

ipinfusion™

ZebOS®
Advanced Routing Suite
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OSPF Command Reference
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IP Infusion Inc.
111 W. St. John Street, Suite 910
San Jose, CA 95113

(408) 794-1500 - main
(408) 278-0521 - fax

For support, questions, or comments via E-mail, contact:
support@ipinfusion.com

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About This Command Reference

Network administrators and application developers who install and configure ZebOS® ARS 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 similar to industry standards. Many of the commands may be used in scripts to automate many configuration tasks. Each command CLI 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. However, only one user is allowed to use the Configure mode at a time, to avoid multiple users from issuing configuration commands simultaneously.

The VTY shell, described in the ZebOS VTY Shell Developer Guide, gives users and administrators the ability to issue commands to several daemons from a single telnet session.

Command Line Help

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

For example, at the CLI command prompt, type `show ?` (the CLI does not display the question mark).

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

```
bgpd# 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
```

Syntax Help

The ZebOS CLI can complete the spelling of command or parameter keywords. Begin typing the command or parameter then press TAB. At the CLI command prompt type `sh:`

```
Router> sh
```

Press TAB. The CLI shows:

```
Router> show
```

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

```
Router> show i
interface ip
Router> show i
```

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

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

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

```
[IFNAME] Interface name
Router> show interface
```

This command has but one positional parameter, an interface name. Supply a value for the `IFNAME` parameter.

Command Abbreviations

The ZebOS CLI accepts abbreviations for commands. For example,

```
sh in 7
```

is the abbreviation for the `show interface` command.

Command line errors

If the router does not recognize the command after ENTER is pressed, it displays this message:

```
% Unknown command.
```

If a command is incomplete it displays this message:

```
% Command incomplete.
```

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

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

Command Reference Primer

Conventions for the syntax, procedures describing how to enter commands and how information is displayed by daemons in response to commands on the console are given in the following table.

Convention	Description
<code>command</code>	This monospaced font represents command strings entered on a command line and sample source code.
UPPERCASE	A variable parameter. Enter a value according to the descriptions that follow.
lowercase	A keyword parameter. Enter lowercase values exactly as shown
	The vertical bar. Delimits choices; select one from the list.
()	Parentheses. Encloses options. Do not enter parentheses as part of any command.

Convention	Description
[]	Square brackets: groups parameters and keywords into a single unit. Take all parts within these brackets. Do not enter brackets as part of any command.
< >	Angle brackets: enclose a numeric range. Do not enter angle brackets as part of any command.
description	Proportional font gives specific details about a parameter.
=	Equal sign: separates the command syntax from explanatory text.
.	A dot. Repeats the element that immediately follows an unspecified number of times. For example: <code>.AA:NN</code> can be expanded to: <code>1:01 1:02 1:03</code> . Do not enter the period as part of the command.
A.B.C.D	An IPv4-style address for example, <code>10.0.11.123</code> .
X:X::X:X	An IPv6-style address, for example, <code>3ffe:506::1</code> , where the <code>::</code> represents all 0s for those address components not explicitly given.

Note: Unless otherwise stated, press Enter after each command entry.

sample command name

Description of the command: what it does, when to use it and so on.

Command Syntax

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

Default

Disabled | Enabled Whether the command is default enabled or disabled before it is executed.

Command Mode

Exec, Privilege Exec, Configure mode and so on.

Usage

Describes the interactions between and among parameters and how this command is used. This, in conjunction with the Example, gives detailed information about the command usage. This section includes appropriate sample displays.

Example

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

Related Commands

Not every one but only those that are “next of kin”.

Equivalent Commands

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

Validation Commands

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

Command Negation

In this example, the OSPF `area virtual-link` command, `no` 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 this example negation is for the base command; the negated form does not take any parameters.

```
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.

Common Command Modes

The commands available for each protocol are separated into several modes (nodes) arranged in a hierarchy; Exec 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. However, only one user is allowed to use the Configure mode at a time, to avoid multiple users from issuing configuration commands simultaneously.

Exec This 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.

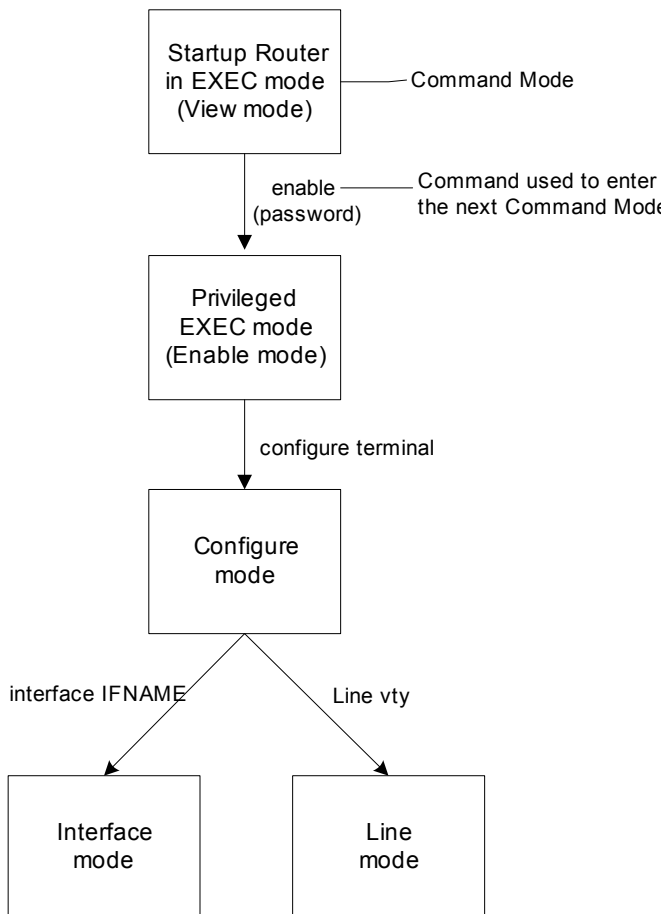
Privileged Exec This mode, also called the Enable mode, allows users to perform debugging commands, the write commands (for saving and viewing the configuration), show commands, and so on. All ZebOS daemons have this mode.

Configure Sometimes referred to as Configure Terminal, this mode serves as a gateway into the Interface, Router, Line, Route Map, Key Chain and Address Family modes. All ZebOS daemons have this mode.

Interface This 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 This mode makes available access-class commands.

This diagram shows the common command mode tree.



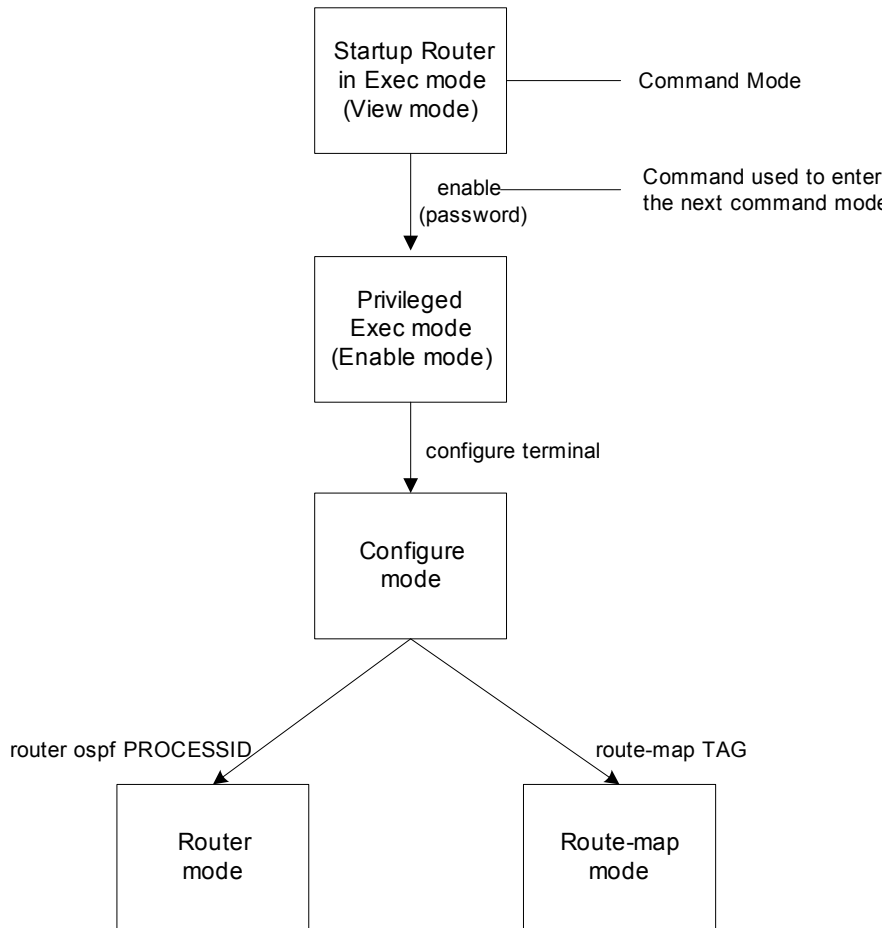
OSPF Command Modes

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
banner	toggle the displaying of the banner text.
configure terminal	enter the configure terminal mode.
copy running-config startup-config	replace the current config with the startup config
description	provide interface-specific information
disable	exit privileged exec mode
enable	enter the privilege exec command mode
enable password	change the password for the enable 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 prefix-list	create an entry for an IPv6 prefix list.
line vty	enter vty 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 stderr	begin logging information to the standard error log
log stdout	begin logging information to the standard output
log syslog	begin logging information to the system log
log trap	limit logging to a specified level or type
log vty	begin logging information to the VTY
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 interface	define the interface match criterion
match ip address	specify the match address of route
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

Command Name	Use this command to:
match route-type	match specified external route type.
match tag	match the specified tag value.
memory maximum	specify maximum limit of memory usage.
memory warning	specify the memory usage warning threshold.
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 Privileged Exec mode instead of the Exec 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.
set community-additive	add a community to the already existing communities.
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 history	display all commands used in a session.
show ip prefix-list	display the prefix list entries.
show memory	display the memory usage for the current session.
show memory all	display the memory reports for all protocols.
show memory detail	display a detailed cell list for the specified cell type.
show memory lib	display the memory report for the NSM library.
show memory stats	display statistics and counters for the specified Memory Cell Type.
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.

Command Name	Use this command to:
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
no area AREAID authentication
```

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

A.B.C.D = The IPv4 specification of the area for which to enable authentication.

<0-4294967295> = The area identification number of the area for which to enable authentication.

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 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 an OSPF authentication 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= The IPv4 specification of the address for the stub or NSSA area.
AREAADDRESSID= The area identification number for the stub or NSSA area.
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 `draft-ietf-nssa-update-11.txt` 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 export-list

Use this command to define restrictions on routes that are advertised from a specified area to other areas.

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

Command Syntax

```
area AREAID export-list NAME
no area AREAID export-list
AREAID=A.B.C.D|<0-4294967295>
A.B.C.D= The IPv4 specification of the address for the stub or NSSA area.
<0-4294967295>= The area identification number for the stub or NSSA area.
NAME The name of the configured access list.
```

Command Mode

Router mode

Usage

Use the `export-list` in combination with the access list to specify the routes that will be advertised to other areas.

This command is applied only when generating summary-LSAs (type 3).

Examples

```
ZebOS# configure terminal
ZebOS(config)# access-list list1 deny 172.22.0.0/8
ZebOS(config-router)# area 1 export-list list1
```

Related Commands

access-list, area import-list

area import-list

Use this command to define restrictions on routes that are advertised from other areas to a specified area.

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

Command Syntax

```
area AREAID import-list NAME
no area AREAID import-list
AREAID=A.B.C.D|<0-4294967295>
A.B.C.D= The IPv4 specification of the address for the area.
<0-4294967295>= The area identification number for the area.
NAME The name of the configured access list.
```

Command Mode

Router mode

Usage

In conjunction with IP access list, this command is used to configure routes outside the area that will be advertised into this area.

This command is only applied when generating summary LSAs (type 3).

Examples

```
ZebOS# configure terminal
ZebOS(config)# access-list list1 deny 172.22.0.0/8
ZebOS(config)# router ospf 100
ZebOS(config-router)#area 1 import-list list1
```

Related Commands

access-list, area export-list

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 (A.B.C.D|AREAID) nssa (TRANSLATE) (OTHER)
```

```
(no) area (A.B.C.D|AREAID) nssa
```

A.B.C.D The IPv4 address of the area

AREAID = <0-4294967295> The numerical identifier of the area

TRANSLATE = (translate-candidate|translate-never|translate-always) (OTHER)

translate-candidate NSSA-ABR default behavior. the router may translate if it is elected. It has the possibility to become NSSA-translator.

translate-never NSSA-ABR never translate type5/7 LSAs

translate-always NSSA-ABR always translate type5/7 LSAs.

OTHER = (no-redistribution|default-information-originate|no-summary)

no-redistribution Do not redistribute external route into NSSA.

default-information-originate originate default information to NSSA.

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

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 1 nssa
```

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|SUBSTITUTE)
```

```
no area AREAID range
  AREAID= A.B.C.D|<0-4294967295>
    A.B.C.D= The IPv4 address specification of the address for the stub or NSSA area.
    <0-4294967295>= The area identification number for the stub or NSSA area.
  ADDRESS= A.B.C.D/M The area range prefix and length.
  advertise Advertises this range.
  not-advertise Does not advertise this range.
  SUBSTITUTE = substitute A.B.C.D/M Announce area range as another prefix.
    A.B.C.D/M = Network prefix to be announced instead of 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
```

Related Commands

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= The IPv4 address specification of the address for the area.
    <0-4294967295>= The area identification number for the area.
  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= The IPv4 address specification of the identifier for the stub area.
<0-4294967295>= The area identification number for the stub area.
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 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 nonbackbone area.

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

Command Syntax

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

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

A.B.C.D= OSPF area ID in IP address format.

<0-4294967295>= range of the number of the OSPF area to be linked.

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

AUTHENTICATION = authentication (message-digest|null|AUTH_KEY)

authentication= Enable authentication on this virtual link

message-digest = Use message-digest authentication.

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

AUTH_KEY = authentication-key KEY

KEY = An 8 character password

INTERVAL=dead-interval|hello-interval|retransmit-interval|transmit-delay VALUE

VALUE = <1-65535> The number of seconds in the delay or interval.

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

retransmit-interval= The interval the router waits before it retransmits a packet. The default is five seconds.

transmit-delay= The interval the router waits before it transmits a packet. The default value is one second.

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

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

Related Commands

area authentication, show ip ospf

auto-cost

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 type.

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

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
```

Related Commands

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 event (abr|asbr|lsa|nssa|os|router|vl)
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
vl 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 (generate|flooding|install|maxage|refresh)
      generate Displays LSA generation.
      flooding Displays LSA flooding.
      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 nsm

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

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

Command Syntax

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

Command Mode

Privileged EXEC mode Configure mode

Usage

The `debug ospf nsm` command enables the display of debug information related to the Neighbor State Machine (NSM).

Examples

```
ZebOS# debug ospf nsm events
ZebOS# no debug ospf nsm timers
```

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 (send|recv) (detail)
PARAMETERS = all|dd|hello|ls-request|ls-update|ls-ack
all Specifies debugging for all OSPF packets.
dd Specifies debugging for OSPF database descriptions.
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.
send Specifies the debug option set for sent packets.
recv Specifies the debug option set for received packets.
detail Sets the debug option set to detailed information.
```

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 all 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 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

debug ospf zebos

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

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

Command Syntax

```
(no) debug ospf zebos (interface|redistribute)
      interface Specifies the zebos interface.
      redistribute Specifies zebos redistribute.
```

Command Mode

Privileged EXEC mode and Configure mode

Usage

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

Examples

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

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|ROUTE)
no default-information originate
      ALWAYS = always (METRIC|ROUTE) Used to advertise the default route regardless of whether the
              software has a default route.
      METRIC = [METRIC METRIC-TYPE] | [METRIC-TYPE METRIC]
      METRIC= metric <0-16777214> (ROUTE)
```

`metric` Sets the OSPF metric used in creating the default route. The default metric value is 10. The value used is specific to the protocol.

`METRIC-TYPE= metric-type 1|2 (ROUTE)`

`metric-type` Sets the OSPF external link type for default routes.

1 Sets OSPF External Type 1 metrics.

2 Sets OSPF External Type 2 metrics.

`ROUTE = 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 <0-16777214>
no default-metric
<0-16777214> 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

description

Use this command to add a description to an interface.

Use the no parameter with this command to remove the description.

Command Syntax

```
description LINE
no description
LINE 1-1023 characters that are a description of the ZebOS interface.
```

Command Mode

Interface mode

Usage

Examples

```
ZebOS# configure terminal
ZebOS(config)# interface eth0
ZebOS(config-if)# description This interface is ethernet interface
```

Related Commands

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 DISTANCE
ROUTE1= external Sets the distance for routes from other routing domains, learned by redistribution.
```

`ROUTE2= inter-area` Sets the distance for all routes from one area to another area.

`ROUTE3= intra-area` Sets the distance for all routes within an area.

`DISTANCE= <1-255>` Distance for external, intra-area, or inter-area routes.

Note: Include `ROUTE1`, `ROUTE2` and `ROUTE3` parameters one time each in a single command in any order.

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
```

Related Commands

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= kernel| connected| static| rip| bgp|isis`

`kernel` Specifies kernel routes.

`connected` Specifies connected routes.

`static` Specifies static routes.

`rip` Specifies RIP routes.

`bgp` Specifies BGP routes.

`isis` Specifies IS-IS 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

enable-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) enable-te
```

Command Mode

Router mode

Usage

Examples

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

Related Commands

show ip ospf te-database

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 authentication (A.B.C.D|MESSAGE|NULL)
no ip ospf authentication
```

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

MESSAGE = message-digest (A.B.C.D) Use message-digest authentication.

NULL = null (A.B.C.D) 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 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 authentication-key AUTHKEY (A.B.C.D)
no ip ospf authentication-key (A.B.C.D)
```

AUTHKEY = Specifies the authentication password. Any continuous string of characters (not more than 8 bytes)

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

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 authentication-key test
```

Equivalent Commands

ospf authentication-key, 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 cost COST (A.B.C.D)
no ip ospf cost (A.B.C.D)

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

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 cost 10 10.10.10.50
```

Related Commands

show ip ospf interface, auto-cost

Equivalent Commands

ospf 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 database-filter all out (A.B.C.D)
no ip ospf database-filter (A.B.C.D)
    all = Filter all LSAs
    out = Outgoing LSAs
    A.B.C.D = IP address of the interface.
```

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
```

Related Commands

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

Equivalent Commands

ospf dead-interval

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
```

Related Commands

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

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

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

Equivalent Commands

ospf hello-interval

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 message-digest-key KEYID md5 KEY (A.B.C.D)
no ip ospf message-digest-key KEYID (A.B.C.D)
KEYID= <1-255> Specifies a key ID.
md5 Uses the MD5 algorithm.
KEY= 1-16 characters that specify the OSPF password.
A.B.C.D = IP address of the interface.
```

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

Equivalent Commands

ospf message-digest-key

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
```

Related Commands

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 behaviour 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
```

Equivalent Commands

`ospf network`

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 priority <1-255> (A.B.C.D)
```

```
no ip ospf priority (A.B.C.D)
    A.B.C.D = IP address of the interface.
```

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

INTERVAL= <3-65535> Specifies the time in seconds between retransmissions. Default interval value is 5
seconds.
A.B.C.D = IP address of the interface.
```

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 ospf retransmit-interval 6
```

Related Commands

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 transmit-delay DELAY (A.B.C.D)
no ip ospf transmit-delay (A.B.C.D)
```

DELAY= <1-65535> Specifies the time taken, in seconds, to transmit a link-state-update. The default transmit delay value is 1 second.

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

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
```

Equivalent Commands

`ospf transmit-delay`

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 NEIGHBORADDRESS PRIORITY|POLL
```

NEIGHBORADDRESS=A.B.C.D Specifies the interface IP address of the neighbor.

PRIORITY=`priority` <0-255> (POLL) Specifies the 8-bit number indicating the router priority value of the non-broadcast neighbor associated with the IP address specified. The default is 0. This keyword does not apply to point-to-multipoint interfaces.

POLL=`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 is 120 seconds.

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
```

Related Commands

network area

Use this command to enable OSPF routing with a specified Area 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
```

```
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> Specifies the OSPF area ID that is to be associated with the Network Address.

Default

No `network area` is configured.

Command Mode

Router mode

Usage

OSPF routing can be enabled per IPv4 subnet basis. Each subnet can belong to one particular OSPF area. 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.

Examples

```
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
```

Related commands

opaque-lsa-capable

Use this command to enable opaque-lsa.

Use the no parameter with this command to disable it.

Command Syntax

```
(no) opaque-lsa-capable
```

Default

Enabled

Command Mode

Router mode

Usage

Opaque-LSAs are Type 9, 10 and 11 LSAs that deliver information used by external applications. When using this command, restart the OSPF router.

Examples

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

Related commands

ospf abr-type

Use this command to set an OSPF area border router (ABR) type.

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

Command Syntax

```
ospf abr-type cisco|ibm|shortcut|standard
```

```
no ospf abr-type cisco|ibm|shortcut
    cisco Specifies an alternative ABR using Cisco implementation.
    ibm Specifies an alternative ABR using IBM implementation.
    shortcut Specifies a shortcut ABR.
    standard Specifies a standard behavior ABR that conforms to RFC 2328 (Default).
```

Command Mode

Router mode

Usage

Specify the ABR type for better functioning between different implementations. This command is specially useful in a multi-vendor environment.

Examples

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

Related Commands

area short-cut

ospf authentication-key

Use this command to assign a password to be used by neighboring routers.

Use the `no` parameter with this command to remove a previously assigned password.

Command Syntax

```
ospf authentication-key AUTHKEY
no ospf authentication-key
    AUTHKEY Specifies the authentication password. Any continuous string of characters (not more than 8 bytes)
```

Default

Authentication password not specified.

Command Mode

Interface mode

Usage

The `authentication-key` command creates a key (password) which is inserted into the OSPF header, when ZebOS software originates routing protocols packets. You can assign a separate password to each network for different interfaces. All neighboring routers on the same network must have the same password to enable exchange of OSPF information.

The password can be used only if authentication has been enabled for an area. Use the `area authentication` command to enable authentication.

Simple password authentication allows a password to be configured per 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)# ospf authentication-key test
```

Related Commands

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

ospf cost

Use this command to explicitly specify the cost of sending a packet on an interface.

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

Command Syntax

```
ospf cost COST
no ospf cost
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. It is inversely proportional to the bandwidth of that interface. By default, the `cost` of an interface is calculated based on the bandwidth ($10^8 / \text{bandwidth}$); use this command to set cost manually.

Examples

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

Equivalent Commands

`ip ospf cost`

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 disable this function

Command Syntax

```
ospf dead-interval INTERVAL
no ospf dead-interval
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

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

Equivalent Commands

ip ospf dead-interval

ospf hello-interval

Use this command to specify the interval between hello packets that the ZebOS software sends on the interface.

Use the no parameter with this command to return to the default setting.

Command Syntax

```
ospf hello-interval INTERVAL
no ospf hello-interval
INTERVAL= <1-65535> Specifies the interval in seconds. The default interval is 10 seconds.
```

Command Mode

Interface mode

Usage

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 this also results in more routing traffic.

Examples

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

Equivalent Commands

ip ospf hello-interval

ospf hitless-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.

Command Syntax

```
(no) ospf hitless-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 Hitless 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 `Hitless` state.

Examples

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

Equivalent Commands

ospf hitless-restart helper

Use this command to configure the `helper` behavior for Hitless Restart.

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

Command Syntax

```
(no) ospf hitless-restart helper (never|POLICY)
      never Never to act as Helper
      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

Examples

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

Equivalent Commands

ospf message-digest-key

Use this command to enable OSPF MD5 authentication.

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

Command Syntax

```
ospf message-digest-key KEYID md5 KEY
no ospf message-digest-key
KEYID= <1-255> the key identifier.
md5 Uses the MD5 algorithm.
KEY the alphanumeric password of up to 16 bytes. All characters except white space and control character.
```

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 keys. 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 key. This allows neighboring routers to continue communication while the network administrator is updating them with a new key. The router will stop sending duplicate packets once it detects that all of its neighbors have adopted the new key.

Maintain only one key per interface, removing the old key whenever you add a new one. This will prevent the local system from continuing to communicate with the system that is using the old key. Removing the old key also reduces overhead during rollover.

All neighboring routers on the same network must have the same key value to enable exchange of OSPF information.

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

Equivalent Commands

ip ospf message-digest-key

ospf network

Use this command to configure the OSPF network type to a type other than the default for a given medium.

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

Command Syntax

```
ospf network broadcast|non-broadcast|point-to-multipoint|point-to-point
```

```
no ospf network
```

`broadcast` Specifies OSPF broadcast as a multi-access network.

`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

The default is the `broadcast` type.

Command Mode

Interface mode

Usage

Use `ospf network` command to configure broadcast networks as nonbroadcast multiaccess networks (NBMA) and vice versa. You would need to do this if you have routers in your network that do not support multicast addressing.

The `ospf network` command saves you from having to configure neighbors. Configuring NBMA networks requires a fully meshed network or a virtual circuit connecting every router. In case the network is not fully meshed, configure the OSPF network type as a point-to-multipoint network. Routing between two routers that are not directly connected will go through the router that has virtual circuits to both routers.

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)# ospf network point-to-point
```

Equivalent Commands

ip ospf network

ospf priority

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

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

Command Syntax

```
ospf priority <0-255>
no ospf priority
```

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 becomes DR.

Only a router with a nonzero router priority value is 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)# ospf priority 3
```

Related Commands

`show ip ospf`

Equivalent Commands

`ip ospf priority`

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

ospf transmit-delay

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

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

Command Syntax

```
ospf transmit-delay DELAY
no ospf transmit-delay
DELAY= <1-65535> the delay in seconds. The default transmit delay value 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
ZebOSZebOS(config-if)# ospf transmit-delay 3
```

Equivalent Commands

ip ospf transmit-delay

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 MAXDBSIZE WAITTIME
no overflow database external
```

`MAXDBSIZE = <0-4294967294>` The maximum size of external database. Note that this value should be the same on all routers in the AS.

`WAITTIME = <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 `WAITTIME` to recover from this state.

Examples

The following example shows setting the size of database overflow 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
```

Related Commands

passive-interface

Use this command to suppress sending Hello packets on the 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.

Examples

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

Related Commands

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 (METRICS|ROUTE)
no redistribute PROTOCOL
PROTOCOL = bgp| isis| rip| connected| static| kernel
    bgp Specifies BGP
    connected Specifies connected routes
    kernel Specifies kernel routes
    rip Specifies RIP
    static Specifies static routes
    isis Specifies IS-IS routes
METRICS = [METRIC METRIC-TYPE] |[METRIC-TYPE METRIC]
METRIC = metric <0-16777214> (ROUTE)
METRIC-TYPE = metric-type <1-2> (ROUTE)
ROUTE = route-map WORD
WORD = A pointer to route-map entries list. It is a string comprised of any characters, numbers or symbols.
```

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
```

Related Commands

refresh timer

Use this command to adjust refresh parameters.

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

Command Syntax

```
(no) refresh timer TIMERVALUE
TIMERVALUE = <10-1800> Timer value in seconds. The default refresh time is 10 seconds.
```

Command Mode

Router mode

Usage

Use this command to set the Refresh Timer value in seconds. OSPF requires each LSA to be refreshed by the originating router in every 30 minutes. Refresh timer in the OSPF sets the time interval for LSAs to be refreshed. The requirement for each LSA to be refreshed every 30 minutes is

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ospf 100
ZebOS(config-router)# refresh timer 12
```

Related Commands

restart ospf hitless

Use this command to force restarting OSPF as Hitless Restart.

Command Syntax

```
restart ospf hitless (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 Hitless and NSM preserves routes installed by OSPF until grace-period expires.

Examples

```
ZebOS# restart ospf hitless grace-period 200
```

Equivalent Commands

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

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

For releases starting with 1.1, `router ospf` command forces the router into compatibility mode. This mode supports only one OSPF instance and prevents the creation of other instances of OSPF. For multiple instances-- first, use the `no router ospf` command to end the single instance routing process, and then, configure multiple instances by specifying the process ID parameter for each instance.

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)#
```

Related Commands

show debugging ospf

Use this command to display the set OSPF debugging option.

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
```

Related Commands

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.

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 and third outputs show information only about the instances specified by the process ID.

OSPF Commands

ZebOS# **show ip ospf**

```
OSPF Routing Process 1, Router ID: 10.10.11.60
Supports only single TOS (TOS0) routes
This implementation conforms to RFC2328
RFC1583Compatibility flag is disabled
Opaque-LSA capability is on
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
```

Area ID: 0.0.0.1

```
Shortcutting mode: Default, S-bit consensus: ok
Number of interfaces in this area: Total: 1, Active: 1
Number of fully adjacent neighbors in this area: 0
Area has no authentication
Number of full virtual adjacencies going through this area: 0
SPF algorithm executed 1 times
Number of LSA 1
```

OSPF Routing Process 100, Router ID: 10.10.11.60

```
Supports only single TOS (TOS0) routes
This implementation conforms to RFC2328
RFC1583Compatibility flag is disabled
Opaque-LSA capability is on
SPF schedule delay 0 secs, Hold time between two SPFs 0 secs
Refresh timer 10 secs
Number of external LSA 0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
```

Area ID: 0.0.0.0 (Backbone)

```
Number of interfaces in this area: Total: 0, Active: 0
Number of fully adjacent neighbors in this area: 0
Area has no authentication
SPF algorithm executed 1 times
Number of LSA 1
```

ZebOS# **show ip ospf 1**

```
OSPF Routing Process 1, Router ID: 10.10.11.60
Supports only single TOS (TOS0) routes
This implementation conforms to RFC2328
RFC1583Compatibility flag is disabled
Opaque-LSA capability is on
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 0
```

```
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
```

```
Area ID: 0.0.0.1
  Shortcutting mode: Default, S-bit consensus: ok
  Number of interfaces in this area: Total: 1, Active: 1
  Number of fully adjacent neighbors in this area: 0
  Area has no authentication
  Number of full virtual adjacencies going through this area: 0
  SPF algorithm executed 1 times
  Number of LSA 1
```

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

```
OSPF Routing Process 100, Router ID: 10.10.11.60
Supports only single TOS (TOS0) routes
This implementation conforms to RFC2328
RFC1583Compatibility flag is disabled
Opaque-LSA capability is on
SPF schedule delay 0 secs, Hold time between two SPFs 0 secs
Refresh timer 10 secs
Number of external LSA 0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
```

```
Area ID: 0.0.0.0 (Backbone)
  Number of interfaces in this area: Total: 0, Active: 0
  Number of fully adjacent neighbors in this area: 0
  Area has no authentication
  SPF algorithm executed 1 times
  Number of LSA 1
```

Examples

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

Related Commands

```
router ospf
```

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.

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 100
===== OSPF router routing table =====
R    10.10.10.70          [10] area: 0.0.0.0, ASBR
                               via 10.10.10.10, eth0
```

Examples

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

Related Commands

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.

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
```

Related Commands

show ip ospf database asbr-summary

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

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

Usage

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
```

Related Commands

show ip ospf database external

Use this command to display information about the external LSAs.

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
```

Related Commands

show ip ospf database network

Use this command to display information about the network LSAs.

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 Commands

```
    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

```

Related Commands

show ip ospf database nssa-external

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

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
```

Related Commands

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.

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

```

Related Commands

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).

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
```

Related Commands

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.

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
```

Related Commands

show ip ospf database router

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

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
```

Related Commands

show ip ospf database summary

Use this command to display information about the summary LSAs.

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
```

Related Commands

show ip ospf interface

Use this command to display interface information for OSPF.

Command Syntax

```
show ip ospf interface IFNAME
  IFNAME= An alphanumeric string that is the interface name.
```

Command Mode

Privileged Exec mode

Usage

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

```
ZebOS# show ip ospf interface hme0
hme0 is up, line protocol is up
  Internet Address 10.10.10.50/24, Area 0.0.0.0
  Router ID 10.10.11.50, Network Type BROADCAST, Cost: 10
```



```

Transmit Delay is 5 sec, State Waiting, Priority 1
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 35, Dead 35, Wait 35, Retransmit 5
  Hello due in 00:00:16
Neighbor Count is 0, Adjacent neighbor count is 0

```

Examples

```
ZebOS# show ip ospf interface myifname
```

Related Commands

show ip ospf neighbor

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

Command Syntax

```

show ip ospf 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

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 and third outputs show database information only about the instances specified by the process ID. The last two displays show the use of the `detail` and `all` parameters.

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

```

OSPF process 1:
Neighbor ID      Pri   State           Dead Time   Address           Interface          RXmtL
RqstL DBsmL
10.10.11.50      5    Full/DR         00:00:40   10.10.10.50      eth1:10.10.10.90  0
0                0

```

```

OSPF process 100:
Neighbor ID      Pri   State           Dead Time   Address           Interface          RXmtL
RqstL DBsmL
10.10.11.50      5    Full/DR         00:00:40   10.10.10.50      eth2:10.10.11.90  0
0                0

```

OSPF Commands

ZebOS# **show ip ospf 1 neighbor**

OSPF process 1:

Neighbor ID	Pri	State	Dead Time	Address	Interface	RXmtL
10.10.11.50	5	Full/DR	00:00:40	10.10.10.50	eth1:10.10.10.90	0
0	0					

ZebOS# **show ip ospf 100 neighbor**

OSPF process 100:

Neighbor ID	Pri	State	Dead Time	Address	Interface	RXmtL
10.10.11.50	5	Full/DR	00:00:40	10.10.10.50	eth2:10.10.11.90	0
0	0					

ZebOS# **show ip ospf neighbor all**

OSPF process 100:

Neighbor ID	Pri	State	Dead Time	Address	Interface	RXmtL	RqstL	DBsmL
10.10.11.51	1	Full/DR	00:00:38	10.10.10.10	hme0:10.10.10.50	0	0	0
10.10.11.51	1	Full/DR	00:00:38	10.10.11.10	hme1:10.10.11.50	0	0	0

ZebOS# **show ip ospf neighbor detail**

Neighbor 10.10.11.51, interface address 10.10.10.10

In the area 0.0.0.0 via interface hme0

Neighbor priority is 1, State is Full, 6 state changes

DR is 10.10.10.10, BDR is 10.10.10.50

Options 66 *|O|-|-|-|E|-

Dead timer due in 00:00:32

Database Summary List 0

Link State Request List 0

Link State Retransmission List 0

Thread Inactivity Timer on

Thread Database Description Retransmission off

Thread Link State Request Retransmission off

Thread Link State Update Retransmission on

Neighbor 10.10.11.51, interface address 10.10.11.10

In the area 0.0.0.0 via interface hme1

Neighbor priority is 1, State is Full, 6 state changes

DR is 10.10.11.10, BDR is 10.10.11.50

Options 66 *|O|-|-|-|E|-

Dead timer due in 00:00:32

Database Summary List 0

Link State Request List 0

Link State Retransmission List 0

Thread Inactivity Timer on

Thread Database Description Retransmission off

Thread Link State Request Retransmission off

Thread Link State Update Retransmission on

Neighbor 10.10.11.51, interface address 10.10.11.10

```

In the area 0.0.0.0 via interface hme1
Neighbor priority is 1, State is Full, 6 state changes
DR is 10.10.11.10, BDR is 10.10.11.50
Options 66 *|O|-|-|-|E|-
Dead timer due in 00:00:32
Database Summary List 0
Link State Request List 0
Link State Retransmission List 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

```

Related Commands

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.

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

```

ZebOS# show ip ospf route
OSPF process 100:
===== OSPF network routing table =====
N   10.10.10.0/24          [10] area: 0.0.0.0
                                   directly attached to eth1

===== OSPF router routing table =====

===== OSPF external routing table =====

OSPF process 110:

```

OSPF Commands

```
===== OSPF network routing table =====
N    10.10.11.0/24          [10] area: 0.0.0.1
                                   directly attached to eth2
```

```
===== OSPF router routing table =====
```

```
===== OSPF external routing table =====
```

```
ZebOS#
```

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

```
OSPF process 100:
```

```
===== OSPF network routing table =====
```

```
N    10.10.10.0/24         [10] area: 0.0.0.0
                                   directly attached to eth1
```

```
===== OSPF router routing table =====
```

```
===== OSPF external routing table =====
```

```
ZebOS#
```

```
ZebOS# show ip ospf 110 route
```

```
OSPF process 110:
```

```
===== OSPF network routing table =====
```

```
N    10.10.11.0/24         [10] area: 0.0.0.1
                                   directly attached to eth2
```

```
===== OSPF router routing table =====
```

```
===== OSPF external routing table =====
```

Examples

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

Related Commands

show ip ospf virtual-links

Use this command to display virtual link information.

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
```

Equivalent Commands

show ip protocols

Use this command to display OSPF process parameters and statistics.

Note: This command is unavailable to ZebOS Server Routing Suite (SRS) customers and to ZebOS Advanced Routing Suite (ARS) customers using the VTY Shell for CLI management.

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 filterd 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
```

show memory ospf

Use this command to display memory statistics for the OSPF protocol.

Command Syntax

```
show memory ospf
```

Command Mode

Privileged Exec mode and Exec mode

Usage

The following is a sample output from the `show memory ospf` command displaying OSPF statistics

```
ZebOS# show memory ospf
Memory type           : Alloc count   Alloc memory
=====
OSPF table            :           102       1660
OSPF node              :            53       1528
OSPF prefix           :            53        515
-----
OSPF structure        :             1       1600
OSPF area              :             2        216
OSPF interface        :             2        368
OSPF neighbor         :             2        336
OSPF SPF vertex       :             0           0
OSPF SPF nexthop     :             0           0
OSPF route            :             3        132
OSPF path             :             3         36
OSPF LSA               :             7        364
OSPF LSA data         :             7        224
OSPF LSDB             :             9       1296
OSPF LS Request       :             0           0
OSPF packet           :             1         16
OSPF FIFO queue       :             2         24
OSPF extern info      :             1         32
OSPF distance         :             0           0
-----
OSPF network          :             2         22
OSPF virtual-link     :             0           0
OSPF if params        :             0           0
OSPF passive if      :             0           0
OSPF auth key         :             0           0
OSPF crypt key        :             0           0
OSPF area range       :             0           0
OSPF summary addr     :             0           0
OSPF static nbr       :             0           0
-----
```

OSPF opaque data	:	0	0
OSPF Opq-LSA show	:	0	0
OSPF notifier	:	0	0
OSPF description	:	0	0
OSPF API data	:	0	0
OSPF message	:	0	0
OSPF tmp mem	:	2	16

Examples

```
ZebOS# show memory ospf
```

Related Commands

show memory all, show memory lib

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
```

Related Commands

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

`enable-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= <0-4294967295> Specifies the delay between receiving a change to SPF calculation. The  
      default spf-delay value is 5 seconds  
      SPF-HOLDTIME= <0-4294967295> 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 configure the hold time between two consecutive SPF calculations.

Examples

```
timers spf 5 10
```

Related Commands

CHAPTER 3 OSPFv3 Commands

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

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 OSPFv3 Area ID in IPv4 address format
<0-4294967295> OSPFv3 Area ID as a decimal 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 [A.B.C.D | <0-4294967295>] range X:X::X:X/M (advertise | not-advertise)
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
```

Related Commands

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= The IPv4 address specification of the identifier for the stub area.
<0-4294967295>= The area identification number for the stub area.
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 IP address format.
<0-4294967295> OSPF area ID as decimal.
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

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

Usage

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|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

Examples

```
ZebOS# debug ipv6 ospf lsa
```

Related Commands

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

Usage

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

Usage

Examples

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

Related Commands

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 (all|hello|dd|ls-request|ls-update|ls-ack)
    all -> Debugging for all OSPFv3 packet.
    hello -> Debugging for OSPFv3 hello packet.
    dd -> Debugging for OSPFv3 database description packet.
    ls-request -> Debugging for OSPFv3 LS request packet.
    ls-update -> Debugging for OSPFv3 LS update packet.
    ls-ack -> Debugging for OSPFv3 LS ack packet.
```

Command Mode

Privileged Exec mode and Configure mode

Usage

Examples

```
ZebOS# debug ipv6 ospf packet all
```

Related Commands

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

Usage

Examples

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

```
ZebOS# debug ipv6 ospf route ia
```

Related Commands

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 <0-16777214>
no default-metric
<0-16777214> 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

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 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 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(INSTID)])
(no) ipv6 router ospf TAG area AREAID (INSTID)
    AREA_ID = 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
    TAG = tag WORD
        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

passive-interface

Use this command to suppress sending of `hello` packets on a specified interface.

Use the `no` form with this command to resume sending `hello` packets.

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.

Examples

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# passive-interface eth0
```

Related commands

redistribute

Use this command to import routes from other routing protocols 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

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

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 including static or connected routes. Each injected prefix is put into the AS-external-LSA with a specified metric and metric-type.

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
```

Related Commands

default-metric, route-map

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 use the previous OSPFv3 router-id behavior.

Command Syntax

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

IPADDRESS Specifies the router ID in IPv6 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 `3ffe:ffff::1`

```
ZebOS# configure terminal
ZebOS(config)# router ipv6 ospf
ZebOS(config-router)# router-id 3ffe:ffff::1
```

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.

Command Syntax

```
show debugging ipv6 ospf
```

Command Mode

Privileged Exec mode

Usage

Examples

```
ZebOS# show debugging ipv6 ospf
```

Related Commands

show ipv6 ospf

Use this command to display global and area information about OSPFv3.

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
```

Related Commands

show ipv6 ospf database

Use this command to display information in the OSPFv3 Link State Database.

Command Syntax

```
show ipv6 ospf (TAG) database (LSATYPE (ADVROUTER))
    TAG OSPFv3 process tag
    LSATYPE = router|network|inter-prefix|inter-router|external|link|intra-prefix
        router Shows Router-LSAs.
        network Shows Network-LSAs.
        intra-prefix Shows Intra-Area-Prefix-LSAs.
        link Shows Link-LSAs.
        external Shows AS-external-LSAs.
        inter-prefix Shows Inter-Area-Prefix LSAs.
        inter-router Shows Inter-Area-Router 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 0xeaea 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
```

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
```

Related Commands

show ipv6 ospf interface

Use this command to display OSPFv3 interface information.

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
lo is up, line protocol is up
  OSPFv3 not enabled on this interface
sit0 is down, line protocol is down
  OSPFv3 not enabled on this interface
```

Examples

```
show ipv6 ospf interface myifname
```

Related Commands

show ipv6 ospf neighbor

Use this command to display information about an OSPFv3 neighbor.

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
```

Related Commands

show ipv6 ospf route

Use this command to display the IPv6 routing table for OSPFv3.

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
```

Related Commands

show ipv6 ospf topology

Use this command to display information about OSPFv3 topology for each area.

Command Syntax

```
show ipv6 ospf (TAG) topology (area AREAID)
      TAG OSPFv3 process tag
      AREAID = A.B.C.D|<0-4294967295>
```

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
```

Related Commands

show ipv6 ospf virtual-links

Use this command to display information about OSPFv3 virtual-links.

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
```

Related Commands

show memory ipv6 ospf

Use this command to display memory statistics for the OSPFv3.

Command Syntax

```
show memory ipv6 ospf
```

Command Mode

Privileged Exec mode and Exec mode

Usage

The following is a sample output of the `show memory ipv6 ospf` command displaying OSPFv3 memory statistics.

```
ZebOS# show memory ipv6 ospf
```

Memory type		Active cells	Alloc bytes
=====		=====	=====
OSPFv3 structure	:	1	208
OSPFv3 area	:	1	100
OSPFv3 interface	:	1	176
OSPFv3 neighbor	:	1	168
OSPFv3 vertex	:	3	60
OSPFv3 vertex nexthop	:	2	16
OSPFv3 route	:	9	144
OSPFv3 path	:	9	216
OSPFv3 nexthop	:	2	56
OSPFv3 LSA	:	12	384
OSPFv3 LSA data	:	12	596
OSPFv3 LSA map	:	1	12
OSPFv3 LSDB	:	6	816
OSPFv3 prefix	:	0	0
OSPFv3 prefix map	:	0	0
OSPFv3 packet	:	1	28
OSPFv3 FIFO	:	1	12
OSPFv3 redist info	:	0	0
OSPFv3 redist map	:	0	0
OSPFv3 if params	:	1	36
OSPFv3 area range	:	0	0
OSPFv3 route map data	:	0	0
OSPFv3 description	:	1	5

Example

```
ZebOS# show memory ipv6 ospf
```

Related Commands

show memory all, show memory ospf, show memory lib

timers spf

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= <0-4294967295> Specifies the delay between receiving a change to SPF calculation. The default spf-delay value is 5 seconds

SPF-HOLDTIME= <0-4294967295> 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 configure the hold time between two consecutive SPF calculations.

Examples

```
timers spf 5 10
```

Related Commands

CHAPTER 4 OSPF VPN Commands

This chapter provides an alphabetized reference for each 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.

Examples

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

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.

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
```

Related Commands

show ip vrf NAME

Use this command to display VRF information for a specified VRF instance.

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
```

Related Commands

CHAPTER 5 CSPF-TE Commands

This chapter provides an alphabetized reference for each of the CSPF-TE commands.

cspf-default-retry-interval

Use this command to set the default route computation retry interval (in seconds). 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

Usage

Examples

```
cspf-default-retry-interval 720
```

Related Commands

cspf-tie-break

Use this command to set the tie-break method to one of the values (`random`, `least-fill`, `most-fill`). 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

```
cspf-tie-break least-fill
```

Related Commands

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 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#te mo
```

```
ZebOS# 2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_recv: Delete message received from
client 2
2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_process: Client = 2, lspid = 0x8000
2002/03/19 15:17:29 OSPF: cspf_api_msg_request_recv: Route request message received from
client 2
2002/03/19 15:17:29 OSPF: cspf_api_msg_request_process: Client = 2, request type = 1,
ingress = 192.40.40.3, egress = 192.20.20.1, lspid = 0x8000
2002/03/19 15:17:29 OSPF: cspf_compute_route: lspid = 0x8000, setup priority = 7, ingress =
192.40.40.3, egress = 192.20.20.1, hop limit constraint = 255, bandwidth constraint =
125000.000000, include mask = 0x0, exclude mask = 0x0, path constraint count = 0
2002/03/19 15:17:29 OSPF: cspf_process_te_lsa_vertex: Vertex id = 192.30.30.2, dest addr =
192.20.20.1
2002/03/19 15:17:34 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_te_lsa_vertex: Vertex id = 192.30.30.2, dest addr =
192.20.20.1
2002/03/19 15:17:34 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.40.40.2, dest
addr = 192.20.20.1
2002/03/19 15:17:34 OSPF: cspf_process_te_lsa_vertex: Vertex id = 192.20.20.2, dest addr =
192.20.20.1
2002/03/19 15:17:34 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.20.20.2, dest
addr = 192.20.20.1
```

```
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_recv: LSP Established message received
from client 2
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_process: Client = 2, lspid = 0x8000,
metric = 0
```

Examples

```
ZebOS# debug cspf events
```

Related Commands

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

Usage

Examples

```
ZebOS# debug cspf hexdump
```

Related Commands

enable-cspf

Use this command to enable CSPF functionality for an OSPF instance. Only one CSPF instance is supported in this release.

Use the `no` parameter with this command to disable CSPF functionality for the OSPF instance.

Command Syntax

```
(no) enable-cspf
```

Command Mode

Router mode

Usage

Examples

```
enable-cspf
```

Related Commands

show cspf lsp

Use this command to display information about all the LSPs stored in CSPF database.

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
```

Related Commands

show debugging cspf

Use this command to display the CSPF debugging options set.

Command Syntax

```
show debugging cspf
```

Command mode

Exec and Privileged Exec mode

Usage

Following is a sample output 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_api_msg_request_process: Client = 2, request type = 1,
ingress = 192.40.40.3, egress = 192.20.20.1, lspid = 0x8000
2002/03/27 17:09:21 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 =
2375.000000, include mask = 0x0, exclude mask = 0x0, path constraint count = 0
2002/03/27 17:09:21 OSPF: cspf_process_te_lsa_vertex: Vertex id = 192.30.30.2, dest addr =
192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.40.40.2, dest
addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_te_lsa_vertex: Vertex id = 192.20.20.2, dest addr =
192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.30.30.3, dest
addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_te_lsa_vertex: Vertex id = 192.30.30.3, dest addr =
192.20.20.1
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
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
```

Related Commands

show ip ospf te-database

Use this command to display the traffic engineering database contents for all ospf instances.

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
```

Related Commands

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- set extcommunity
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- set ipv6 next-hop
- set metric
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- set next-hop
- set origin
- set originator-id
- set tag
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