    refresh Displays LSA refresh.
```

Command Mode

Privileged Exec mode and Configure mode

Examples

```
ZebOS# 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

```
(no) debug ipv6 ospf nfsm (status|events|timers)
    status Displays NFSM status information.
    events Displays NFSM event information.
    timers Displays NFSM timer information.
```

Command Mode

Privileged Exec mode and Configure mode

Examples

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

Related Commands

log file

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

```
(no) debug ipv6 ospf nsm (redistribute|interface)
    redistribute Specifies zebos redistribute.
    interface Specifies the debugging of nsm interface.
```

Command Mode

Privileged Exec mode and Configure mode

Examples

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

debug ipv6 ospf packet

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

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

Command Syntax

```
(no) debug ipv6 ospf packet (dd|detail|hello|ls-ack|ls-request|
    ls-update|recv|send)
    dd OSPFv3 database description
    detail Detail information
    hello OSPFv3 hello
    ls-ack OSPFv3 Link State Acknowledgment
    ls-request OSPFv3 Link State Request
    ls-update OSPFv3 Link State Update
    recv Packet received
    send Packet sent
```

Command Mode

Privileged Exec mode and Configure mode

Examples

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

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

```
(no) debug ipv6 ospf route (ase|install|spf|ia)
    ase Specifies the debugging of external route calculation
    install Specifies the debugging of route installation
    spf Specifies the debugging of SPF calculation
    ia Specifies the debugging of Inter-Area route calculation
```

Command Mode

Privileged Exec mode and Configure mode

Examples

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

default-metric

Use this command to set default metric values for the OSPFv3 routing protocol.

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

Command Syntax

```
default-metric <1-16777214>
no default-metric
<1-16777214> Default metric value appropriate for the specified routing protocol.
```

Default

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

Command Mode

Router mode

Usage

A default metric facilitates redistributing routes even with incompatible metrics. If the metrics do not convert, the default metric provides an alternative and enables the redistribution to continue. Default-metric command is used to cause the current routing protocol to use the same metric value for all redistributed routes. Use this command in conjunction with the `redistribute` command.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# default-metric 100
```

Related commands

`redistribute`

enable db-summary-opt

Use this command to enable the database summary list optimization for OSPFv3. The default setting is disabled.

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

Command Syntax

```
(no) enable db-summary-opt
```

Command Mode

Router mode

Usage

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.

Examples

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

ipv6 ospf cost

Use this command to specify the link-cost described in LSAs.

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

Command Syntax

```
ipv6 ospf cost COST (INSTID)
no ipv6 ospf cost (INSTID)

COST = <1-65535> Specifies the cost of the interface. The default value is 10.
INSTID = instance-id <0-255>
<0-255> Specifies instance ID of the interface. The default value is 0.
```

Command Mode

Interface mode

Usage

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. If instance ID is specified, the cost value is applied to an instance with the same instance ID on the interface.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf cost 20 instance-id 1
```

Related Commands

show ipv6 ospf interface

ipv6 ospf dead-interval

Use this command to set the interval during which no `hello` packets are received and after which a neighbor is declared dead.

Use the `no` parameter with this command to reset the interval to default.

Command Syntax

```
ipv6 ospf dead-interval INTERVAL (INSTID)
```

```
no ipv6 ospf dead-interval (INSTID)
    INTERVAL= <1-65535> Specifies the interval in seconds. The default interval is 40 seconds.
    INSTID = instance-id <0-255>
    <0-255> Specifies instance ID of the interface. The default value is 0.
```

Command Mode

Interface mode

Usage

Dead-interval is advertised in the Hello packets. When receiving Hello packets, OSPF router compares dead-interval in a receiving packet and the dead-interval configured on the receiving interface. If the intervals do not match, the Hello packet is discarded. Dead-interval is the amount of time that the router waits to receive an OSPF Hello packet from the neighbor before declaring the neighbor down.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf dead-interval 20
```

Related commands

ipv6 ospf hello-interval, show ipv6 ospf interface

ipv6 ospf display route single-line

Use this command to change the result of the show ipv6 ospf route command.

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

Command Syntax

```
(no) ipv6 ospf display route single-line
```

Command Mode

Configure mode

Usage

By default, the `show ipv6 ospf route` command displays routes in multiple lines. This command changes the result to show each route entry in a single-line.

Examples

```
ZebOS# configure terminal
ZebOS(config)# ipv6 ospf display route single-line
```

Related Commands

show ipv6 ospf route

ipv6 ospf hello-interval

Use this command to specify the interval between `hello` packets.

Use the `no` parameter with this command to reset the interval to default.

Command Syntax

```
ipv6 ospf hello-interval INTERVAL (INSTID)
no ipv6 ospf hello-interval (INSTID)
INTERVAL= <1-65535> Specifies the interval in seconds. The default interval is 10 seconds.
INSTID = instance-id <0-255>
<0-255> Specifies instance ID of the interface. The default value is 0.
```

Command Mode

Interface mode

Usage

Hello-interval is advertised in the Hello packets. When receiving Hello packets, the OSPF router compares Hello interval in the receiving packet with the interval configured on the receiving interface. If this interval does not match, Hello packet is discarded. A shorter Hello-interval ensures faster detection of topological changes, but this also results in more routing traffic.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf hello-interval 5 instance-id 1
```

Related commands

ipv6 ospf dead-interval, show ipv6 ospf interface

ipv6 ospf neighbor

Use this command to configure OSPFv3 routers interconnecting to non-broadcast networks.

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

Command Syntax

```
(no) ipv6 ospf neighbor X:X::X:X (COST) (PRIORITY|POLL-INTERVAL) INSTID
X:X::X:X = Neighbor ID.
COST = cost <1-65535> Cost of the interface. The default value is 10. Not applicable to non-broadcast
multiaccess (NBMA) networks.
PRIORITY = priority <0-255> Priority. The default priority is 1. Not applicable to point-to-multipoint
interfaces.
POLL-INTERVAL = poll-interval <1-65535>. Dead neighbor polling interval in seconds. It is recommended
to set this value much higher than the hello interval. The default value is 120 seconds.
INSTID = instance-id <0-255>
<0-255> Specifies instance ID of the interface. The default value is 0.
```

Command Mode

Interface mode

Usage

One neighbor entry must be included for each known non-broadcast network neighbor. The neighbor address must be a link-local address of the neighbor.

Note: The `priority` keyword does not apply to point-to-multipoint interfaces. For point-to-multipoint interfaces, the `cost` keyword and the number argument are the only applicable options. The `cost` keyword does not apply to non-broadcast multiaccess (NBMA) networks.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf neighbor 2000:500::1 cost 2 instance-id 3
```

ipv6 ospf priority

Use this command to set the router priority for determining the designated router for the network.

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

Command Syntax

```
ipv6 ospf priority PRIORITY (INSTID)
no ipv6 ospf priority (INSTID)
PRIORITY = <0-255> Specifies the priority. The default priority is 1.
INSTID = instance-id <0-255>
<0-255> Specifies interface instance ID. The default value is 0.
```

Default

The default priority is 1.

Command Mode

Interface mode

Usage

Set the priority to help to determine the OSPF Designated Router (DR) for a network. If more than one router attempts to become the DR, the router with higher priority becomes DR. If the router priority is the same amongst routers, the router with highest router ID breaks a tie.

Only routers with non-zero router priority values are eligible to become the designated router or Backup designated router. Router priority values are only valid for broadcast or NBMA networks, since DR election is triggered only on these type of networks.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf priority 127
```

Related Commands

```
show ipv6 ospf interface
```

ipv6 ospf restart grace-period

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

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

Note: This command is available only when the `--enable-restart` configuration option is enabled when compiling ZebOS.

Command Syntax

```
ipv6 ospf restart grace-period <1-1800>
no ipv6 ospf restart grace-period
    <1-1800> Specifies the grace period in seconds.
```

Default

The default grace period is 120 seconds.

Command Mode

Configure mode

Usage

Use this command to enable the OSPF Graceful Restart feature on the OSPFv3 daemon to handle an unplanned restart as a graceful restart. If this command is configured, NSM is notified about the Grace Period. In case the OSPFv3 daemon unexpectedly shuts down, NSM sends this value to the OSPFv3 daemon when it comes up again. OSPFv3 daemon uses this value to end the Graceful state.

Examples

```
ZebOS# configure terminal
ZebOS(config)# ipv6 ospf graceful-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.

Note: This command is available only when the `--enable-restart` configuration option is enabled when compiling ZebOS.

Command Syntax

```
ipv6 ospf restart helper never router-id A.B.C.D
    router-id Router ID of neighbor to never to act as helper
    A.B.C.D Router ID in IPv4 address format
ipv6 ospf restart helper POLICY
    POLICY = only-reload|only-upgrade|max-grace-period <1-1800>
    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
no ipv6 ospf restart helper never router-id A.B.C.D|all
```

```
router-id Router ID of neighbor to never to act as helper
A.B.C.D Router ID in IPv4 address format
all All router IDs
no ipv6 ospf restart helper POLICY
POLICY = only-reload|only-upgrade|max-grace-period <1-1800>
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
```

Command Mode

Configure mode

Usage

Use the `never` parameter with the `ipv6 ospf restart helper` command to prevent the neighbor from entering Helper mode.

Use the `POLICY` parameters with the `ipv6 ospf restart helper` command to configure certain local policies on the helper. If the configured policies are satisfied, only a router can act as helper.

Use the `never router-id all` parameter with the `no ipv6 ospf restart helper` command to remove all neighbor IDs from the never router ID list.

Examples

```
ZebOS# configure terminal
ZebOS(config)# ipv6 ospf restart helper never router-id 1.1.1.1

ZebOS# configure terminal
ZebOS(config)# ipv6 ospf restart helper only-reload

ZebOS# configure terminal
ZebOS(config)# ipv6 ospf restart helper only-reload max-grace-period 200

ZebOS# configure terminal
ZebOS(config)# no ipv6 ospf restart helper never

ZebOS# configure terminal
ZebOS(config)# no ipv6 ospf restart helper router-id all

ZebOS# configure terminal
ZebOS(config)# no ipv6 ospf restart helper only-upgrade only-reload
```

ipv6 ospf retransmit-interval

Use this command to set the interval between retransmission of Link State Update packets for adjacencies belonging to the interface.

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

Command Syntax

```
ipv6 ospf retransmit-interval INTERVAL (INSTID)
no ipv6 ospf retransmit-interval (INSTID)
INTERVAL = <3-65535> Specifies the interval in seconds. The default interval is 5 seconds.
```

INSTID = instance-id <0-255>
<0-255> Specifies instance ID of the interface. The default value is 0.

Command Mode

Interface mode

Usage

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 set time (retransmit interval) it sends the LSA to the neighbor again.

This value is also used to retransmit DD packet and Link State Request packet.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf retransmit-interval 3
```

Related Commands

show ipv6 ospf interface

ipv6 ospf transmit-delay

Use this command to set the estimated time it takes to transmit a Link State Update packet over the interface.

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

Command Syntax

```
ipv6 ospf transmit-delay DELAY (INSTID)
no ipv6 ospf transmit-delay (INSTID)

DELAY=<1-65535> Specifies the delay in seconds. The default delay value is 1 second.
INSTID = instance-id <0-255>
<0-255> Specifies instance ID of the interface. The default value is 0.
```

Command Mode

Interface mode

Usage

The transmit-delay value is added to the LS age of LSAs and is advertised through this interface whenever the LSAs are transmitted.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 ospf transmit-delay 2
```

Related Commands

show ipv6 ospf interface

ipv6 router ospf

Use this command to enable OSPFv3 routing on an interface.

Use the `no` parameter with this command to disable OSPFv3 routing on an interface.

Command Syntax

```
(no) ipv6 router ospf area AREAID (INSTID | TAG
(no) ipv6 router ospf TAG area AREAID (INSTID)
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
TAG = tag WORD instance-id <0-255>
WORD OSPFv3 process tag. It is a string comprised of any characters, numbers or symbols.
INSTID = instance-id <0-255>
<0-255> Specifies interface instance ID. The default value is 0.
```

Command Mode

Interface mode

Usage

When enabling OSPFv3 routing on an interface, specifying the Area ID is mandatory; Instance ID and Tag are optional. Each OSPFv3 process allows one instance of routing for each Instance ID. You can enable routing on an interface with one instance ID. You can run multiple OSPFv3 processes on the same interface if the instance ID is different. Similarly, different OSPF processes cannot enable OSPFv3 routing instances with the same instance ID.

Whenever the OSPFv3 process receives a packet it checks if the Instance ID present in OSPFv3 packet matches the Instance ID of the receiving interface.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 router ospf area 1 tag IPI instance-id 1
```

Related Commands

router ipv6 ospf

ipv6 te-metric

Use this command to set Traffic Engineering metric for an interface.

Use the `no` parameter with this command to unset Traffic Engineering metric for this interface.

Command Syntax

```
(no) ipv6 te-metric <1-65535>
<1-65535> The TE metric value. The default value is 0.
```

Command Mode

Interface mode

Usage

The TE metric is used in OSPFv3-TE Link State Advertisements. When the TE metric value is not set, OSPF cost value of an interface is used in TE LSAs.

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# ipv6 te-metric 6
```

Related Commands

capability te

max-concurrent-dd

Use this command to set the limit for the number of neighbors in the database exchange process that can be processed concurrently. The specified limit is for the number of neighbors from all interfaces, not per interface.

Command Syntax

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

Command Mode

Router mode

Usage

This command is useful if a router has to bring up adjacency on several neighbors and that is affecting the performance. Using this command to limit the number of neighbors that can be processed concurrently can enhance the performance of the system.

Examples

The following example sets the max-concurrent-dd value to 4 to allow processing of only 4 neighbors at a time.

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# max-concurrent-dd 4
```

passive-interface

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

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

Command Syntax

```
(no) passive-interface (NAME)
NAME Interface name
```

Command Mode

Router mode

Usage

The `passive-interface` command is used to configure OSPFv3 on simplex Ethernet interfaces. Since the simplex interfaces represent 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.

Using the `passive-interface` command without the optional parameters puts all interfaces into passive mode. Using the `no passive-interface` command without the optional parameters removes all interfaces from passive mode.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# passive-interface eth0
```

redistribute

Use this command to import routes from other routing protocols, or from another OSPFv3 instance, into OSPFv3 AS-external-LSAs.

Use the `no` parameter with this command to stop redistribution.

Command Syntax

```
redistribute PROTOCOL (METRIC|METRIC_TYPE|ROUTEMAP)
no redistribute PROTOCOL

PROTOCOL = kernel|connected|static|bgp|rip|isis|ospf (WORD)
kernel Specifies Kernel routes
connected Specifies Connected routes
static Specifies Static routes
bgp Specifies BGP routes
rip Specifies RIP (RIPng) routes
isis Specifies IS-IS routes
ospf Specifies OSPF routes
WORD Specifies OSPFv3 process tag
METRIC = metric <0-16777214>
<0-16777214> metric value put into AS-external-LSAs.
METRIC_TYPE = metric-type <1-2>
<1-2> External metric type
ROUTEMAP = route-map NAME
NAME Name of route-map. A router-map is a series of rule-sets defined in the Privileged Exec mode.
```

Command Mode

Router mode

Usage

OSPFv3 advertises routes learnt from other routing protocols, or other OSPFv3 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 `redistribute ospf` command to inject routes, learnt from other OSPF instances, into this OSPF instance to generate AS-external-LSAs.

Examples

The following example shows redistribution of BGP routes into the OSPFv3 routing table, with metric as 10.

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# redistribute bgp metric 10 metric-type 1
```

The following example shows redistribution of OSPFv3 instance `tag1` routes into the OSPFv3 instance `tag2` routing table, with metric as 10.

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf tag2
ZebOS(config-router)# redistribute ospf tag1 metric 10 metric-type 1
```

Related Commands

default-metric, route-map

restart ipv6 ospf graceful

Use this command to force restarting OSPFv3 as Graceful Restart.

Note: This command is available only when the `--enable-restart` configuration option is enabled when compiling ZebOS.

Command Syntax

```
restart ipv6 ospf graceful (grace-period <1-1800>)
```

Command Mode

Privileged Exec mode and Exec mode

Usage

After this command is executed, the router immediately shuts down and notifies NSM that OSPFv3 has shut down as Graceful. In turn, NSM preserves routes installed by OSPFv3, until the grace period expires.

Examples

```
ZebOS# restart ipv6 ospf graceful grace-period 200
```

router-id

Use this command to specify a router ID for the OSPFv3 process.

Use the `no` form of this command to force OSPFv3 to stop the routing functionality..

Command Syntax

```
router-id IPADDRESS
```

```
no router-id
```

IPADDRESS Specifies the router ID in an IPv4 address format.

Command Mode

Router mode

Usage

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.

Examples

The following example shows a fixed router ID 43.3.3.3

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# router-id 43.3.3.3
```

Related Commands

show ip ospf

router ipv6 ospf

Use this command to initiate OSPFv3 routing process and enter Router mode to configure OSPFv3 routing process.

Use the `no` parameter with this command to remove OSPFv3 process.

Command Syntax

```
(no) router ipv6 ospf (WORD)
```

WORD OSPFv3 process tag. It is a string comprised of any characters, numbers or symbols.

Command Mode

Configure mode

Usage

Use this command to initiate the OSPFv3 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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf IPI
ZebOS(config-router)#
```

Related Commands

ipv6 router ospf, router_id

show debugging ipv6 ospf

Use this command to display the OSPFv3 debugging option.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show debugging ipv6 ospf
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# show debugging ipv6 ospf
```

show ipv6 ospf

Use this command to display global and area information about OSPFv3.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG)
TAG OSPFv3 process tag
```

Command Mode

Privileged Exec mode and Exec Mode

Usage

```
ZebOS# 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
```

Examples

```
ZebOS# show ipv6 ospf
ZebOS# show ipv6 ospf IPI
```

show ipv6 ospf database

Use this command to display information in the OSPFv3 Link State Database.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG) database (LSATYPE) (ADVROUTER)
TAG OSPFv3 process tag
LSATYPE = external|grace|link|inter-prefix|inter-router|intra-
         prefix|network|router||te
external Shows AS-external-LSAs.
grace Shows a specific LSA in the OSPFv3 database.
link Shows Link-LSAs.
inter-prefix Shows Inter-Area-Prefix LSAs.
inter-router Shows Inter-Area-Router LSAs.
intra-prefix Shows Intra-Area-Prefix-LSAs.
network Shows Network-LSAs.
router Shows Router-LSAs.
te Shows TE LSAs.
ADVROUTER = adv-router A.B.C.D
A.B.C.D = Router ID of the Advertising Router.
```

Command Mode

Privileged Exec mode and Exec Mode

Usage

This is a sample output from the `show ipv6 ospf database` command displaying the database summary for the OSPFv3 information:

```
ZebOS# show ipv6 ospf database
Link-LSA (Interface eth0)
  Link State ID ADV Router Age Seq# CkSum Prefix
  0.0.0.3 1.2.3.4 104 0x80000004 0x889e 0
  0.0.0.5 5.6.7.8 142 0x80000003 0xab70 2
Router-LSA (Area 0.0.0.0)
  Link State ID ADV Router Age Seq# CkSum Link
  0.0.0.1 1.2.3.4 94 0x80000014 0xaeaa 1
  0.0.0.1 5.6.7.8 105 0x80000019 0x8a32 1
Network-LSA (Area 0.0.0.0)
  Link State ID ADV Router Age Seq# CkSum
  0.0.0.5 5.6.7.8 105 0x80000001 0xa441
Intra-Area-Prefix-LSA (Area 0.0.0.0)
  Link State ID ADV Router Age Seq# CkSum Prefix Reference
  0.0.0.1 5.6.7.8 104 0x80000001 0x8d4f 2 Network-LSA
AS-external-LSA
  Link State ID ADV Router Age Seq# CkSum
  0.0.0.1 5.6.7.8 1229 0x80000002 0xe92d
  0.0.0.2 5.6.7.8 1229 0x80000002 0xef25
  0.0.0.3 5.6.7.8 1229 0x80000002 0xf51d
```

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:

```
ZebOS# 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

      Grace Period: 320
      Restart Reason:
        Software Restart
```

Examples

```
ZebOS# show ipv6 ospf database
ZebOS# show ipv6 ospf IPI database
ZebOS# show ipv6 ospf IPI database router
ZebOS# show ipv6 ospf IPI database network adv-router 10.10.11.50
ZebOS# show ipv6 ospf IPI database grace
```

show ipv6 ospf interface

Use this command to display OSPFv3 interface information.

To modify the lines displayed, use the `|` (output modifier token) ; to save the output to a file, use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf interface (IFNAME)
      IFNAME= An alphanumeric string that is 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:

```
ZebOS# 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
```

Examples

```
show ipv6 ospf interface fe80::246:4ff:f32d
```

show ipv6 ospf neighbor

Use this command to display information about an OSPFv3 neighbor.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG) neighbor (INTERFACE|A.B.C.D|detail)
TAG = OSPFv3 process tag.
A.B.C.D Neighbor ID
INTERFACE = IFNAME (detail)
IFNAME Name of the Interface
detail Detail of neighbors
```

Command Mode

Privileged Exec mode and Exec Mode

Usage

This is a sample output from the show ipv6 ospf neighbor command displaying information about the OSPFv3 neighbor.

```
ZebOS# 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
```

Examples

```
ZebOS# show ipv6 ospf neighbor
ZebOS# show ipv6 ospf IPI neighbor
ZebOS# show ipv6 ospf IPI neighbor detail
ZebOS# show ipv6 ospf IPI neighbor eth0 detail
```

show ipv6 ospf route

Use this command to display the IPv6 routing table for OSPFv3.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG) route
TAG OSPFv3 process tag
```

Command Mode

Privileged Exec mode and Exec mode

Usage

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:

```
ZebOS# 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
```

```
ZebOS# 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
E2 3ffe:100:2::1/128 10/20
fe80::203:47ff:fe4c:776e eth0
E2 3ffe:100:3::1/128 10/20
fe80::203:47ff:fe4c:776e eth0
IA 3ffe:101:1::/48 20
```

```
fe80::203:47ff:fe4c:776e eth0
IA 3ffe:101:2::/48 20
fe80::203:47ff:fe4c:776e eth0
IA 3ffe:101:3::/48 20
fe80::203:47ff:fe4c:776e eth0
```

Example

```
ZebOS# show ipv6 ospf route
ZebOS# show ipv6 ospf IPI route
```

show ipv6 ospf topology

Use this command to display information about OSPFv3 topology for each area.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG) topology (area AREAID)
TAG OSPFv3 process tag
AREAID = A.B.C.D|<0-4294967295>
A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
```

Command Mode

Privileged Exec mode and Exec Mode

Usage

```
ZebOS# show ipv6 ospf 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
```

Examples

```
ZebOS# show ipv6 ospf topology
ZebOS# show ipv6 IPI ospf topology
```

show ipv6 ospf virtual-links

Use this command to display information about OSPFv3 virtual-links.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show ipv6 ospf (TAG) virtual-links
TAG OSPFv3 process tag
```

Command Mode

Privileged Exec mode and Exec Mode

Usage

```
ZebOS# 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
```

Examples

```
ZebOS# show ipv6 ospf virtual-links
ZebOS# show ipv6 ospf IPI virtual-links
```

timers spf

Note: Use this command to adjust route-calculation timers.

Use the `no` parameter of this command to return to the default timer values.

Command Syntax

```
timers spf SPF-DELAY SPF-HOLDTIME
no timers spf SPF-DELAY SPF-HOLDTIME
```

SPF-DELAY= <0-2147483647> Specifies the delay between receiving a change to SPF calculation. The default spf-delay value is 5 seconds

SPF-HOLDTIME= <0-2147483647> Specifies hold time between consecutive SPF calculations. The default spf-holdtime value is 10 seconds.

Command Mode

Router mode

Usage

The `timer spf` command configures the delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF). This command also configures the hold time between two consecutive SPF calculations.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# timers spf 5 10
```

Related Commands

timers spf exp

Use this command to adjust route-calculation timers using exponential back-off delays.

Use the `no` parameter with this command to return to the default exponential back-off timer values.

Command Syntax

```
timers spf exp MIN_HOLDTIME MAX_HOLDTIME
no timers spf exp
```

`MIN_HOLDTIME` = <0-2147483647> Specifies the minimum delay between receiving a change to SPF calculation in milliseconds. The default SPF minimum hold-time delay value is 50 milliseconds.

`MAX_HOLDTIME` = <0-2147483647> Specifies the maximum delay between receiving a change to SPF calculation in milliseconds. The default SPF maximum hold-time delay value is 50 seconds.

Command Mode

Router mode

Usage

The `timers spf exp` command configures the minimum and maximum delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF).

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf 100
ZebOS(config-router)# timers spf exp 5 10
```

undebg ipv6 ospf event

Use this command to disable debugging options for OSPFv3 event troubleshooting. Use this command without parameters to disable all the options.

Command Syntax

```
undebg ipv6 ospf event (abr|asbr|os|router|vlink)
abr disables debugging of ABR events
asbr disables debugging of ASBR events
os disables debugging of OS interaction events
router disables debugging of other router events
vlink disables debugging of virtual link events
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebg ipv6 ospf event abr
```

undebg ipv6 ospf ifsm

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

Command Syntax

```
undebg ipv6 ospf ifsm (status|events|timers)
events Disables debugging of IFSM event information
```

`status` Disables debugging of IFSM status information

`timers` Disables debugging of IFSM timer information

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ipv6 ospf ifsm events
```

Related Commands

undebug ipv6 ospf lsa

Use this command to disable debugging options for OSPFv3 Link State Advertisements (LSA) troubleshooting.

Command Syntax

```
undebug ipv6 ospf lsa (generate|flooding|install|maxage|refresh)
```

`generate` Disables debugging of the LSA generation.

`flooding` Disables debugging of the LSA flooding.

`install` Disables debugging of the LSA installation.

`maxage` Disables debugging of maximum age of the LSA in seconds.

`refresh` Disables debugging of LSA refresh.

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ipv6 ospf lsa refresh
```

undebug ipv6 ospf nfsm

Use this command to disable the debugging options for OSPFv3 Neighbor State Machines (NSMs).

Command Syntax

```
undebug ipv6 ospf nfsm (status|events|timers)
```

`status` Disable the logging of NSM status information.

`events` Disable the logging of NSM event information.

`timers` Disable the logging of NSM timer information.

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebug ipv6 ospf nfsm events
```

undebg ipv6 ospf nsm

Use this command to disable debugging options for OSPFv3 NSM information.

Command Syntax

```
undebg ipv6 ospf nsm (interface|redistribute)
    interface Disable logging of NSM interface information.
    redistribute Disable logging of NSM redistribute information.
```

Command Mode

Privileged Exec mode

Usage

```
ZebOS# undebg ipv6 ospf nsm interface
```

undebg ipv6 ospf packet

Use this command to disable debugging options for OSPFv3 packets.

Command Syntax

```
undebg ospf packet PARAMETERS
    PARAMETERS = dd|detail|hello|ls-ack|ls-request|ls-update
    dd Disable debugging for OSPF database descriptions.
    detail Disable the setting of the debug option set to detailed information.
    hello Disable debugging for OSPF hello packets.
    ls-ack Disable debugging for OSPF link state acknowledgments.
    ls-request Disable debugging for OSPF link state requests.
    ls-update Disable debugging for OSPF link state updates.
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebg ipv6 ospf packet ls-request rcv detail
```

undebg ipv6 ospf route

Use this command to disable route calculation for OSPFv3 debugging. Use this command without parameters to disable all the options.

Command Syntax

```
undebg ipv6 ospf route (ase|ia|install|spf)
    ia Disable the debugging of Inter-Area route calculation
    ase Disable the debugging of external route calculation
    install Disable the debugging of route installation
    spf Disable the debugging of SPF calculation
```

Command Mode

Privileged Exec mode

Examples

```
zebOS# undebug ipv6 ospf route install
```


CHAPTER 4 OSPF VPN Commands

This chapter provides an alphabetized reference of the OSPF VPN commands.

router ospf vrf

Use this command to specify a VRF instance in OSPF.

Note: This command is available only if `--enable-pece-ospf` configuration option is enabled when compiling ZebOS.

Command Syntax

```
router ospf PROCESSID VRFNAME
```

PROCESSID = <1-65535> Any positive integer identifying a routing process. The process ID should be unique for each routing process.

VRFNAME Name of the VRF to associate with this OSPF instance.

Command Mode

Configure mode

Usage

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. Refer to the *NSM Command Reference* for details on this command.

Examples

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

Related Commands

`ip vrf`

show ip vrf

Use this command to list information about existing VRFs, such as, VRF name, OSPF process ID and the name of the interface to which each VRF is assigned.

To modify the lines displayed, use the `|` (output modifier token) ; to save the output to a file, use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Note: This command is available only if `--enable-pece-ospf` configuration option is enabled when compiling ZebOS.

Command Syntax

```
show ip vrf
```

Command Mode

Exec mode and Privileged Exec mode

Usage

The following is a sample output of the `show ip vrf` command displaying the VRF information and the Process IDs of OSPF instances:

Name	OSPF PID	Interface List
qa	3	eth0
you	4	eth1
ipi	5	eth2

Examples

```
ZebOS# show ip vrf
```

show ip vrf NAME

Use this command to display VRF information for a specified VRF instance.

To modify the lines displayed, use the `|` (output modifier token) ; to save the output to a file, use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Note: This command is available only if `--enable-pece-ospf` configuration option is enabled when compiling ZebOS.

Command Syntax

```
show ip vrf NAME
```

NAME Specify the VRF name to be associated with this OSPF instance.

Command Mode

Exec mode and Privileged Exec mode

Usage

The following is a sample output of the `show ip vrf NAME` command displaying VRF information for VRF instance named `ipi`.

```
-----  
ZebOS# show ip vrf ipi  
VRF ipi; (id=3); OSPF PID is 5  
-----
```

Examples

```
ZebOS# show ip vrf VRF1
```

CHAPTER 5 CSPF-TE Commands

This chapter provides an alphabetized reference for each of the CSPF-TE commands.

capability cspf

Use this command to enable CSPF functionality for an OSPFv2 or OSPFv3 instance. Only one CSPF instance is supported in this release.

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

Command Syntax

```
(no) capability cspf
```

Command Mode

Router mode

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# capability cspf
```

capability te

Use this command to enable the ZebOS traffic engineering feature for an OSPFv2 or OSPFv3 instance. The ZebOS process generates TE LSAs for each link it is configured for.

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

Command Syntax

```
(no) capability te
```

Default

Enabled

Command Mode

Router mode

Examples

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

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# capability te
```

Related Commands

show ip ospf te-database, show ipv6 ospf te-database

cspf default-retry-interval

Use this command to set the default route computation retry interval (in seconds) 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.

Command Syntax

```
(no) cspf default-retry-interval <1-3600>
      <1-3600> The retry interval in seconds. The default interval value is 10 seconds.
```

Command Mode

Router mode

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# cspf default-retry-interval 720
```

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# cspf default-retry-interval 720
```

cspf tie-break

Use this command to set the tie-break method to one of the values (`random`, `least-fill`, `most-fill`) for an OSPFv2 or OSPFv3 instance. This selects a link (during route computation) when more than one candidate link satisfies all the route constraints, the associated cost and hop limit link attributes are equal.

Use the `no` parameter with this command to unset tie-break method.

Command Syntax

```
(no) cspf tie-break (random|least-fill|most-fill)
      random To pick any path at random. This is the default tie-break method.
      least-fill To specify preferred path to be the one with the largest minimum available bandwidth ratio.
      most-fill To specify preferred path to be the one with smallest minimum available bandwidth ratio.
```

Default

By default, the tie-break method is set to `random`.

Command Mode

Router mode

Usage

The random tie-break method places an equal number of LSPs on each link, without taking into account the available bandwidth ratio. The least-fill method equalizes the reservation on each link. The most-fill method uses one link till it is full completely and then uses the next link.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# cspf tie-break least-fill
```

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# cspf tie-break least-fill
```

debug cspf events

Use this command to enable CSPF events debugging option.

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

Command Syntax

```
(no) debug cspf events
```

Command mode

Exec and Privileged Exec modes

Usage

Following is a sample output section from the `debug cspf events` command. Some of the lines in this sample display have wrapped, please note that in the actual output the lines may not wrap.

```
ZebOS# debug cspf events
```

```
ZebOS#terminal monitor
```

```
ZebOS# 2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_rcv: 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_rcv: 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_rcv: 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
```

Examples

```
ZebOS# debug cspf events
```

debug cspf hexdump

Use this command to enable CSPF message hexdump debugging option.

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

Command Syntax

```
(no) debug cspf hexdump
```

Command Mode

Exec and Privileged Exec mode

Examples

```
ZebOS# debug cspf hexdump
```

show cspf ipv6 lsp

Use this command to display information about all the LSPs stored in the CSPF database for all OSPFv3 instances.

To modify the lines displayed, use the `|` (output modifier token); to save the output to a file use the `>` output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show cspf ipv6 lsp
```

Command mode

Exec and Privileged Exec mode

Usage

Following is a sample output from the `show cspf ipv6 lsp` command.

```
ZebOS# 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
```

Examples

```
ZebOS# show cspf ipv6 lsp
```

show cspf lsp

Use this command to display information about all the LSPs stored in CSPF database.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show cspf lsp
```

Command mode

Exec and Privileged Exec mode

Usage

Following is a sample output from the `show cspf lsp` command.

```
ZebOS# 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
```

Examples

```
ZebOS# show cspf lsp
```

show debugging cspf

Use this command to display the CSPF debugging options set.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

Command Syntax

```
show debugging cspf
```

Command node

Exec and Privileged Exec mode

Usage

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.

```
ZebOS# show debugging cspf
CSPF debugging status:
CSPF events debugging is on
ZebOS# terminal monitor
ZebOS# 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
```

Examples

```
ZebOS# show debugging cspf
```

show ip ospf te-database

Use this command to display the traffic engineering database contents for all ospf instances.

To modify the lines displayed, use the | (output modifier token) ; to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

The alternate form of this command displays traffic engineering database for specified ospf instance. This form is enabled only if OSPF virtual router feature is disabled.

Command Syntax

```
show ip ospf te-database
show ip ospf <0-65535> te-database
```

Command mode

Exec and Privileged Exec mode

Usage

Following is a sample output from the `show ip ospf te-database` command.

```
ZebOS# 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
    Priority 6 : 1000.000 Kbits/s
    Priority 7 : 1000.000 Kbits/s
Resource Color : 0x3
```

Examples

```
ZebOS# show ip ospf te-database
ZebOS# show ip ospf 535 te-database
```

show ipv6 ospf te-database

Use this command to display the traffic engineering database contents for all OSPFv3 instances.

To modify the lines displayed, use the | (output modifier token); to save the output to a file, use the > output redirection token. For more information, see the *ZebOS Command Line Interface Environment* chapter.

The alternate form of this command displays traffic engineering database for the specified OSPFv3 instance. This form is enabled only if the OSPFv3 virtual router feature is disabled.

Command Syntax

```
show ipv6 ospf te-database
show ipv6 ospf WORD te-database
WORD Specified OSPFv3 instance.
```

Command mode

Exec and Privileged Exec mode

Usage

Following is a sample output from the show ipv6 ospf te-database command.

```
ZebOS# 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
```

Examples

```
ZebOS# show ipv6 ospf te-database
ZebOS# show ipv6 ospf 535 te-database
```

undebg cspf events

Use this command to disable CSPF events debugging option.

Command Syntax

```
undebg cspf events
```

Command mode

Privileged Exec mode

Examples

```
ZebOS# undebg cspf events
```

undebg cspf hexdump

Use this command to disable the CSPF message hexdump debugging option.

Command Syntax

```
undebg cspf hexdump
```

Command Mode

Privileged Exec mode

Examples

```
ZebOS# undebg cspf hexdump
```


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