BIG-IP® Advanced Routing™
Open Shortest Path First
Command Line Interface Reference Guide

Version 7.8.1
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<tr>
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CHAPTER 1  ZebOS Command Line Interface Environment

Network administrators and application developers who install and configure ZebOS® IP routing software should use this Command Line Interface (CLI) reference guide. This guide includes the following information:

- An overview of the ZebOS Command Line Interface
- An overview of the Integrated Management Interface (IMI), including a description of both basic access and of the shell commands
- A complete reference of the Command Line Interface (CLI) commands used for Open Shortest Path First (OSPF) configurations

Users can launch either a telnet or SSH session to issue the commands described in this guide.

Command Line Interface Overview

The ZebOS® Command Line Interface (CLI) is a text-based facility conforming to industry standards. Many of the commands can be used in scripts to automate configuration tasks. Each CLI command is usually associated with a specific function or a common function performing a specific task.

Note: Multiple users can open a TELNET session and issue commands using the Exec mode and the Privileged Exec mode. For ZebOS versions prior to 7.4, only one user can log in to the Configure mode at a time. For ZebOS versions 7.4 and later, multiple users can log in to the Configure mode.

The Integrated Management Interface (IMI) Shell, or IMISH, gives users and administrators the ability to issue commands to several daemons using a single TELNET session.

Command Line Interface Help

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

For example, at the CLI command prompt, type

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

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

```
ZebOS# show
   debugging     Debugging functions (see also 'undebug')
   history       Display the session command history
   ip            IP information
   memory        Memory statistics
   route-map     route-map information
   running-config running configuration
   startup-config Contents of startup configuration
   version       Displays ZebOS version
```

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

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

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

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

Command Completion

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

ZebOS> sh
Press TAB. The CLI displays:

ZebOS> show

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

ZebOS> show i
  interface  ip  isis
ZebOS> show i

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

ZebOS> show in
ZebOS> show interface

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

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

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

Note:  For more information about output modifiers and output redirection, see the "Show Command Tokens" section.

Command Abbreviations

The ZebOS CLI accepts abbreviations for commands. For example,

   sh in eth0

is an abbreviation for the show interface command.

Command Line Errors

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

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

where the ^ points to the first character in error in the command.
If a command is incomplete, it displays the following message:

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

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

```
area 10.10.0.18 virtual-link 10.10.0.19 authentication-key 57393
```
Definitions

The following table defines the terms used in this document.

Table 1: Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>token</td>
<td>A token is a non-character, non-numeric symbol: {}, {}, (), &lt;&gt;,</td>
</tr>
<tr>
<td>parameter</td>
<td>A parameter is an UPPERCASE term for which the user substitutes input.</td>
</tr>
<tr>
<td>keyword</td>
<td>A keyword is a lowercase term that the user types exactly as shown.</td>
</tr>
<tr>
<td>line</td>
<td>A line is the user input of any text string, including spaces. No other parameters may be entered after input for this token.</td>
</tr>
<tr>
<td>word</td>
<td>A word is the user input of any contiguous text string (excluding spaces).</td>
</tr>
</tbody>
</table>

Typographic Conventions

The following table describes the typographic conventions that are used in this guide.

Table 2: Typographic Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Name</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monospaced font</td>
<td>Command</td>
<td>Represents command strings entered on a command line and sample source code.</td>
<td>show ip ospf</td>
</tr>
<tr>
<td>UPPERCASE</td>
<td>Variable</td>
<td>Indicates user input. Enter values according to the description. Each upperscaled token expands into one or more other tokens.</td>
<td>area AREAID range ADDRESS</td>
</tr>
<tr>
<td></td>
<td>parameter</td>
<td>Indicates keywords. Enter values exactly as displayed in the command description.</td>
<td>show ip ospf</td>
</tr>
<tr>
<td>lowercase</td>
<td>Keyword</td>
<td>Indicates keywords. Enter values exactly as displayed in the command description.</td>
<td>show ip ospf</td>
</tr>
<tr>
<td></td>
<td>parameter</td>
<td>Indicates user input. Enter values according to the description. Each upperscaled token expands into one or more other tokens.</td>
<td>area AREAID range ADDRESS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical bar</td>
<td>Limits the choices. Select one from the list. Do not enter the bar as part of the command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parentheses</td>
<td>Encloses optional parameters. Select one. Do not enter the parentheses as part of the command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braces</td>
<td>Encloses optional parameters. Select none, one or more than one. Do not enter the brace as part of the command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Square</td>
<td>Encloses optional parameters. Select one. Do not enter the bracket as part of the command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>brackets</td>
<td>Encloses a numeric range, endpoints inclusive. Do not enter the bracket as part of the command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equal sign</td>
<td>Separates the variable from explanatory text. Do not enter the equal sign as part of the command.</td>
</tr>
</tbody>
</table>
Format used for Command Description

The following describes the format used when describing each command in this document.

**Table 3: Command Description Formats**

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command Name</td>
<td>Describes the command, what the command does and when should it be used.</td>
</tr>
<tr>
<td>Command Syntax</td>
<td>Displays the syntax of each command.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Defines parameters and options within each command syntax.</td>
</tr>
<tr>
<td>Default</td>
<td>Displays the status of the command before it is executed.</td>
</tr>
<tr>
<td>Command Mode</td>
<td>Displays the name of the command mode in which this command is used.</td>
</tr>
<tr>
<td></td>
<td>Examples include Exec or Configure modes.</td>
</tr>
<tr>
<td>Example</td>
<td>Displays an example of the command being executed and the complexities of</td>
</tr>
<tr>
<td></td>
<td>the command syntax.</td>
</tr>
<tr>
<td>Related Commands</td>
<td>Lists the commands that are of immediate importance.</td>
</tr>
</tbody>
</table>

Command Negation

Many commands can be negated using the `no` keyword. Depending on the command or the parameters, some command negation can disable one feature or a feature for a specific ID, interface, address or other identifier. However, some negation is for the base command only; thus, the negated form does not take a parameter.

Variable Parameter Expansion

For some commands, an IP address or a number in a given range can replace a parameter. For example:

```
area AREAADDRESSID virtual-link ROUTERID (AUTHENTICATE|MSGD|INTERVAL)
AREAADDRESSID=A.B.C.D|<0-4294967295>
```

Therefore, the following is the minimum command for the ROUTERID by an IP address:

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

Users can only choose an optional parameter in the string `[AUTHENTICATE|MSGD|INTERVAL]`. In addition, users can replace a parameter by a keyword or parameter. For example, the following string replaces the MD5 parameter:

```
MD5= [message-digest-key <1-255> md5 MD5_KEY]
with MD5_KEY replaced by a 1-16 character string.
```
Show Command Tokens

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

ZebOS# show users ?
    | Output modifiers
    > Output redirection

Output Modifiers

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

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

Begin Parameter

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

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

Exclude Parameter

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

ZebOS# show interface eth1 | exclude input
Interface eth1
   Scope: both
   Hardware is Ethernet, address is 0004.75e6.5393
   index 3 metric 1 mtu 1500 <UP,BROADCAST,RUNNING,MULTICAST>
   VRF Binding: Not bound
   Label switching is disabled
   No Virtual Circuit configured
   Administrative Group(s): None
   DSTE Bandwidth Constraint Mode is MAM
   inet6 fe80::204:75ff:fee6:5393/64
      output packets 4438, bytes 394940, dropped 0
output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
    collisions 0

Include Parameter

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

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

Redirect Parameter

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

ZebOS# show history | redirect /var/frame.txt
In addition, the output redirection token (>) allows the user to specify a target file for the lines of output.

ZebOS# show history >/var/frame.txt

Note: To modify the lines displayed for any Show command in this guide, use the | (vertical bar) output modifier token; to save the output to a file, use the > (right arrow) output redirection token.

Command Modes

Commands available for each protocol separate into several modes (or nodes) and are arranged in a hierarchy. Each mode has its own special commands.

Table 4: Command Modes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exec Mode</td>
<td>Also called the View mode, this mode the first mode to appear after logging in to the CLI. It is a base mode from where users can perform basic commands, such as show, exit, quit, help, list, and enable.</td>
</tr>
<tr>
<td>Privileged Exec Mode</td>
<td>Also called the Enable mode, it allows users to run additional basic commands, such as debug, write (for saving and viewing the configuration) and show commands.</td>
</tr>
<tr>
<td>Configure Mode</td>
<td>Also called Configure Terminal mode, it allows users to run configuration commands and to serve as a gateway into the Interface, Router, Line, Route Map, Key Chain and Address Family modes.</td>
</tr>
<tr>
<td>Interface Mode</td>
<td>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.</td>
</tr>
<tr>
<td>Line Mode</td>
<td>Is used to make the access-class commands available.</td>
</tr>
</tbody>
</table>
Common Command Mode Tree

The diagram displays the common command mode tree.

![Diagram of 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.

\[
\text{PROCESSID} = <0-65535> \\
\text{TAG} = \text{WORD (deny|permit)} <1-65535>
\]

deny Route-map denies set operations
permit Route-map permits set operations
\(<1-65535> \text{ Sequence to insert to / delete from existing route-map entry.}\)

## Common Executive Mode Commands

The following are the common Executive Mode commands across multiple protocol daemons. Refer to the ZebOS Network Platform NSM Command Reference for information about using these commands.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Use this command to</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear</td>
<td>resist the functionality of a variety of modules</td>
</tr>
<tr>
<td>debug</td>
<td>debug a variety of modules</td>
</tr>
</tbody>
</table>
# ZebOS Command Line Interface Environment

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Use this command to</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>enter the Privileged Exec mode</td>
</tr>
<tr>
<td>exit</td>
<td>leave the current mode, or logout of the session</td>
</tr>
<tr>
<td>hardware</td>
<td>display the register value from the register</td>
</tr>
<tr>
<td>help</td>
<td>display online text assistance</td>
</tr>
<tr>
<td>logout</td>
<td>exit from the ZebOS CLI</td>
</tr>
<tr>
<td>ping</td>
<td>send a ping request</td>
</tr>
<tr>
<td>quit</td>
<td>leave the current mode</td>
</tr>
<tr>
<td>route-map</td>
<td>enter the route-map mode and to permit or deny match/set operations</td>
</tr>
<tr>
<td>reset</td>
<td>reset log-related command</td>
</tr>
<tr>
<td>rmon</td>
<td>set the remote monitoring debugging feature</td>
</tr>
<tr>
<td>show application-priority</td>
<td>display Application-Priority interface information</td>
</tr>
<tr>
<td>show arp</td>
<td>display Internet Protocol (IP)</td>
</tr>
<tr>
<td>show cli</td>
<td>display the CLI tree of the current mode</td>
</tr>
<tr>
<td>show dot1x</td>
<td>display IEEE 802.1X Port-Based Access Control</td>
</tr>
<tr>
<td>show list</td>
<td>display a list of all commands in the current mode</td>
</tr>
<tr>
<td>show history</td>
<td>display all commands used in a session</td>
</tr>
<tr>
<td>show ip protocols</td>
<td>display the IP routing protocol process parameters and statistics</td>
</tr>
<tr>
<td>show privilege</td>
<td>display the current privilege level</td>
</tr>
<tr>
<td>show rmon</td>
<td>display the Remote Monitoring Protocol (RMON) information</td>
</tr>
<tr>
<td>show route-id</td>
<td>display the route-ID information</td>
</tr>
<tr>
<td>show users</td>
<td>display information about terminal lines</td>
</tr>
<tr>
<td>show user-priority</td>
<td>display the default user priority associated with the layer2 interface</td>
</tr>
<tr>
<td>show version</td>
<td>display the current ZebOS version</td>
</tr>
<tr>
<td>terminal length</td>
<td>set the number of lines in a terminal display</td>
</tr>
<tr>
<td>terminal monitor</td>
<td>display debugging information on a monitor</td>
</tr>
<tr>
<td>traceroute</td>
<td>enable the traceroute commands</td>
</tr>
<tr>
<td>undebug</td>
<td>disable the debugging feature</td>
</tr>
</tbody>
</table>
Common Privileged Executive Mode Commands

The following are the common Privileged Executive Mode commands across multiple protocol daemons. Enter this mode by typing `enable` from the Executive mode. See the ZebOS Network Platform Command Line Interface Reference Guide for information about using these commands.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Use this command to</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear ip prefix-list</td>
<td>clear the IP prefix-list</td>
</tr>
<tr>
<td>configure terminal</td>
<td>enter the Configure Terminal mode. You must me in the Privilege Executive mode to issue this command</td>
</tr>
<tr>
<td>copy running-config startup-config</td>
<td>copy the current running configuration to the startup configuration file</td>
</tr>
<tr>
<td>disable</td>
<td>exit Privileged Exec mode</td>
</tr>
<tr>
<td>end</td>
<td>leave the current mode</td>
</tr>
<tr>
<td>exit</td>
<td>leave the current mode, or logout of the session</td>
</tr>
<tr>
<td>hardware</td>
<td>display the register value from the register</td>
</tr>
<tr>
<td>help</td>
<td>display online text assistance</td>
</tr>
<tr>
<td>login</td>
<td>Login to a particular virtual router context</td>
</tr>
<tr>
<td>logout</td>
<td>exit from the ZebOS CLI</td>
</tr>
<tr>
<td>mstat</td>
<td>show the statistics after multiple multicast traceroutes</td>
</tr>
<tr>
<td>mtrace</td>
<td>trace a multicast path from source to destination</td>
</tr>
<tr>
<td>ping</td>
<td>send a ping request</td>
</tr>
<tr>
<td>quit</td>
<td>leave the current mode</td>
</tr>
<tr>
<td>reset</td>
<td>reset the log related command</td>
</tr>
<tr>
<td>rmon</td>
<td>set the remote monitoring debugging feature</td>
</tr>
<tr>
<td>show access-list</td>
<td>display the list of IP access lists</td>
</tr>
<tr>
<td>show application-priority</td>
<td>display the Application-Priority interface information</td>
</tr>
<tr>
<td>show arp</td>
<td>display the Internet Protocol (IP)</td>
</tr>
<tr>
<td>show cli</td>
<td>display the CLI tree of the current mode</td>
</tr>
<tr>
<td>show dot1x</td>
<td>display the IEEE 802.1X Port-Based Access Control</td>
</tr>
<tr>
<td>show faults</td>
<td>display the recorded faults</td>
</tr>
<tr>
<td>show list</td>
<td>display a list of all commands in the current mode</td>
</tr>
<tr>
<td>show history</td>
<td>display all commands used in a session</td>
</tr>
</tbody>
</table>
Common Configure Mode Commands

The following are the common Configure Mode commands across multiple protocol daemons. Enter this mode by typing `configuration terminal` from the Privileged Executive mode. Refer to the ZebOS Network Platform NSM Command Line Interface Reference Guide for information about using these commands.

Table 7: Common Configure Mode Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Use this command to</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list</td>
<td>configure an access-list for filtering packets</td>
</tr>
<tr>
<td>arp</td>
<td>configure an address resolution protocol</td>
</tr>
<tr>
<td>Command Name</td>
<td>Use this command to</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>banner</td>
<td>toggle the display of the banner text</td>
</tr>
<tr>
<td>clear ip prefix-list</td>
<td>clear the IP prefix-list</td>
</tr>
<tr>
<td>do</td>
<td>run an exec-level command from the config mode</td>
</tr>
<tr>
<td>enable password</td>
<td>change the password for the <code>enable</code> command</td>
</tr>
<tr>
<td>exit</td>
<td>leave the current mode, or logout of the session</td>
</tr>
<tr>
<td>help</td>
<td>display online text assistance</td>
</tr>
<tr>
<td>hostname</td>
<td>set or change network server name</td>
</tr>
<tr>
<td>ip prefix-list</td>
<td>create an entry for a prefix list</td>
</tr>
<tr>
<td>ipv6 access-list</td>
<td>configure an access-list for filtering frames</td>
</tr>
<tr>
<td>ipv6 prefix-list</td>
<td>create an entry for an IPv6 prefix list</td>
</tr>
<tr>
<td>line vty</td>
<td>enter <code>Line</code> mode</td>
</tr>
<tr>
<td>list</td>
<td>list all commands for a mode</td>
</tr>
<tr>
<td>log file</td>
<td>specify the file that collects logging information</td>
</tr>
<tr>
<td>log record-priority</td>
<td>specify the logging of the priority of a message</td>
</tr>
<tr>
<td>log stdout</td>
<td>begin logging information to the standard output</td>
</tr>
<tr>
<td>log syslog</td>
<td>begin logging information to the system log</td>
</tr>
<tr>
<td>log trap</td>
<td>limit logging to a specified level or type</td>
</tr>
<tr>
<td>mac</td>
<td>configure a MAC access list</td>
</tr>
<tr>
<td>mac-access-list</td>
<td>configure a MAC access list for QOS (quality of service)</td>
</tr>
<tr>
<td>mac-address-table</td>
<td>configure spanning tree group commands</td>
</tr>
<tr>
<td>max-fib-routes</td>
<td>set the maximum number of FIB (forwarding information base) routes</td>
</tr>
<tr>
<td>max-static-routes</td>
<td>set the maximum number of static routes</td>
</tr>
<tr>
<td>maximum-access-list</td>
<td>set the maximum number of access-list entries</td>
</tr>
<tr>
<td>maximum-paths</td>
<td>set the multipath numbers installed to FIB</td>
</tr>
<tr>
<td>ospf</td>
<td>set the Open Shortest Path First (OSPF) commandoes</td>
</tr>
<tr>
<td>radius-server</td>
<td>set the RADIUS server configuration commands</td>
</tr>
<tr>
<td>rip</td>
<td>set the Routing Information Protocol (RIP) commands</td>
</tr>
<tr>
<td>rmon</td>
<td>set the remote Monitoring Protocol (RMON) commands</td>
</tr>
<tr>
<td>route-map</td>
<td>enter the route-map mode and to permit or deny match/set operations</td>
</tr>
<tr>
<td>router-id</td>
<td>set the router identifier for this system</td>
</tr>
<tr>
<td>Command Name</td>
<td>Use this command to</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>rsvp-bypass</td>
<td>set the Bypass Tunnel for the RSVP</td>
</tr>
<tr>
<td>service advanced-vty</td>
<td>set the VTY session to <strong>Privileged Exec mode</strong> instead of the <strong>Exec mode</strong> (which is the default)</td>
</tr>
<tr>
<td>service password-encryption</td>
<td>specify encryption of passwords</td>
</tr>
<tr>
<td>service terminal-length</td>
<td>set the terminal length for VTY sessions</td>
</tr>
<tr>
<td>set port</td>
<td>set the port information for a Layer2 interface</td>
</tr>
<tr>
<td>show access-list</td>
<td>display the list of IP access lists</td>
</tr>
<tr>
<td>show cli</td>
<td>display the CLI tree of the current mode</td>
</tr>
<tr>
<td>show list</td>
<td>displays a list of all commands in the current mode</td>
</tr>
<tr>
<td>show running-config</td>
<td>display the current configuration</td>
</tr>
<tr>
<td>snmp</td>
<td>configure SNMP information</td>
</tr>
<tr>
<td>undebug</td>
<td>disable the debugging feature</td>
</tr>
<tr>
<td>username</td>
<td>establish the user name authentication</td>
</tr>
<tr>
<td>virtual-router</td>
<td>set a virtual-router configuration</td>
</tr>
<tr>
<td>vlan</td>
<td>configure VLAN parameters</td>
</tr>
</tbody>
</table>
This chapter provides an alphabetized reference for each of the OSPF Commands. It includes the following commands:

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

- "ip ospf authentication"
- "ip ospf authentication-key"
- "ip ospf bfd"
- "ip ospf cost"
- "ip ospf database-filter"
- "ip ospf dead-interval"
- "ip ospf disable"
- "ip ospf hello-interval"
- "ip ospf message-digest-key"
- "ip ospf mtu"
- "ip ospf mtu-ignore"
- "ip ospf network"
- "ip ospf priority"
- "ip ospf resync-timeout"
- "ip ospf retransmit-interval"
- "ip ospf transmit-delay"
- "max-concurrent-dd"
- "maximum-area"
- "neighbor"
- "network"
- "ospf abr-type"
- "ospf restart grace-period"
- "ospf restart helper"
- "ospf router-id"
- "overflow database"
- "overflow database external"
- "passive-interface"
- "redistribute"
- "redistribute ospf"
- "restart ospf graceful"
- "router ospf"
- "router-id"
- "show debugging ospf"
- "show ip ospf"
- "show ip ospf border-routers"
- "show ip ospf database"
- "show ip ospf database asbr-summary"
- "show ip ospf database external"
- "show ip ospf database network"
• "show ip ospf database nssa-external"
• "show ip ospf database opaque-area"
• "show ip ospf database opaque-as"
• "show ip ospf database opaque-link"
• "show ip ospf database router"
• "show ip ospf database summary"
• "show ip ospf igp-shortcut-lsp"
• "show ip ospf igp-shortcut-route"
• "show ip ospf interface"
• "show ip ospf multi-area-adjacencies"
• "show ip ospf neighbor"
• "show ip ospf route"
• "show ip ospf te-database"
• "show ip ospf virtual-links"
• "show ip protocols"
• "summary-address"
• "te-metric"
• "undebug ospf"
• "undebug ospf events"
• "undebug ospf ifsm"
• "undebug ospf lsa"
• "undebug ospf nfsm"
• "undebug ospf nsm"
• "undebug ospf packet"
• "undebug ospf route"
area authentication

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

Use the `ip ospf authentication-key` command to specify a Simple Text password (see "ip ospf authentication-key").

Use the `ip ospf message-digest-key` command to specify MD5 password (see "ip ospf message-digest-key").

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

**Command Syntax**

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

**Parameters**

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

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

- **message-digest**  
  Enables MD5 authentication on the area specified by AREAID.

**Default**

Null authentication

**Command Mode**

Router mode

**Examples**

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

ZebOS(config)#router ospf 100
ZebOS(config-router)#no 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. This command provides the metric for the summary default route, generated by the area border router, into the NSSA or stub area. Use this option only on an area border router that is attached to the NSSA or stub area. Refer to the RFC 3101 for information on NSSA.

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

Command Syntax

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

Parameters

- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **default-cost**: Indicates the cost for the default summary route used for a stub or NSSA area. Default value of cost is 1.
- **<0-16777215>**: Stub's advertised default summary cost.

Command Mode

Router mode

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

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

Related Commands

area nssa, area stub
area filter-list

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

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

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

Command Syntax

area (A.B.C.D|<0-4294967295>) filter-list [prefix (WORD) (in|out)]
n area (A.B.C.D|<0-4294967295>) filter-list [prefix (WORD) (in|out)]

Parameters

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

Command Mode

Router mode

Examples

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

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

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

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Router mode

**Examples**

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

Use this command to set an area as a Not-So-Stubby-Area (NSSA). 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, but not both.

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

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

Command Syntax

area (A.B.C.D|<0-4294967295>) nssa [default-information-originate (metric <0-16777214>|metric-type <1-2>|no-redistribution|no-summary|translator-role)|no-redistribution (default-information-originate|no-summary|translator-role)|no-summary (default-information-originate|no-redistribution|translator-role) |translator-role (always|never|candidate)]

no area (A.B.C.D|<0-4294967295>) nssa [default-information-originate (metric <0-16777214>|metric-type <1-2>|no-redistribution|no-summary|translator-role)|no-redistribution (default-information-originate|no-summary|translator-role)|no-summary (default-information-originate|no-redistribution|translator-role) |translator-role (always|never|candidate)]

Parameters

A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
default-information-originate Originate Type-7 default LSA into NSSA.
no-redistribution No redistribution into this NSSA area.
no-summary Do not inject inter-area route into NSSA.
translator-role Specify NSSA-ABR translator-role.
metric Specify metric value <0-16777214>.
metric-type Specify external metric type <1-2>.
translator-role NSSA-ABR translator role
    always Router always translate NSSA-LSA to Type-5 LSA.
    never Router never translate NSSA-LSA.
    candidate Router may translate NSSA-LSA to Type-5 LSA if it is elected.

Command Mode

Router mode

Examples

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

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

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

Command Syntax

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

Parameters

A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
A.B.C.D/M The area range prefix and length.
advertise Advertises this range.
not-advertise Does not advertise this range.

Default
Disabled

Command Mode
Router mode

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

ZebOS(config)#router ospf 100
ZebOS(config-router)#no area 1 range 192.16.0.0/24
**area shortcut**

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

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

**Command Syntax**

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

**Parameters**

- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **default**: Sets default short-cutting behavior.
- **enable**: Forces short-cutting through the area.
- **disable**: Disables short-cutting through the area.

**Command Mode**

Router mode

**Examples**

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

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

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

**Related Commands**

`ospf abr-type shortcut`
area stub

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

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

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

Command Syntax

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

Parameters

- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **no-summary**: Stops an ABR from sending summary link advertisements into the stub area.

Default

No stub area is defined.

Command Mode

Router mode

Examples

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

Related Commands

`area default-cost`
**area virtual-link**

Use this command to configure a link between two backbone areas that are physically separated through other non-backbone area. In OSPF, all non-backbone areas must be connected to a backbone area. If the connection to the backbone is lost, the virtual link repairs the connection. Configure virtual links between any two backbone routers that have an interface to a common non-backbone area. The protocol treats these routers joined by a virtual link as if they were connected by an unnumbered point-to-point network. To configure virtual link, include both the transit area ID and the corresponding virtual link neighbor’s router ID in the virtual link neighbor.

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

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

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

**Command Syntax**

```
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D authentication (authentication-key|dead-interval|hello-interval|message-digest-key|retransmit-interval|transmit-delay)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D authentication-key (LINE)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D dead-interval <1-65535> (authentication|authentication-key|message-digest-key|hello-interval|retransmit-interval|transmit-delay)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D hello-interval <1-65535> (authentication|authentication-key|message-digest-key|dead-interval|retransmit-interval|transmit-delay)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D message-digest-key (<1-255>|bfd)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D retransmit-interval (authentication|authentication-key|dead-interval|time|hello-interval|message-digest-key|transmit-delay)
area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D transmit-delay <1-3600> (authentication|authentication-key|message-digest-key|dead-interval|hello-interval|retransmit-interval)
no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D authentication (authentication-key|dead-interval|hello-interval|message-digest-key|retransmit-interval|transmit-delay)
no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D authentication-key (LINE)
no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D dead-interval <1-65535> (authentication|authentication-key|message-digest-key|hello-interval|retransmit-interval|transmit-delay)
no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D fall-over (bfd)
```
no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D hello-interval <1-65535>
  (authentication|authentication-key|message-digest-key|dead-interval|retransmit-interval|transmit-delay)

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D message-digest-key <1-255>

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

no area (A.B.C.D|<0-4294967295>) virtual-link A.B.C.D transmit-delay <1-3600>
  (authentication|authentication-key|message-digest-key|dead-interval|hello-interval|retransmit-interval)

Parameters

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

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

A.B.C.D
  Specify ID (IP address) associated with virtual link neighbor.

authentication
  Enable authentication on this virtual link

authentication-key
  Set authentication key.

LINE
  Authentication password of 16 characters.

dead-interval
  The interval, in seconds, during which no packets are received and after which the router
  acknowledges a neighboring router as off-line <1-65535>. The default is 40 seconds.

fall-over
  Specify fall-over detection.

bfd
  Bidirectional Forwarding Detection (BFD)

hello-interval
  The interval, in seconds, the router waits before it sends a hello packet <1-65535>. The
  default is 10 seconds.

message-digest-key
  Set message digest key <1-255>.

md5
  Specify using of the MD5 algorithm.

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

transmit-delay
  The interval, in seconds, the router waits before it transmits a packet<1-3600>. The
  default value is 1 second.

Command Mode

Router mode

Examples

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

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

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

Command Syntax

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

Parameters

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

Command Mode

Router mode

Examples

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

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

Related Commands

ip ospf cost
**bfd all-interfaces**

Use this command to enable Bidirectional Forwarding Detection (BFD) on all interfaces. Use the `no` parameter with this command to disable it.

**Command Syntax**

```
  bfd all-interfaces
  no bfd all-interfaces
```

**Parameters**

None

**Command Mode**

Router mode

**Examples**

```
ZebOS(config-router)#bfd all-interfaces
ZebOS(config-router)#no bfd all-interfaces
```
**capability cspf**

Use this command to enable the constrained shortest path first (CSPF) functionality. Use the **no** parameter with this command to disable this command.

**Command Syntax**

```
capability cspf
no capability cspf
```

**Parameters**

None

**Default**

Enabled

**Command Mode**

Router mode

**Examples**

```
ZebOS(config)#router ospf 100
ZebOS(config-router)#capability cspf

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

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

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

**Command Syntax**

```
capability opaque
no capability opaque
```

**Parameters**

None

**Default**

Enabled

**Command Mode**

Router mode

**Examples**

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

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

Use this command to enable OSPF graceful restart or restart signaling features. Use the `no` parameter with this command to disable it.

**Command Syntax**

```plaintext
capability restart [graceful|signaling]
no capability restart [graceful|signaling]
```

**Parameters**

- **graceful**: Specify enabling OSPF graceful restart feature.
- **signaling**: Specify enabling OSPF signaling restart feature.

**Default**

Enabled

**Command Mode**

Router mode

**Examples**

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

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

Use this command to enable the OSPF Traffic Engineering (TE) extension feature. The ZebOS process generates TE LSAs for each configured link.

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

**Command Syntax**

```
capability te
no capability te
```

**Parameters**

None

**Default**

Disabled

**Command Mode**

Router mode

**Examples**

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

ZebOS(config)#router ospf 100
ZebOS(config-router)#no capability te

ZebOS#configure terminal
ZebOS(config)#router ospf 100
ZebOS(config-router)#capability traffic-engineering

ZebOS(config)#router ospf 100
ZebOS(config-router)#no capability traffic-engineering
```
clear ip ospf

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

Command Syntax

    clear ip ospf [<0-65535>|process]

Parameters

    <0-65535>      Specify the Routing Process ID.
    process        Resets OSPF process.

Command Mode

    Privileged Exec Mode

Examples

    ZebOS#clear ip ospf process
    ZebOS#clear ip ospf 555 process
**compatible rfc1583**

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

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.

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

**Command Syntax**

- `compatible rfc1583`
- `no compatible rfc1583`

**Parameters**

None

**Default**

By default, OSPF is rfc 2328 compatible.

**Command Mode**

Router mode

**Examples**

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

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

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

**Command Syntax**

```
debug ospf [all|bfd|events|ifsm|lsa|nfsm|nsm|packet|route]
no debug ospf [all|bfd|events|ifsm|lsa|nfsm|nsm|packet|route]
```

**Parameters**

- **all**: Enable all debugging
- **bfd**: Debug Bidirectional Forwarding Detection (BFD)
- **events**: Debug OSPF events information (see "debug ospf events")
- **ifsm**: Debug OSPF Interface State Machine (see "debug ospf ifsm")
- **lsa**: Debug OSPF Link State Advertisement (see "debug ospf lsa")
- **nfsm**: Debug OSPF Neighbor State Machine (see "debug ospf nfsm")
- **nsm**: Debug OSPF NSM information (see "debug ospf nsm")
- **packet**: Debug OSPF packets (see "debug ospf packet")
- **route**: Debug OSPF route information (see "debug ospf route")

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

```
ZebOS#debug ospf all
ZebOS#debug ospf bfd
ZebOS#no debug ospf bfd
```

**Related Commands**

- `log file`
debug ospf events

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

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

Command Syntax

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

no debug ospf events (abr|asbr|lsa|nssa|os|router|vlink)

Parameters

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

Command Mode

Privileged Exec mode and Configure mode

Examples

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**

```
  debug ospf ifsm (status|events|timers)
  no debug ospf ifsm (status|events|timers)
```

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

```
  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**

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

**Parameters**

- `flooding`: Debug LSA flooding.
- `generate`: Debug LSA generation.
- `install`: Debug LSA installation.
- `maxage`: Debug the maximum age of the LSA in seconds.
- `refresh`: Debug LSA refresh.

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

**Related Commands**

`log file`
**debug ospf nfsm**

Use this command to specify debugging options for OSPF Neighbor Finite State Machines (NFSMs).
Use the `no` parameter with this command to disable this function.

**Command Syntax**

```
debug ospf nfsm (events|status|timers)
no debug ospf nfsm (events|status|timers)
```

**Parameters**

- **events**: Debug NSM event information
- **status**: Debug NSM status information
- **timers**: Debug NSM timer information

**Command Mode**

Privileged Exec mode Configure mode

**Examples**

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

**Related Commands**

- `log file`
**debug ospf nsm**

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

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

**Command Syntax**

```
depth ospf nsm (interface|redistribute)
nos debug ospf nsm (interface|redistribute)
```

**Parameters**

- **interface**
  - Debug NSM interface information.
- **redistribute**
  - Debug NSM redistribute information.

**Command Mode**

Privileged Exec mode and Configure mode

**Example**

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

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

**Related Commands**

- log file
**debug ospf packet**

Use this command to specify debugging options for OSPF packets.

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

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

**Related Commands**

- `log file`
**debug ospf route**

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

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

**Command Syntax**

```
debug ospf route (ase|ia|install|spf)
nod debug ospf route (ase|ia|install|spf)
```

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

**Related Commands**

- log file
default-information originate

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

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

Command Syntax

```
default-information originate (always|metric<0-16777214>|metric-type <1|2>|route-map [word])
no default-information originate (always|metric|metric-type|route-map)
```

Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>always</td>
<td>Used to advertise the default route regardless of whether there is a default route.</td>
</tr>
<tr>
<td>METRIC</td>
<td>Sets the OSPF metric used in creating the default route &lt;0-16777214&gt;. The default metric value is 10. The value used is specific to the protocol.</td>
</tr>
<tr>
<td>metric-type</td>
<td>Sets the OSPF external link type for default routes.</td>
</tr>
<tr>
<td>1</td>
<td>Sets OSPF External Type 1 metrics.</td>
</tr>
<tr>
<td>2</td>
<td>Sets OSPF External Type 2 metrics.</td>
</tr>
<tr>
<td>route-map</td>
<td>Specify the name of route-map. It is a string comprised of any characters, numbers or symbols.</td>
</tr>
<tr>
<td>WORD</td>
<td>Specify the name of route-map. It is a string comprised of any characters, numbers or symbols.</td>
</tr>
</tbody>
</table>

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

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

Related Commands

route-map
default-metric

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

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.

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

Command Syntax

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

Parameters

<1-16777214> Default metric value appropriate for the specified routing protocol.

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

Command Mode
Router mode

Examples

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

Related commands
redistribute
**distance**

Use this command to define OSPF route administrative distances based on route type. This command sets the distance for an entire group of routes, rather than a specific route that passes an access list.

The administrative distance rates the trustworthiness of a routing information source. 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 the `no` parameter with this command to restore the default value.

**Command Syntax**

```
distance [1-255]|ospf (external 1-255)|inter-area 1-255)|intra-area 1-255)
no distance ospf
```

**Parameters**

- `<1-255>`: OSPF administrative distance.
- `ospf`: OSPF routes administrative distance.
- `external`: Sets the distance for routes from other routing domains, learned by redistribution `<1-255>`.
- `inter-area`: Sets the distance for all routes from one area to another area `<1-255>`.
- `intra-area`: Sets the distance for all routes within an area `<1-255>`.

**Default**

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

**Command Mode**

Router mode

**Examples**

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

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

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

Command Syntax

distribute-list [WORD] (in|out[bgp|connected|isis|kernel|ospf|rip|static])
no distribute-list [WORD] (in|out[bgp|connected|isis|kernel|ospf|rip|static])

Parameters

WORD Specify the name of the access list.
in Indicates incoming routing updates.
out Indicates that outgoing advertised routes will be cleared.
bgp Specify BGP routes.
connected Specify connected routes.
isis Specify IS-IS routes.
kernel Specify kernel routes.
ospf Specify OSPF routes.
rip Specify RIP routes.
static Specify static routes.

Command Mode

Router mode

Examples

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

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

Related Commands

redistribute
**OSPF Commands**

### domain-id

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

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

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

**Command Syntax**

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

**Parameters**

- **A.B.C.D** OSPF domain ID in IP address format.
- **secondary** When specified, the domain ID is considered secondary. If not specified the domain ID is considered primary.
- **NULL** Null domain-ID
- **type** domain ID value type. Can be one of the following:
  - **type-as** AS format. Hex value is 0x0005.
  - **type-as4** AS4 format. Hex value is 0x0205.
  - **type-back-comp** Used for backward compatibility. Hex value is 0x8000.

**Default**

No domain ID is defined.

**Command Mode**

Router mode

**Examples**

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

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

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

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

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

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

Use this command to enable the database summary list optimization for OSPFv2. The default setting is disabled; however, when this feature is enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor, if the LSA instance in database summary list is the same as, or less recent than, the listed LSA in the database description packet received from the neighbor.

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

Command Syntax

   enable db-summary-opt
   no enable db-summary-opt

Parameters

None

Default

disabled

Command Mode

Router mode

Examples

   ZebOS#configure terminal
   ZebOS(config)#router ospf
   ZebOS(config-router)#enable db-summary-opt
   ZebOS(config-router)#no enable db-summary-opt
enable ext-ospf-multi-inst

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

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

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

**Command Syntax**

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

**Parameters**

None

**Defaults**

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

**Command Mode**

Configure mode

**Examples**

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

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

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

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

**Command Syntax**

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

**Parameters**

- **A.B.C.D** Specify IP address of the host.
- **area** Set the OSPF area ID
- **A.B.C.D** OSPF Area ID in IPv4 address format.
- **<0-4294967295>** OSPF Area ID as 4 octets unsigned integer value.
- **COST** Specify cost for stub host entry <0-65535>.

**Default**

No host entry is configured.

**Command Mode**

Router mode

**Examples**

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

Use this command to send and receive OSPF packets with the specified authentication method. This command enables OSPF packet to use authentication on the current interface. Use the `no` parameter with this command to disable the authentication.

**Command Syntax**

```
ip ospf (A.B.C.D) authentication (message-digest|null)
nop ip ospf (A.B.C.D) authentication
```

**Parameters**

- **A.B.C.D**  
  The IP address of the interface.
- **message-digest**  
  Use the message digest authentication.
- **null**  
  Use no authentication. It overrides password or message-digest authentication of the interface.

**Command Mode**

Interface mode

**Examples**

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

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

**Related Commands**

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

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

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.

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

**Command Syntax**

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

**Parameters**

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

- **LINE**
  - Specify the authentication password. String by the end of line will be taken.

**Default**

Authentication password not specified.

**Command Mode**

Interface mode

**Examples**

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

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

**Related Commands**

area authentication, ip ospf authentication.
ip ospf bfd

Use this command to enable Bidirectional Forwarding Detection (BFD).
Use this command with either the no or disable parameter to disable BFD.

Command Syntax

- ip ospf bfd (disable)
- no ip ospf bfd (disable)

Parameters

disable

Specify to disable BFD.

Command Mode

Interface mode

Examples

ZebOS#configure terminal
ZebOS(config)#interface eth0
ZebOS(config-if)#ip ospf bfd
**ip ospf cost**

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

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 \( \left( \frac{10^8}{\text{bandwidth}} \right) \); use this `ip ospf cost` command to set the cost manually.

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

**Command Syntax**

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

**Parameters**

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

- **<1-65535>**  
  Specify the link-state metric. The default value is 10.

**Command Mode**

Interface mode

**Examples**

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

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

**Related Commands**

- `show ip ospf interface`
- `auto-cost`
**ip ospf database-filter**

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

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.

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

**Command Syntax**

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

**Parameters**

- **A.B.C.D**  
  The IP address of the interface.
- **all**  
  Specify to filter all LSAs.
- **out**  
  Specify to filter outgoing LSAs.

**Default**

Disabled, all outgoing LSAs are flooded to the interface.

**Command Mode**

Interface mode

**Examples**

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

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

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

Command Syntax

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

Parameters

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

Command Mode

Interface mode

Examples

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

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

Related Commands

- ip ospf hello-interval
- show ip ospf interface
**ip ospf disable**

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

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

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

**Command Syntax**

```
ip ospf disable [all]
no ip ospf disable [all]
```

**Parameters**

| all | Specify to disable all functionality. |

**Command Mode**

Interface mode

**Usage**

**Example**

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

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

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

Command Syntax

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

Parameters

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

Command Mode

Interface mode

Examples

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

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

Related Commands

- ip ospf dead-interval, show ip ospf interface
ip ospf message-digest-key

Use this command to register MD5 key for OSPF MD5 authentication.
Use the no parameter with this command to remove an MD5 key.

**Command Syntax**

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

**Parameters**

- **A.B.C.D** : IPv4 address of the interface
- **<1-255>** : Specify a key ID
- **md5** : Use the MD5 algorithm
- **LINE** : 1-16 characters that specify the OSPF password. String by the end of line will be taken.

**Default**

Disabled.

**Command Mode**

Interface mode

**Usage**

Message Digest Authentication is a cryptographic authentication. A key (password) and key-id are configured on each router. The router uses an algorithm based on the OSPF packet, the key, and the key-id to generate a message digest that gets appended to the packet. Use this command for uninterrupted transitions between passwords. This is helpful for administrators who want to change the OSPF password without disrupting communication. The system begins a rollover process until all the neighbors have adopted the new password. This allows neighboring routers to continue communication while the network administrator is updating them with a new password. The router will stop sending duplicate packets once it detects that all of its neighbors have adopted the new password.

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

**Examples**

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

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

Use this command to set MTU size for OSPF to construct packets based on this value. 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.

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

Command Syntax

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

Parameters

   <576-65535>   Specify an MTU size.

Default

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

Command Mode

Interface mode

Examples

   ZebOS#configure terminal
   ZebOS(config)#interface eth0
   ZebOS(config-if)#ip ospf mtu 1480
**ip ospf mtu-ignore**

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

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

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

**Command syntax**

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

**Parameters**

- **A.B.C.D**
  - IP address of the interface.

**Command Mode**

Interface mode

**Examples**

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

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

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

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

**Command Syntax**

```
ip ospf network (A.B.C.D) [broadcast|non-broadcast|point-to-point|point-to-multipoint]
no ip ospf network (A.B.C.D)
```

**Parameters**

- **A.B.C.D**
  - IP address of the interface.

- **broadcast**
  - Sets the network type to broadcast.

- **non-broadcast**
  - Sets the network type to NBMA.

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

- **point-to-multipoint**
  - Sets the network type to point-to-multipoint. This option can also specify non-broadcast.

**Default**

Broadcast type

**Command Mode**

interface mode

**Examples**

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

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

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

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.

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

Command Syntax

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

Parameters

- **A.B.C.D**: The IP address of the interface.
- **<0-255>**: Specify the Router Priority of the interface. Default value is 1.

Default

The default priority is 1.

Command Mode

Interface mode

Examples

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

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

Related Commands

- ip ospf network

Equivalent Commands

- ospf priority
ip ospf resync-timeout

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

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

Command Syntax

ip ospf (A.B.C.D) resync-timeout <1-65535>
no ip ospf (A.B.C.D) resync-timeout

Parameters

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

Command Mode

Interface mode

Examples

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

ZebOS#configure terminal
ZebOS(config)#interface eth0
ZebOS(config-if)#ip ospf resync-timeout 65
ip ospf retransmit-interval

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

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.

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

Command Syntax

    ip ospf (A.B.C.D) retransmit-interval <5-65535>
    no ip ospf (A.B.C.D)retransmit-interval

Parameters

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

Command Mode

Interface mode

Examples

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

    ZebOS#configure terminal
    ZebOS(config)#interface eth0
    ZebOS(config-if)#ip ospf retransmit-interval 6
**ip ospf transmit-delay**

Use this command to set the estimated time it takes to transmit a link-state-update packet on the interface. The transmit delay value adds a specified time to the age field of an update. If the delay is not added, the time in which the LSA transmits over the link is not considered. This command is especially useful for low speed links. Add transmission and propagation delays when setting the transmit delay value.

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

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Interface mode

**Examples**

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

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

Use this command to set the limit for the number of Database Descriptors (DD) that can be processed concurrently. This command is useful when a router's performance is affected from simultaneously bringing up several OSPF adjacencies. This command limits the maximum number of DD exchanges that can occur concurrently per OSPF instance, thus allowing for all of the adjacencies to come up.

Use the no option with this command to unset the limit.

**Command Syntax**

```
max-concurrent-dd <1-65535>
no max-concurrent-dd
```

**Parameters**

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

**Command Mode**

Router mode

**Examples**

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

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

Use this command to configure the maximum number of OSPF areas.
Use the no parameter with this command to disable the limit.

Command Syntax

maximum-area <1-4294967294>
no maximum-area

Parameters

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

Command Mode

Router mode

Examples

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

Use this command to configure OSPF routers interconnecting to NBMA networks. To configure neighbor on NBMA network manually use this command and include one neighbor entry for each known non-broadcast 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.

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

Command Syntax

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

Parameters

- **A.B.C.D** Specify the interface IP address of the neighbor.
- **cost** Specify the link-state metric to this neighbor <1-65535>.
- **priority** Specify the 8-bit number indicating the router priority value of the non-broadcast neighbor associated with the specified IP address <0-255>. The default value is 0. This keyword does not apply to point-to-multipoint interfaces.
- **poll-interval** Dead neighbor polling interval in seconds <1-65535>. It is recommended to set this value much higher than the hello interval. The default value is 120 seconds.

Command Mode

Router mode

Examples

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

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

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

OSPF routing can be enabled per IPv4 subnet basis. Network address can be defined using the prefix length or a wildcard mask. A wildcard mask is comprised of consecutive 0 as network bits and consecutive 1 as host bits. If OSPF multiple-instance support is enabled (using the `enable ext-ospf-multi-inst` command), different instance IDs can be enabled on the same subnet. By default, the instance ID is 0.

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

**Command Syntax**

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

**Parameters**

- **A.B.C.D/M**: IPv4 network address with prefix length.
- **A.B.C.D**: IPv4 network address.
- **area**: Set the OSPF area ID
- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **instance-id**: Interface instance ID.
- **<0-255>**: Instance ID range. Default is 0.

**Default**

No network area is configured.

**Command Mode**

Router mode

**Examples**

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

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

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

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

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

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

**Command Syntax**

```
ospf abr-type [cisco|ibm|shortcut|standard]
no ospf abr-type [cisco|ibm]
```

**Parameters**

- **cisco**: Specify an alternative ABR using Cisco implementation (RFC 3509). This is the default ABR type.
- **ibm**: Specify an alternative ABR using IBM implementation (RFC 3509).
- **shortcut**: Specify a Shortcut ABR (draft-ietf-ospf-shortcut-abr-02.txt).
- **standard**: Specify a standard behavior ABR (RFC 2328).

**Default**

ABR type Cisco

**Command Mode**

Router mode

**Usage**

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

- **Cisco ABR Type**: By this definition, a router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.
- **Standard ABR Type**: By this definition, a router is considered an ABR if it has more than one area actively attached to it.
- **IBM ABR Type**: By this definition, a router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.
- **Shortcut ABR Type**: The Shortcut ABR improves over the Standard ABR behavior by modifying the calculation of inter-area routes. It is allowed to install inter-area routes through non-backbone areas if the non-backbone path is better, thus providing a shortcut through these areas. To prevent routing loops, the inter-area routes are re-advertised only if they are associated with the backbone area.

**Examples**

```
ZebOS#configure terminal
ZebOS(config)#router ospf 100
ZebOS(config-router)#ospf abr-type ibm
```
**ospf restart grace-period**

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

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

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

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

**Command Syntax**

ospf restart grace-period <1-1800>
no ospf restart grace-period <1-1800>

**Parameters**

- **grace-period** Specify the grace period in seconds<1-1800>.
- **helper** Specify the local policy as helper mode (see "ospf restart helper").

**Command Mode**

Configure mode

**Examples**

ZebOS#configure terminal
ZebOS(config)#ospf restart grace-period 250
**ospf restart helper**

Use this command to configure the helper behavior for Graceful Restart.

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

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

**Command Syntax**

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

**Parameters**

- `max-grace-period`  
  Help only if received grace-period is less than this value `<1-1800>`.

- `never`  
  Never act as helper.

- `router-id`  
  Router ID of neighbor to never to act as helper `<A.B.C.D>`.

- `only-reload`  
  Help only on software reloads.

- `only-upgrade`  
  Help only on software upgrades.

**Command Mode**

Configure mode

**Usage**

Use the `never` parameter with the `ospf restart helper` command to prevent the neighbor from entering Helper mode. Use the optional `POLICY` parameters with the `ospf restart helper` command to configure certain local policies on the helper. If the configured policies are satisfied, only a router can act as helper. Use the `never router-id all` parameter with the `no ospf restart helper` command to remove all neighbor IDs from the never router ID list.

**Examples**

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

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

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

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

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

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

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

**Command Syntax**

```
ospf router-id [A.B.C.D]
no ospf router-id
```

**Parameters**

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

**Command Mode**

Router mode

**Examples**

The following example shows a specified router ID 2.3.4.5.

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

**Related Commands**

- `show ip ospf`
**overflow database**

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

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

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

**Command Syntax**

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

**Parameters**

- `<0-4294967294>`
  - The maximum number of LSAs

- `hard`
  - Shutdown occurs if the number of LSAs exceeds the specified value.

- `soft`
  - Warning message appears if the number of LSAs exceeds the specified value.

**Command Mode**

Router mode

**Examples**

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

```
ZebOS(config-router)#overflow database 5 hard
```

84
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. This command limits 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 recover time <0-65535> to recover from this state.

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

**Command Syntax**

```
overflow database external [0-2147483647]|(0-65535]
no overflow database external
```

**Parameters**

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

**Command Mode**

Router mode

**Examples**

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

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

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

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

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

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

**Command Syntax**

```
passive-interface [IFNAME|A.B.C.D]
```

**Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFNAME</td>
<td>The name of the interface.</td>
</tr>
<tr>
<td>A.B.C.D</td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Command Mode**

Router mode

**Examples**

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

This command redistributes routes from a routing protocol, static route and kernel route into an OSPF routing table. Use the `no` parameter with this command to disable this function.

Command Syntax

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

Parameters

- `bgp` Specify BGP routes.
- `connected` Specify connected routes.
- `isis` Specify IS-IS routes.
- `kernel` Specify kernel routes.
- `ospf` Specify OSPF routes (see “redistribute ospf”).
- `rip` Specify RIP routes.
- `static` Specify static routes.
- `<1-65535>` Specify an OSPF Process ID
- `metric` Specify the external metric `<0-16777214>`.
- `metric-type` Specify the external metric-type:
  - `1` Set OSPF External Type 1 metrics.
  - `2` Set OSPF External Type 2 metrics.
- `route-map` Specify a Route map reference.
- `WORD` Specify name of the route-map.
- `tag` Specify the external route tag `<0-4294967295>`.

Command Mode

Router mode

Examples

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

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

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

**Command Syntax**

```
redistribute ospf (<1-65535>|metric|metric-type|route-map|tag)
no redistribute ospf (<1-65535>|metric|metric-type|route-map|tag)
```

**Parameters**

- `<1-65535>`: Specify an OSPF Process ID
- `metric`: Specify the external metric `<0-16777214>`.
- `metric-type`: Specify the external metric-type:
  - `1`: Set OSPF External Type 1 metrics.
  - `2`: Set OSPF External Type 2 metrics.
- `route-map`: Specify a Route map reference.
  - `WORD`: Specify name of the route-map.
- `tag`: Specify the external route tag `<0-4294967295>`.

**Command Mode**

Router mode

**Usage**

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

**Examples**

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

```
ZebOS#configure terminal
ZebOS(config)#router ospf 1
ZebOS(config-router)#redistribute ospf 2
```

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

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

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

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

Command Syntax

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

Parameters

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

Command Mode

Privileged Exec mode and Exec mode

Examples

    ZebOS#restart ospf graceful grace-period 200
router ospf

Use this command to enter router mode and to configure an OSPF routing process. Specify the process ID with this command to configure multiple instances.

Process ID <1-65535> of OSPF is an optional parameter. When running a single instance of OSPF, you may or may not specify the Process ID but for running multiple instances of OSPF you must specify the Process ID.

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

Command Syntax

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

Parameters

    <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

Examples

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

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

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

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

**Command Syntax**

```
router-id [A.B.C.D]
no router-id [A.B.C.D]
```

**Parameters**

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

**Command Mode**

Router mode

**Examples**

The following example shows a fixed router ID 10.10.10.60

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

**Related Commands**

show ip ospf
show debugging ospf

Use this command to display the set OSPF debugging option.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show debugging ospf
```

**Parameters**

None

**Command Mode**

Privileged Exec mode

**Example**

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

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

**Examples**

```
ZebOS#show debugging ospf
```
**show ip ospf**

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

To modify the lines displayed, use the `|` (output modifier token). To save the output to a file, use the `>` output redirection token.

**Command Syntax**

```plaintext
show ip ospf <0-65535>
```

**Parameters**

`<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

**Examples**

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

```
ZebOS#show ip ospf
Routing Process "ospf 1" with ID 10.10.11.60
  Process uptime is 46 minutes
  Conforms to RFC2328, and RFC1583 Compatibility flag is disabled
  Supports only single TOS(TOS0) routes
  Supports opaque LSA
  This router is an ASBR (injecting external routing information)
  SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
  Refresh timer 10 secs
  Number of external LSA 1. Checksum Sum 0xBC1E
  Number of non-default external LSA 1
  External LSA database is unlimited.
  Number of areas attached to this router: 1
    Area 0 (BACKBONE)
  Number of interfaces in this area is 1(1)
  Number of fully adjacent neighbors in this area is 1
  Area has no authentication
  SPF algorithm last executed 00:46:27.935 ago
  SPF algorithm executed 2 times
  Number of LSA 5. Checksum Sum 0x026a20

Routing Process "ospf 100" with ID 10.10.11.146
  Process uptime is 0 minute
  Conforms to RFC2328, and RFC1583 Compatibility flag is disabled
  Supports only single TOS(TOS0) routes
  Supports opaque LSA
  SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
  Refresh timer 10 secs
  Number of external LSA 0. Checksum Sum 0x0
  Number of non-default external LSA 0
```
OSPF Commands

External LSA database is unlimited.
Number of areas attached to this router: 1
   Area 1
Number of interfaces in this area is 1(1)
Number of fully adjacent neighbors in this area is 0
Number of fully adjacent virtual neighbors through this area is 0
Area has no authentication
SPF algorithm executed 0 times
Number of LSA 1. Checksum Sum 0x00e3e2

ZebOS#show ip ospf 100
Routing Process "ospf 100" with ID 10.10.11.146
Process uptime is 0 minute
Conforms to RFC2328, and RFC1583 Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Refresh timer 10 secs
Number of external LSA 0. Checksum Sum 0x0
Number of non-default external LSA 0
External LSA database is unlimited.
Number of areas attached to this router: 1
   Area 1
Number of interfaces in this area is 1(1)
Number of fully adjacent neighbors in this area is 0
Number of fully adjacent virtual neighbors through this area is 0
Area has no authentication
SPF algorithm executed 0 times
Number of LSA 1. Checksum Sum 0x00e3e2
**show ip ospf border-routers**

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

To modify the lines displayed, use the \| (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf <0-65535> border-routers
```

**Parameters**

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

**Command Mode**

Privileged Exec mode

**Example**

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

```
ZebOS#show ip ospf border-routers
OSPF process 1 internal Routing Table
Codes: i - Intra-area route, I - Inter-area route
i 10.15.0.1 [10] via 10.10.1.0, eth0, ASBR, Area 0.0.0.0
i 172.16.10.1 [10] via 10.10.11.50, eth1, ABR, ASBR, Area 0.0.0.0
```
show ip ospf database

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf database [<0-65535>|adv-router|asbr-summary|external|max-age|network
 |nssa-external|opaque-area|opaque-as|opaque-link|router|self-originate|summary]
```

Parameters

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Advertising Router link states.
- `asbr-summary`: ASBR summary link states (see "show ip ospf database asbr-summary").
- `external`: External link states (see "show ip ospf database external").
- `max-age`: Display 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.
- `network`: Network link states (see "show ip ospf database network").
- `nssa-external`: NSSA external link state (see "show ip ospf database nssa-external").
- `opaque-area`: Link area Opaque-LSA (see "show ip ospf database opaque-area").
- `opaque-as`: Link AS Opaque-LSA (see "show ip ospf database opaque-as").
- `opaque-link`: Link local Opaque-LSA (see "show ip ospf database opaque-link").
- `router`: Router link states (see "show ip ospf database router").
- `self-originate`: Display self-originated link states.
- `summary`: Network summary link states (see "show ip ospf database summary").

Command Mode

Privileged Exec mode

Examples

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 IDADV RouterAge Seq#CkSum Link count
10.10.11.60 10.10.11.60 32 0x80000002 0x472b 1
OSPF Router process 100 with ID (10.10.11.60)
Router Link States (Area 0.0.0.0)
Link IDADV RouterAge Seq#CkSum Link count
10.10.11.60 10.10.11.60219 0x80000001 0x4f5d 0
```
**show ip ospf database asbr-summary**

Use this command to display information about the Autonomous System Boundary Router (ASBR) summary LSAs. To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf database [<0-65535>|asbr-summary(adv-router|A.B.C.D|self-originate]
```

**Parameters**

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

**Command Mode**

Privileged Exec mode

**Examples**

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

Use this command to display information about the external LSAs.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf database [<0-65535>|external (adv-router|A.B.C.D|self-originate]
```

Parameters

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

Command Mode

Privileged Exec mode

Example

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
```
show ip ospf database network

Use this command to display information about the network LSAs.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf database network <0-65535> [adv-router|A.B.C.D|self-originate]
```

Parameters

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

Command Mode

Privileged Exec mode

Example

The following is a sample output from the `show ip ospf database network` command with the `adv-router` option selected:

```
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
```
**show ip ospf database nssa-external**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf database <0-65535> [adv-router|A.B.C.D|self-originate]
```

**Parameters**

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

**Command Mode**

Privileged Exec mode

**Example**

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)
```
show ip ospf database opaque-area

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf database opaque-area [<0-65535>|adv-router|A.B.C.D|self-originate]
```

**Parameters**

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

**Command Mode**

Privileged Exec mode

**Example**

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
```
show ip ospf database opaque-as

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf database opaque-as [<0-65535>|adv-router|A.B.C.D|self-originate]
```

**Parameters**

- `<0-65535>`: The ID of the router process for which information should be displayed.
- `adv-router`: Display all the LSAs of the specified router.
- `A.B.C.D`: A link state ID (as an IP address).
- `self-originate`: Display self-originated link states.

**Command Mode**

Privileged Exec mode

**Example**

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
```
show ip ospf database opaque-link

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf database opaque-link [<0-65535>|adv-router|A.B.C.D|self-originate]
```

Parameters

- `<0-65535>` The ID of the router process for which information should be displayed.
- `adv-router` Display all the LSAs of the specified router.
- `A.B.C.D` A link state ID (as an IP address).
- `self-originate` Display self-originated link states.

Command Mode

Privileged Exec mode

Examples

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)
```
**show ip ospf database router**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf database router [<0-65535>|adv-router|A.B.C.D|self-originate]
```

**Parameters**

- `<0-65535>` The ID of the router process for which information should be displayed.
- `adv-router` Display all the LSAs of the specified router.
- `A.B.C.D` A link state ID (as an IP address).
- `self-originate` Display self-originated link states.

**Command Mode**

Exec mode and Privileged Exec mode

**Example**

The following is a sample output from this 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
```
show ip ospf database summary

Use this command to display summary information about the LSAs.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf database summary [<0-65535>|adv-router|A.B.C.D|self-originate]
```

Parameters

- `<0-65535>` The ID of the router process for which information should be displayed.
- `adv-router` Display all the LSAs of the specified router.
- `A.B.C.D` A link state ID (as an IP address).
- `self-originate` Display self-originated link states.

Command Mode

Privileged Exec mode

Example

The following are the sample outputs from the show ip ospf database summary command using the adv-router options.

```
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
```

**show ip ospf igp-shortcut-lsp**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf <0-65535> igp-shortcut-lsp
```

**Parameters**

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

**Command Mode**

Exec mode

**Example**

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

Use this command to show the IGP Shortcut route calculated by OSPF.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax
    show ip ospf <0-65535> igp-shortcut-route

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

Command Mode
    Exec mode

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

Use this command to display interface information for OSPF.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

    show ip ospf interface [IFNAME]

Parameters

    IFNAME               An alphanumeric string that is the interface name.

Command Mode

Privileged Exec mode and Exec mode

Example

The following is a sample output of this command:

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

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Privileged Exec mode and Exec mode

**Example**

The following is a sample output of this command:

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

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

To modify the lines displayed, use the `|` (output modifier token). To save the output to a file, use the `>` output redirection token.

**Command Syntax**

```plaintext
show ip ospf <0-65535> neighbor [A.B.C.D|all|DETAIL|INTERFACE]
```

**Parameters**

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

**Command Mode**

Privileged Exec mode and Exec mode

**Example**

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

```
ZebOS#show ip ospf neighbor
OSPF process 1:
Neighbor ID PriState Dead Time Address Interface
10.10.10.50 1 Full/DR 00:00:38 10.10.10.50 eth0
OSPF process 100:
Neighbor ID PriState Dead Time Address Interface
10.11.11.50 1 Full/Backup 00:00:31 10.11.11.50 eth1

ZebOS#show ip ospf 1 neighbor
OSPF process 1:
Neighbor ID PriState Dead Time Address Interface
10.10.10.50 1 Full/DR 00:00:38 10.10.10.50 eth0

ZebOS#show ip ospf neighbor detail
Neighbor 10.10.10.50, interface address 10.10.10.50
In the area 0.0.0.0 via interface eth0
Neighbor priority is 1, State is Full, 5 state changes
DR is 10.10.10.50, BDR is 10.10.10.10
Options is 0x42 (*|O|---|---|---|E-)
Dead timer due in 00:00:38
Neighbor is up for 00:53:07
Database Summary List 0
Link State Request List 0
Link State Retransmission List 0
Crypt Sequence Number is 0
Thread Inactivity Timer on
Thread Database Description Retransmission off
```
**show ip ospf route**

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

To modify the lines displayed, use the `|` (output modifier token). To save the output to a file, use the `>` output redirection token.

**Command Syntax**

```
show ip ospf <0-65535> route
```

**Parameters**

`<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

**Examples**

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

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

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

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

Use this command to display traffic engineering (TE) database information.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ip ospf <0-65535> te-database
```

**Parameters**

`<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 and Exec mode

**Example**

The following example displays traffic engineering database information.

```
ospfd#show ip ospf te-database
```
show ip ospf virtual-links

Use this command to display virtual link information.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

    show ip ospf <0-65535> virtual-links

Parameters

    <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 and Exec mode

Example

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

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

Use this command to display OSPF process parameters and statistics.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

    show ip protocols [ospf]

Parameters

    ospf       Display Open Shortest Path First (OSPF) information.

Command Mode

Privileged Exec mode

Usage

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

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

Use this command to summarize or suppress external routes with the specified address range. Use the `no` option with this command to disable summary address.

**Command Syntax**

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

**Parameters**

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

- **not-advertise**
  Suppresses external routes.

- **tag**
  Set a tag value <0-4294967295>. The default tag value is 0.

**Command Mode**

Router mode

**Usage**

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

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

**Examples**

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

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

This command sets traffic engineering metric for an interface.

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.

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

**Command Syntax**

```
te-metric <1-65535>
no te-metric
```

**Parameters**

- `<1-65535>`
  - Set the te-metric value. Default value is 0.

**Command Mode**

Interface mode

**Examples**

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

**Related Commands**

capability te
**undebug ospf**

Use this command to disable all debugging options for OSPF.

**Command Syntax**

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

**Parameters**

- **all**: Turn off all debugging.
- **bfd**: Turn off Bidirectional Forwarding Detection (BFD) debugging.
- **events**: Turn off OSPF event information debugging (see "undebug ospf events").
- **ifsm**: Turn off OSPF Interface State Machine debugging (see "undebug ospf ifsm").
- **lsa**: Turn off OSPF Link State Advertisement debugging (see "undebug ospf lsa").
- **nfsm**: Turn off OSPF Neighbor State Machine debugging (see "undebug ospf nfsm").
- **nsm**: Turn off OSPF NSM information debugging (see "undebug ospf nsm").
- **packet**: Turn off OSPF packets debugging (see "undebug ospf packet").
- **route**: Turn off OSPF route information debugging (see "undebug ospf route").

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ospf all
ZebOS#undebug ospf bfd
```
**undebug ospf events**

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

**Command Syntax**

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

**Parameters**

- **abr**
  - Disables debugging of ABR events
- **asbr**
  - Disables debugging of ASBR events
- **lsa**
  - Disables debugging of LSA events
- **nssa**
  - Disables debugging of NSSA events
- **os**
  - Disables debugging of OS interaction events
- **router**
  - Disables debugging of other router events
- **vlink**
  - Disables debugging of virtual link events

**Command Mode**

Privileged Exec mode

**Examples**

```plaintext
ZebOS#undebug ospf event abr
```
**undebug ospf ifsm**

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

**Command Syntax**

```
undebug ospf ifsm (status|events|timers)
```

**Parameters**

- **events**: Disables debugging of IFSM event information
- **status**: Disables debugging of IFSM status information
- **timers**: Disables debugging of IFSM timer information

**Command Mode**

Privileged Exec mode

**Examples**

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

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

**Command Syntax**

```
undebug ospf lsa (generate|flooding|install|maxage|refresh)
```

**Parameters**

- **generate** Disables debugging of the LSA generation.
- **flooding** Disables debugging of the LSA flooding.
- **install** Disables debugging of the LSA installation.
- **maxage** Disables debugging of maximum age of the LSA in seconds.
- **refresh** Disables debugging of LSA refresh.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ospf lsa refresh
```
**undebug ospf nfsm**

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

**Command Syntax**

`undebug ospf nfsm (status|events|timers)`

**Parameters**

- **status**: Disable the logging of NFSM status information.
- **events**: Disable the logging of NFSM event information.
- **timers**: Disable the logging of NFSM timer information.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ospf nfsm events
```
**undebug ospf nsm**

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

**Command Syntax**

`undebug ospf nsm (interface|redistribute)`

**Parameters**

- **interface**  
  Disable logging of NSM interface information.

- **redistribute**  
  Disable logging of NSM redistribute information.

**Command Mode**

Privileged Exec mode

**Example**

```
ZebOS#undebug ospf nsm interface
```
**undebug ospf packet**

Use this command to disable debugging options for OSPF packets.

**Command Syntax**

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

**Parameters**

- **dd**
  - Disable debugging for OSPF database descriptions.
- **detail**
  - Disable the setting of the debug option set to detailed information.
- **hello**
  - Disable debugging for OSPF hello packets.
- **ls-ack**
  - Disable debugging for OSPF link state acknowledgments.
- **ls-request**
  - Disable debugging for OSPF link state requests.
- **ls-update**
  - Disable debugging for OSPF link state updates.
- **send**
  - Disable the debug option set for sent packets.
- **recv**
  - Disable the debug option set for received packets.

**Command Mode**

Privileged Exec mode

**Examples**

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

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

**Command Syntax**

```
undebug ospf route (ase|ia|install|spf)
```

**Parameters**

- **ia**
  - Disable the debugging of Inter-Area route calculation.
- **ase**
  - Disable the debugging of external route calculation.
- **install**
  - Disable the debugging of route installation.
- **spf**
  - Disable the debugging of SPF calculation.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ospf route install
```
CHAPTER 3  OSPFv3 Commands

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

- "abr-type"
- "area default-cost"
- "area range"
- "area stub"
- "area virtual-link"
- "auto-cost reference bandwidth"
- "capability restart"
- "capability te"
- "clear ipv6 ospf process"
- "debug ipv6 ospf"
- "debug ipv6 ospf events"
- "debug ipv6 ospf ifsm"
- "debug ipv6 ospf lsdb"
- "debug ipv6 ospf nfm"
- "debug ipv6 ospf packet"
- "debug ipv6 ospf route"
- "default-metric"
- "enable db-summary-opt"
- "ipv6 ospf cost"
- "ipv6 ospf dead-interval"
- "ipv6 ospf display route single-line"
- "ipv6 ospf hello-interval"
- "ipv6 ospf neighbor"
- "ipv6 ospf network"
- "ipv6 ospf priority"
- "ipv6 ospf restart grace-period"
- "ipv6 ospf restart helper"
- "ipv6 ospf retransmit-interval"
- "ipv6 ospf transmit-delay"
- "ipv6 router ospf"
- "ipv6 te-metric"
- "max-concurrent-dd"
OSPFv3 Commands

- "passive-interface"
- "redirect"
- "restart ipv6 ospf graceful"
- "router-id"
- "router ipv6 ospf"
- "show debugging ipv6 ospf"
- "show ipv6 ospf"
- "show ipv6 ospf database"
- "show ipv6 ospf interface"
- "show ipv6 ospf neighbor"
- "show ipv6 ospf route"
- "show ipv6 ospf topology"
- "show ipv6 ospf virtual-links"
- "undebug ipv6"
- "undebug ipv6 ospf events"
- "undebug ipv6 ospf ifsm"
- "undebug ipv6 ospf lsa"
- "undebug ipv6 ospf nfsm"
- "undebug ipv6 ospf nsm"
- "undebug ipv6 ospf packet"
- "undebug ipv6 ospf route"
**abr-type**

Use this command to set an OSPFv3 Area Border Router (ABR) type. Use the *no* parameter with this command to disable this function.

**Command Syntax**

```
abr-type [cisco|ibm|standard]
no abr-type [cisco|ibm|standard]
```

**Parameters**

- **cisco** Specify an alternative ABR using Cisco implementation (RFC 3509). This is the default ABR type.
- **ibm** Specify an alternative ABR using IBM implementation (RFC 3509).
- **standard** Specify a standard behavior ABR (RFC 2328).

**Default**

ABR type Cisco

**Command Mode**

Router mode

**Usage**

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

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

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

IBM ABR Type: By this definition, a router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.

**Examples**

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

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

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

Command Syntax

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

Parameters

A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
default-cost Indicates the cost for the default summary route used for a stub or NSSA area. Default value of cost is 1.
<0-16777215> Stub's advertised default summary cost.

Command Mode

Router mode

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

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

Command Syntax

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

Parameters

A.B.C.D OSPF Area ID in IPv4 address format.
<0-4294967295> OSPF Area ID as 4 octets unsigned integer value.
X:X::X:X/M The area IPv6 range prefix and length.
advertise Advertises this range.
not-advertise Does not advertise this range.

Command Mode

Router mode

Examples

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

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

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

Command Syntax

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

Parameters

- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **no-summary**: Stops an ABR from sending summary link advertisements into the stub area.

Default

No stub area is defined.

Command Mode

Router mode

Examples

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

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 (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [dead-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)
area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [instance-id <0-255>]
area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [hello-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [retransmit-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [transmit-delay <1-3600>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
no area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [dead-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)
no area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [instance-id <0-255>]
no area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [hello-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
no area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [retransmit-interval <1-65535>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
no area (A.B.C.D|<0-4294967295>) virtual-link (A.B.C.D) [transmit-delay <1-3600>
  (dead-interval|hello-interval|retransmit-interval|transmit-delay)]
```

Parameters

- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **A.B.C.D**: Specify ID (IP address) associated with virtual link neighbor.
- **dead-interval**: The interval, in seconds, during which no packets are received and after which the router acknowledges a neighboring router as off-line <1-65535>. The default is 40 seconds.
- **hello-interval**: The interval, in seconds, the router waits before it sends a hello packet <1-65535>. The default is 10 seconds.
- **instance-id**: Specify an OSPFv3 instance ID.
- **retransmit-interval**: The interval, in seconds, the router waits before it retransmits a packet. The default is 5 seconds.
- **transmit-delay**: The interval, in seconds, the router waits before it transmits a packet <1-3600>. The default value is 1 second.

Command Mode

Router mode
OSPfv3 Commands

Usage

In OSPFv3, all non-backbone areas must be connected to a backbone area. If the connection to the backbone is lost, the virtual link repairs the connection.

You can configure virtual links between any two backbone routers that have an interface to a common non-backbone area. The protocol treats these two routers joined by a virtual link as if they were connected by an unnumbered point-to-point network. To configure virtual link, include both the transit area ID and the corresponding virtual link neighbor’s router ID in the virtual link neighbor. To see the router ID use the `show ip ospf` command.

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

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

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

Include the transit area ID and the corresponding virtual link neighbor’s router ID in each virtual link neighbor to properly configure a virtual link.

Examples

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

Related commands

`show ipv6 ospf virtual-links`
auto-cost reference bandwidth

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

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

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

Command Syntax

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

Parameters

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

Command Mode

Router mode

Default

100 Mbps

Examples

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

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

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

Related Commands

ipv6 ospf cost
capability restart

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

Use the no parameter with this command to disable it.

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

Command Syntax

capability restart (graceful)
no capability restart

Parameter

  graceful  Specify a graceful OSPF restart

Default

Enabled

Command Mode

Router mode

Examples

ZebOS(config)#router ipv6 ospf 100
ZebOS(config-router)#capability restart graceful

ZebOS(config)#router ipv6 ospf 100
ZebOS(config-router)#capability restart
**capability te**

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

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

**Command Syntax**

```
capability te
no capability te
```

**Parameters**

None

**Default**

Disabled

**Command Mode**

Router mode

**Examples**

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

**Related Commands**

`ipv6 te-metric`
clear ipv6 ospf process

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

Command Syntax

clear ipv6 ospf (WORD) process

Parameters
None

Command Mode
Privileged Exec Mode

Examples

ZebOS#clear ipv6 ospf ipi process
**debug ipv6 ospf**

Use this command to specify all debugging options for OSPFv3.
Use the no option with this command to disable the options.

**Command Syntax**

```
debug ipv6 ospf (all|events|ifsm|lsa|n fsm|nsm|packet|route)
no debug ipv6 ospf (all|events|ifsm|lsa|n fsm|nsm|packet|route)
```

**Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Enables all debugging information.</td>
</tr>
<tr>
<td>events</td>
<td>Debug OSPFv3 events (see “debug ipv6 ospf events”).</td>
</tr>
<tr>
<td>ifsm</td>
<td>Debug OSPFv3 Interface State Machines (see “debug ipv6 ospf ifsm”).</td>
</tr>
<tr>
<td>lsa</td>
<td>Debug OSPFv3 Link State Advertisements (see “debug ipv6 ospf lsa”).</td>
</tr>
<tr>
<td>n fsm</td>
<td>Debug OSPFv3 Neighbor State Machines (see “debug ipv6 ospf n fsm”).</td>
</tr>
<tr>
<td>n sm</td>
<td>Debug OSPFv3 NSM information (see “debug ipv6 ospf n sm”).</td>
</tr>
<tr>
<td>packet</td>
<td>Debug OSPFv3 packets (see “debug ipv6 ospf packet”).</td>
</tr>
<tr>
<td>route</td>
<td>Debug OSPFv3 route information (see “debug ipv6 ospf route”).</td>
</tr>
</tbody>
</table>

**Command Mode**

Privileged Exec and Configure mode

**Examples**

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

**Related Commands**

log file
**debug ipv6 ospf events**

Use this command to specify debugging options for OSPFv3 event troubleshooting. This command enables the display of debug information related to OSPF internal events. Use this command without parameters to turn on all the options. Use the `no` parameter with this command to disable this function.

**Command Syntax**

```plaintext
debug ipv6 ospf events (abr|asbr|os|router|vlink)
no debug ipv6 ospf events (abr|asbr|os|router|vlink)
```

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

**Related Commands**

`log file`
**debug ipv6 ospf ifsm**

Use this command to specify debugging options for OSPFv3 Interface Finite State Machine (IFSM) troubleshooting. Use the no parameter with this command to disable this function.

**Command Syntax**

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

**Parameters**

- **events**: Debug IFSM event information.
- **status**: Debug IFSM status information.
- **timers**: Debug IFSM timer information.

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

```
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

ddebug ipv6 ospf lsa (flooding|generate|install|maxage|refresh)

no debug ipv6 ospf lsa (flooding|generate|install|maxage|refresh)

Parameters

flooding Debug LSA flooding.
generate Debug LSA generation.
install Debug LSA installation.
maxage Debug maximum age of the LSA in seconds.
refresh Debug LSA refresh.

Command Mode
Privileged Exec mode and Configure mode

Examples

ZebOS#debug ipv6 ospf lsa
debug ipv6 ospf nfsm

Use this command to specify debugging options for OSPFv3 Neighbor Finite State Machines (NFSMs).
Use the no parameter with this command to disable this function.

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

**Related Commands**

`log file`
debug ipv6 ospf nsm

Use this command to specify the debugging options for OSPFv3 NSM information. Use the no parameter with this command to disable this function.

Command Syntax

d debug ipv6 ospf nsm (redistribute|interface)
no debug ipv6 ospf nsm (redistribute|interface)

Parameters

redistribute Debug ZebOS redistribute.
interface Debug the NSM interface.

Command Mode

Privileged Exec mode and Configure mode

Examples

ZebOS#debug ipv6 ospf nsm interface
debug ipv6 ospf packet

Use this command to specify the packet debugging options for OSPFv3 ZebOS information.
Use the `no` parameter with this command to disable this function.

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

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

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

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

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Privileged Exec mode and Configure mode

**Examples**

```
ZebOS#no debug ipv6 ospf route
ZebOS#debug ipv6 ospf route ia
```
**default-metric**

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

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 (see "redistribute").

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

**Command Syntax**

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

**Parameter**

- `<1-16777214>`: Default metric value appropriate for the specified routing protocol.

**Default**

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

**Command Mode**

Router mode

**Examples**

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

**Related commands**

redistribute
**enable db-summary-opt**

Use this command to enable the database summary list optimization for OSPFv3. The default setting is disabled; however, when enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor. The process proceeds only if the LSA instance in database summary list is the same as, or less recent than the listed LSA in the database description packet received from the neighbor.

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

**Command Syntax**

```plaintext
  enable db-summary-opt
  no enable db-summary-opt
```

**Parameters**

None

**Default**

Disabled

**Command Mode**

Router mode

**Examples**

```plaintext
  ZebOS#configure terminal
  ZebOS(config)#router ospf
  ZebOS(config-router)#enable db-summary-opt
  ZebOS(config-router)#no enable db-summary-opt
```
**ipv6 ospf cost**

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

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.

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

**Command Syntax**

```
ip ospf (A.B.C.D) cost [<1-65535>|instance-id <0-255>]
nop ip ospf (A.B.C.D) cost
```

**Parameters**

- **A.B.C.D**
  - IP address of the interface
- **<1-65535>**
  - Specify the link-state metric. The default value is 10.
- **instance-id**
  - Specify the interface instance ID <0-255>.

**Command Mode**

Interface mode

**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.

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.

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

Command Syntax

ipv6 ospf (A.B.C.D) dead-interval <1-65535> [instance-id <0-255>]
nov6 ospf (A.B.C.D) dead-interval

Parameters

A.B.C.D IP address of the interface.
<1-65535> Specify the interval in seconds. The default interval is 40 seconds.
instance-id Specify the interface instance ID <0-255>.

Command Mode

Interface mode

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**

- ipv6 ospf display route single-line
- no ipv6 ospf display route single-line

**Parameters**

None

**Default**

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

**Command Mode**

Configure mode

**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.

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.

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

**Command Syntax**

```
ipv6 ospf (A.B.C.D) hello-interval [<1-65535>|instance-id <0-255>]
no ipv6 ospf (A.B.C.D) hello-interval
```

**Parameters**

- **A.B.C.D**  
  The IP address of the interface.
- **<1-65535>**  
  Specify the interval in seconds. The default interval is 10 seconds.
- **instance-id**  
  Specify the interface instance ID <0-255>.

**Command Mode**

Interface mode

**Examples**

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

**Related commands**

ipv6 ospf dead-interval, show ipv6 ospf interface
ipv6 ospf neighbor

Use this command to configure OSPFv3 routers interconnecting to non-broadcast networks. One neighbor entry must be included for each known non-broadcast network neighbor. The neighbor address must be a link-local address of the neighbor.

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

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

Command Syntax

```
ipv6 ospf neighbor [X::X::X|COST <1-65535>|PRIORITY <0-255>|POLL-INTERVAL <0-4294967925>|instance-id <0-255>]
```

```
no ipv6 ospf neighbor [X::X::X|COST <1-65535>|PRIORITY <0-255>|POLL-INTERVAL <0-4294967925>|instance-id <0-255>]
```

Parameters

- **X::X::X** Specify a neighbor IP address.
- **cost** Cost of the interface <1-65535>. The default value is 10. Not applicable to non-broadcast multiaccess (NBMA) networks.
- **priority** Specify a priority <0-255>. The default priority is 1. Not applicable to point-to-multipoint interfaces.
- **poll-interval** Dead neighbor polling interval in seconds <0-4294967925>. It is recommended to set this value much higher than the hello interval. The default value is 120 seconds.
- **instance-id** Specify instance ID of the interface <0-255>. The default value is 0.

Command Mode

Interface mode

Examples

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

Use this command to configure an OSPFv3 network type to a type different from the default for the media. This command forces the interface network type to a specified type. Depending on the network type, OSPFv3 changes the behavior of the sending packet and describes the link in LSAs.

Use the *no* option with this command to return to the default value.

**Command Syntax**

```
ipv6 ospf network (A.B.C.D) [broadcast|instance-id <0-255>|non-broadcast|point-to-point|point-to-multipoint]
no ipv6 ospf network (A.B.C.D) [broadcast|instance-id <0-255>|non-broadcast|point-to-point|point-to-multipoint]
```

**Parameters**

- **A.B.C.D**
  - IP address of the interface.
- **broadcast**
  - Sets the network type to broadcast.
- **instance-id**
  - Specify the ID of the network instance <0-255>.
- **non-broadcast**
  - Sets the network type to NBMA.
- **point-to-point**
  - Sets the network type to point-to-point.
- **point-to-multipoint**
  - Sets the network type to point-to-multipoint. This option can also specify non-broadcast.

**Default**

Broadcast type

**Command Mode**

Interface mode

**Examples**

The following example shows how to set the network to point-to-point type on the eth0 interface.

```
ZebOS#configure terminal
ZebOS(config)#interface eth0
ZebOS(config-if)#ipv6 ospf network point-to-point
```
**ipv6 ospf priority**

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

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.

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

**Command Syntax**

```
ipv6 ospf (A.B.C.D) priority [<0-255>|instance-id <0-255>]
no ipv6 ospf (A.B.C.D) priority
```

**Parameters**

- `A.B.C.D` Specify the IP address of the interface.
- `<0-255>` Specify the Router Priority of the interface. Default value is 1.
- `instance-id` Specify instance ID of the interface `<0-255>`. The default value is 0.

**Default**

The default priority is 1.

**Examples**

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

**Related Commands**

```
show ipv6 ospf interface
```
**ipv6 ospf restart grace-period**

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

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

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

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

**Command Syntax**

```
ipv6 ospf restart grace-period <1-1800>
no ipv6 ospf restart grace-period
```

**Parameters**

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

**Default**

The default grace period is 120 seconds.

**Command Mode**

Configure mode

**Examples**

```
ZebOS#configure terminal
ZebOS(config)#ipv6 ospf restart grace-period 250
```
**ipv6 ospf restart helper**

Use this command to configure the helper behavior for Graceful Restart.

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

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

**Command Syntax**

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

**Parameters**

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

**Command Mode**

Configure mode

**Usage**

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

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

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

**Examples**

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

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

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

ZebOS#configure terminal
ZebOS(config)#no ipv6 ospf restart helper never
```
ipv6 ospf retransmit-interval

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

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.

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

Command Syntax

```
ip ospf (A.B.C.D) retransmit-interval [<5-65535>|instance-id <0-255>]
no ip ospf (A.B.C.D) retransmit-interval
```

Parameters

- **A.B.C.D**  
The IPv4 address of the interface.
- **<5-65535>**  
Specify the interval in seconds. The default interval is 5 seconds.
- **instance-id**  
Specify instance ID of the interface <0-255>. The default value is 0.

Command Mode

Interface mode

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

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

**Command Syntax**

```
ip ospf (A.B.C.D) transmit-delay [<1-65535>|instance-id <0-255>]
no ip ospf (A.B.C.D) transmit-delay
```

**Parameters**

- **A.B.C.D**  
  The IPv4 address of the interface.
- **<1-65535>**  
  Specify the time, in seconds, to transmit a link-state update. The default interval is 1 second.
- **instance-id**  
  Specify instance ID of the interface <0-255>. The default value is 0.

**Command Mode**

Interface mode

**Examples**

```
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.

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.

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

Command Syntax

```
ipv6 router ospf [area|tag (WORD)|<0-4294967295>|A.B.C.D|instance-id <0-255>]
no ipv6 router ospf [area|tag (WORD)|<0-4294967295>|A.B.C.D|instance-id <0-255>]
```

Parameters

- **area**: OSPF Area ID in IPv4 address format.
- **tag**: Set the OSPF process tag.
- **WORD**: OSPFv3 process tag. It is a string comprised of any characters, numbers or symbols.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.
- **A.B.C.D**: OSPF area ID in IP address format.
- **instance-id**: Specify instance ID of the interface <0-255>. The default value is 0.

Command Mode

Interface mode

Examples

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

Related Commands

- router ipv6 ospf
**ipv6 te-metric**

Use this command to set Traffic Engineering metric for an interface. The TE metric is used in OSPFv3-TE Link State Advertisements. When the TE metric value is not set, OSPF cost value of an interface is used in TE LSAs.

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

**Command Syntax**

```
ipv6 te-metric <1-65535> [instance-id <0-255>]
no ipv6 te-metric
```

**Parameters**

- `<1-65535>` Specify the TE metric value. The default value is 0.
- `instance-id` Specify instance ID of the interface `<0-255>`. The default value is 0.

**Command Mode**

Interface mode

**Examples**

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

**Related Commands**

`capability te`
max-concurrent-dd

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

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

Use the no option with this command to disable it.

Command Syntax

max-concurrent-dd <1-65535>
no max-concurrent-dd

Parameters

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

Command Mode

Router mode

Examples

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

ZebOS#configure terminal
ZebOS(config)#router ipv6 ospf
ZebOS(config-router)#max-concurrent-dd 4
**passive-interface**

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

This command configures OSPFv3 on simplex Ethernet interfaces. Since the simplex interfaces represent only one network segment between two devices, configure the transmitting interface as a passive interface. This ensures that OSPFv3 does not send hello packets for the transmitting interface. Both the devices can see each other via the hello packet generated for the receiving interface.

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

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

**Command Syntax**

```
passive-interface (IFNAME)
no passive-interface (IFNAME)
```

**Parameters**

- **IFNAME**
  Specify an interface name

**Command Mode**

Router mode

**Examples**

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

Use this command to import routes from other routing protocols, or from another OSPFv3 instance, into OSPFv3 AS-external-LSAs. OSPFv3 advertises routes learnt from other routing protocols, or other OSPFv3 instances, including static or connected routes. Each injected prefix is put into the AS-external-LSA with a specified metric and metric-type. This command injects routes, learnt from other OSPF instances, into OSPF to generate AS-external-LSAs.

Use the `no` parameter with this command to stop redistribution.

**Command Syntax**

```
redistribute [bgp (metric|metric-type|route-map|tag) connected (metric|metric-type|route-map|tag) isis (metric|metric-type|route-map|tag) kernel (metric|metric-type|route-map|tag) ospf (<1-65535>|metric|metric-type|route-map|tag) rip (metric|metric-type|route-map|tag) static (metric|metric-type|route-map)]
```

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

**Parameters**

- `bgp` Specify BGP routes.
- `connected` Specify connected routes.
- `isis` Specify IS-IS routes.
- `kernel` Specify kernel routes.
- `ospf` Specify OSPF routes.
- `rip` Specify RIP routes.
- `static` Specify static routes.
- `<1-65535>` Specify an OSPF Process ID
- `metric` Specify the external metric `<0-16777214>`.
- `metric-type` Specify the external metric-type:
  - `1` Set OSPF External Type 1 metrics.
  - `2` Set OSPF External Type 2 metrics.
- `route-map` Specify a Route map reference.
- `WORD` Specify name of the route-map.

**Command Mode**

Router mode

**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
```
**restart ipv6 ospf graceful**

Use this command to force restarting OSPFv3 as Graceful Restart. After this command is executed, the router immediately shuts down and notifies NSM that OSPFv3 has shut down as Graceful. In turn, NSM preserves routes installed by OSPFv3, until the grace period expires.

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

**Command Syntax**

```
restart ipv6 ospf graceful (grace-period <1-1800>)
```

**Parameters**

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

**Command Mode**

Privileged Exec mode and Exec mode

**Examples**

```
ZebOS#restart ipv6 ospf graceful grace-period 200
```
router-id

Use this command to specify a router ID for the OSPFv3 process. Configure each router with a unique router-id. In an OSPFv3 router process that has active neighbors, a new router-id is used at the next reload or when you start the OSPFv3 manually.

Use the `no` form of this command to force OSPFv3 to stop the routing functionality.

**Command Syntax**

```
router-id [A.B.C.D]
no router-id [A.B.C.D]
```

**Parameters**

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

**Command Mode**

Router mode

**Examples**

The following example shows a fixed router ID 43.3.3.3

```
ZebOS#configure terminal
ZebOS(config)#router ipv6 ospf
ZebOS(config-router)#router-id 43.3.3.3
```

**Related Commands**

`show ip ospf`
router ipv6 ospf

Use this command to initiate OSPFv3 routing process and enter Router mode to configure OSPFv3 routing process. For making the OSPFv3 routing process functional, you must specify OSPFv3 process tag in router mode and enable OSPFv3 on at least one interface. OSPFv3 is only enabled on interfaces where OSPFv3 process tag matches the tag specified using ipv6 router ospf area command in Interface mode.

Use the no parameter with this command to remove OSPFv3 process.

Command Syntax

```
router ipv6 [vrf] ospf (WORD)
no router ipv6 [vrf] ospf (WORD)
```

Parameters

- **vrf** (Optional) Enable an IPv6 VRF routing process
- **WORD** OSPFv3 process tag. It is a string comprised of any characters, numbers or symbols.

Command Mode

Configure mode

Examples

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

Related Commands

ipv6 router ospf, router_id
**show debugging ipv6 ospf**

Use this command to display the OSPFv3 debugging option.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show debugging ipv6 ospf
```

**Parameters**

None

**Command Mode**

Exec mode and Privileged Exec mode

**Examples**

```
ZebOS#show debugging ipv6 ospf

OSPFv3 debugging status:
OSPFv3 all packet debugging is on
OSPFv3 all NFSM debugging is on
ZebOS#
```
**show ipv6 ospf**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ipv6 ospf (WORD) [database|interface|neighbor|route|te-database|topology|virtual-links]
```

**Parameters**

- **WORD**
  - OSPFv3 process tag.
- **database**
  - Database summary (see "show ipv6 ospf database").
- **interface**
  - Interface information (see "show ipv6 ospf interface").
- **neighbor**
  - Neighbor list (see "show ipv6 ospf neighbor").
- **route**
  - OSPFv3 routing table (see "show ipv6 ospf route").
- **te-database**
  - TE database.
- **topology**
  - OSPFv3 paths to OSPF routers (see "show ipv6 ospf topology").
- **virtual-links**
  - Virtual link information (see "show ipv6 ospf virtual-links").

**Command Mode**

Privileged Exec mode and Exec Mode

**Example**

```
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
```
show ipv6 ospf database

Use this command to display information in the OSPFv3 Link State Database.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

show ipv6 ospf (WORD)[external|grace|inter-prefix|inter-router|intra-prefix|link
|network|router|te]

Parameters

WORD OSPFv3 process tag.
exernal Shows AS-external-LSAs.
grace Shows a specific LSA in the OSPFv3 database.
link Shows Link-LSAs.
inter-prefix Shows Inter-Area-Prefix LSAs.
inter-router Shows Inter-Area-Router LSAs.
intra-prefix Shows Intra-Area-Prefix-LSAs.
link Shows Link-LSA
network Shows Network-LSAs.
router Shows Router-LSAs.
te Shows TE LSAs.
ADVROUTER = adv-router A.B.C.D
A.B.C.D = Router ID of the Advertising Router.

Command Mode

Privileged Exec mode and Exec Mode

Example

This is a sample output from the show ipv6 ospf database grace command displaying the database summary for a specific LSA in the OSPFv3 database:

ZebOS#show ipv6 ospf database grace
OSPFV3 Router with ID (45.45.45.1) (Process *null*)

Grace-LSA (Interface eth1)
  LS age: 2
  LS Type: Grace LSA
  Link State ID: 0.0.0.3
  Advertising Router: 99.99.99.1
  LS Seq Number: 0x80000001
  Checksum: 0x9046
  Length: 36
  Grace Period: 320
  Restart Reason:
    Software Restart
**show ipv6 ospf interface**

Use this command to display OSPFv3 interface information.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ipv6 ospf (WORD) interface (IFNAME)
```

**Parameters**

- **WORD**
  - OSPFv3 process tag.
- **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
```
**show ipv6 ospf neighbor**

Use this command to display information about an OSPFv3 neighbor.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ipv6 ospf (WORD) neighbor (INTERFACE|A.B.C.D|detail)
```

**Parameters**

- **WORD**: OSPFv3 process tag
- **A.B.C.D**: Display the neighbor IP.
- **INTERFACE**: Display the name of the Interface
- **detail**: Detail of neighbors

**Command Mode**

Privileged Exec mode and Exec Mode

**Example**

This is a sample output from the show ipv6 ospf neighbor command displaying information about the OSPFv3 neighbor.

```
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
```
**show ipv6 ospf route**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ipv6 ospf (WORD) route
```

**Parameters**

- **WORD**
  - OSPFv3 process tag

**Command Mode**

- Privileged Exec mode and Exec mode

**Example**

The routes can be displayed in two ways. One shows each routing entry in a single-line, the other in multi-line. By default, the routing table is displayed in the multi-line format, for a single line display use the ipv6 ospf display route single-line. The following is a sample output for a routing display in single-line and multi-line formats:

```plaintext
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
```

```plaintext
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
```
**show ipv6 ospf topology**

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

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show ipv6 ospf (WORD) topology (area) [A.B.C.D|<0-4294967295>]
```

**Parameters**

- **WORD**: OSPFv3 process tag
- **area**: OSPF area ID
- **A.B.C.D**: OSPF Area ID in IPv4 address format.
- **<0-4294967295>**: OSPF Area ID as 4 octets unsigned integer value.

**Command Mode**

Privileged Exec mode and Exec Mode

**Example**

```
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
```
show ipv6 ospf virtual-links

Use this command to display information about OSPFv3 virtual-links.
To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

    show ipv6 ospf (WORD) virtual-links

Parameters

    WORD        OSPFv3 process tag

Command Mode

Privileged Exec mode and Exec Mode

Example

    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
**undebug ipv6**

Use this command to disable debugging options for OSPFv3.

**Command Syntax**

```plaintext
undebug ospf (all|events|ifsm|lsa|nfsm|nsm|packet|route)
```

**Parameters**

- `all`  
  Turn off all debugging.
- `events`  
  Turn off OSPF event information debugging (see "undebug ipv6 ospf events").
- `ifsm`  
  Turn off OSPF Interface State Machine debugging (see "undebug ipv6 ospf ifsm").
- `lsa`  
  Turn off OSPF Link State Advertisement debugging (see "undebug ipv6 ospf lsa").
- `nfsm`  
  Turn off OSPF Neighbor State Machine debugging (see "undebug ipv6 ospf nfsm").
- `nsm`  
  Turn off OSPF NSM information debugging (see "undebug ipv6 ospf nsm").
- `packet`  
  Turn off OSPF packets debugging (see "undebug ipv6 ospf packet").
- `route`  
  Turn off OSPF route information debugging (see "undebug ipv6 ospf route").

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf all
ZebOS#undebug ipv6 ospf bfd
```
**undebug ipv6 ospf events**

Use this command to disable debugging options for OSPFv3 event troubleshooting. Use this command without parameters to disable all the options.

**Command Syntax**

```
undebug ipv6 ospf events (abr|asbr|os|router|vlink)
```

**Parameters**

- `abr`: Disables debugging of ABR events
- `asbr`: Disables debugging of ASBR events
- `os`: Disables debugging of OS interaction events
- `router`: Disables debugging of other router events
- `vlink`: Disables debugging of virtual link events

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf events abr
```
**undebug ipv6 ospf ifsm**

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

**Command Syntax**

```
undebug ipv6 ospf ifsm (status|events|timers)
```

**Parameters**

- `events`  
  Disables debugging of IFSM event information
- `status`  
  Disables debugging of IFSM status information
- `timers`  
  Disables debugging of IFSM timer information

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf ifsm events
```
**undebug ipv6 ospf lsa**

Use this command to disable debugging options for OSPFv3 Link State Advertisements (LSA) troubleshooting.

**Command Syntax**

```
undebug ipv6 ospf lsa (generate|flooding|install|maxage|refresh)
```

**Parameters**

- `generate`: Disables debugging of the LSA generation.
- `flooding`: Disables debugging of the LSA flooding.
- `install`: Disables debugging of the LSA installation.
- `maxage`: Disables debugging of maximum age of the LSA in seconds.
- `refresh`: Disables debugging of LSA refresh.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf lsa refresh
```
**undebug ipv6 ospf nfsm**

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

**Command Syntax**

```
undebug ipv6 ospf nfsm (status|events|timers)
```

**Parameters**

- **status**: Disable the logging of NSM status information.
- **events**: Disable the logging of NSM event information.
- **timers**: Disable the logging of NSM timer information.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf nfsm events
```
undebug ipv6 ospf nsm

Use this command to disable debugging options for OSPFv3 NSM information.

Command Syntax

    undebug ipv6 ospf nsm (interface|redistribute)

Parameters

- **interface**: Disable logging of NSM interface information.
- **redistribute**: Disable logging of NSM redistribute information.

Command Mode

Privileged Exec mode

Usage

    ZebOS#undebug ipv6 ospf nsm interface
**undebug ipv6 ospf packet**

Use this command to disable debugging options for OSPFv3 packets.

**Command Syntax**

```
undebug ospf packet (dd)
```

**Parameters**

- **dd**
  
  Disable debugging for OSPF database descriptions.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf packet dd
```
**undebug ipv6 ospf route**

Use this command to disable route calculation for OSPFv3 debugging. Use this command without parameters to disable all the options.

**Command Syntax**

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

**Parameters**

- `ia`     Disable the debugging of Inter-Area route calculation
- `ase`    Disable the debugging of external route calculation
- `install` Disable the debugging of route installation
- `spf`    Disable the debugging of SPF calculation

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug ipv6 ospf route install
```
This chapter provides an alphabetized reference of the OSPF VPN commands. It includes the following commands:

- "router ospf vrf"
- "show ip vrf"
**router ospf vrf**

Use this command to specify a VRF instance in OSPF. To use this command, you must first create a VRF Name in the NSM using the `ip vrf` command. Associate the same name with the OSPF instance using this command.

**Note:** This command is available only if `--enable-pece-ospf` configuration option is enabled when compiling ZebOS.

**Command Syntax**

```
router ospf [<1-65535>|WORD]
```

**Parameters**

- `<1-65535>`: Any positive integer identifying a routing process. The process ID should be unique for each routing process.
- `WORD`: Name of the VRF to associate with this OSPF instance.

**Command Mode**

Configure mode

**Examples**

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

**Related Commands**

- `ip vrf`
**show ip vrf**

Use this command to list information about existing VRFs, such as, VRF name, OSPF process ID and the name of the interface to which each VRF is assigned.

To modify the lines displayed, use the `|` (output modifier token). To save the output to a file, use the `>` output redirection token.

**Note:** This command is available only if `--enable-pece-ospf` configuration option is enabled when compiling ZebOS.

**Command Syntax**

```
show ip vrf (NAME)
```

**Parameter**

**NAME**

Specify the VRF name to be associated with this OSPF instance.

**Command Mode**

Exec mode and Privileged Exec mode

**Examples**

The following is a sample output of the `show ip vrf` command displaying the VRF information and the Process IDs of OSPF instances:

```
ZebOS#show ip vrf
Name    OSPF PID  Interface List
--------------  ------------  ------------
qa          3          eth0
you         4          eth1
ipi         5          eth2
```

The following is a sample output of the `show ip vrf NAME` command displaying VRF information for VRF instance named `ipi`.

```
ZebOS#show ip vrf ipi
VRF ipi; (id=3); OSPF PID is 5
```
This chapter provides an alphabetized reference for each of the CSPF-TE commands. It includes the following commands:

- "capability cspf"
- "capability te"
- "cspf default-retry-interval"
- "cspf tie-break"
- "debug cspf"
- "show cspf ipv6 lsp"
- "show cspf lsp"
- "show debugging cspf"
- "show debugging ipv6 cspf"
- "show ip ospf te-database"
- "show ipv6 ospf te-database"
- "undebug cspf"
**capability cspf**

Use this command to enable CSPF functionality for an OSPFv2 or OSPFv3 instance. Only one CSPF instance is supported in this release.

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

**Command Syntax**

```
capability cspf
no capability cspf
```

**Parameters**

None

**Command Mode**

Router mode

**Examples**

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

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

Use this command to enable the ZebOS traffic engineering feature for an OSPFv2 or OSPFv3 instance. The ZebOS process generates TE LSAs for each link it is configured for.

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

**Command Syntax**

```plaintext
capability te
no capability te
```

**Parameters**

None

**Default**

Enabled

**Command Mode**

Router mode

**Examples**

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

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

**Related Commands**

`show ip ospf te-database`, `show ipv6 ospf te-database`
**cspf default-retry-interval**

Use this command to set the default route computation retry interval (in seconds) for an OSPFv2 or OSPFv3 instance. This value is used for route recomputation (in the case of computation failures) and no retry interval is specified for a given LSP.

Use the `no` parameter with this command to unset default route computation retry interval.

**Command Syntax**

```plaintext
  cspf default-retry-interval <1-3600>
  no cspf default-retry-interval
```

**Parameter**

- `<1-3600>`: The retry interval in seconds. The default interval value is 10 seconds.

**Default**

Enabled

**Command Mode**

Router mode

**Examples**

```plaintext
ZebOS#configure terminal
ZebOS(config)#router ospf 100
ZebOS(config-router)#cspf default-retry-interval 720

ZebOS#configure terminal
ZebOS(config)#router ipv6 ospf
ZebOS(config-router)#cspf default-retry-interval 720
```
**cspf tie-break**

Use this command to set the tie-break method to one of the values (random, least-fill, most-fill) for an OSPFv2 or OSPFv3 instance. This selects a link (during route computation) when more than one candidate link satisfies all the route constraints, the associated cost and hop limit link attributes are equal.

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.

Use the `no` parameter with this command to unset tie-break method.

**Command Syntax**

```
cspf tie-break (random|least-fill|most-fill)
no cspf tie-break
```

**Parameters**

- `random` Pick any path at random. This is the default tie-break method.
- `least-fill` Specify the preferred path to be the one with the largest minimum available bandwidth ratio.
- `most-fill` Specify the preferred path to be the one with smallest minimum available bandwidth ratio. The retry interval in seconds. The default interval value is 10 seconds.

**Default**

By default, the tie-break method is set to **random**.

**Command Mode**

Router mode

**Examples**

```
ZebOS#configure terminal
ZebOS(config)#router ospf 100
ZebOS(config-router)#cspf tie-break least-fill

ZebOS#configure terminal
ZebOS(config)#router ipv6 ospf
ZebOS(config-router)#no cspf tie-break
```
debug cspf

Use this command to enable either the CSPF events or hexdump debugging option.

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

Command Syntax

d debug cspf [events|hexdump]
no debug cspf [events|hexdump]

Parameters

  events  Debug CSPF event information.
  hexdump Debug CSPF message hexdump.

Command Mode

Exec and Privileged Exec modes

Examples

Following is a sample output section from this command. Some of the lines in this sample display have wrapped, please note that in the actual output the lines may not wrap.

ZebOS#debug cspf hexdump
ZebOS#debug cspf events
ZebOS#terminal monitor
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_api_msg_delete_process: Client = 2, lspid = 0x8000
2002/03/19 15:17:29 OSPF: cspf_api_msg_delete_process: Client = 2, lspid = 0x8000
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

....

2002/03/19 15:17:34 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.20.20.2, dest addr = 192.20.20.1
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_recv: LSP Established message received from client 2
2002/03/19 15:17:34 OSPF: cspf_api_msg_established_process: Client = 2, lspid = 0x8000, metric = 0
**show cspf ipv6 lsp**

Use this command to display information about all the LSPs stored in the CSPF database for all OSPFv3 instances. To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show cspf ipv6 lsp
```

**Command mode**

Exec and Privileged Exec mode

**Parameters**

None

**Example**

Following is a sample output from the **show cspf ipv6 lsp** command.

```
ZebOS#show cspf ipv6 lsp
Lsp Id      : 0x650065
Ingress     : 2001:5152::1
Egress      : 2001:5154::1
Ext Tunnel ID: 2001:5152::1
LSP Type    : 0
Client ID   : 3
State       : 2
Setup Priority : 7
Hold Priority : 0
Hop Limit   : 255
Include Mask : 0x0
Exclude Mask : 0x0
LSP Metric  : 0
Computed ERO : 
   3ffe:1::2
   3ffe:2::2
```
**show cspf lsp**

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

To modify the lines displayed, use the `|` (output modifier token). To save the output to a file, use the `>` output redirection token.

**Command Syntax**

```
show cspf lsp
```

**Parameters**

None

**Command Mode**

Exec and Privileged Exec modes

**Example**

Following is a sample output from the `show cspf lsp` command.

```
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
```
**show debugging cspf**

Use this command to display the CSPF debugging options set.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

```
show debugging cspf
```

**Parameters**

None

**Command Mode**

Exec and Privileged Exec modes

**Example**

Following is a sample output section from the `show debugging cspf` command. Some of the lines in this sample display have wrapped, please note that in the actual output the lines may not wrap.

```
ZebOS#show debugging cspf
CSPF debugging status:
CSPF events debugging is on

ZebOS#terminal monitor
ZebOS#2002/03/27 17:09:21 OSPF: cspf_api_msg_delete_recv: Delete message received from client 2
2002/03/27 17:09:21 OSPF: cspf_api_msg_delete_process: Client = 2, lspid = 0x8000
2002/03/27 17:09:21 OSPF: cspf_api_msg_request_recv: Route request message received from client 2
... 2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.10.10.9, dest addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_process_network_lsa_vertex: Vertex id = 192.20.20.2, dest addr = 192.20.20.1
2002/03/27 17:09:21 OSPF: cspf_api_msg_established_recv: LSP Established message received from client 2
2002/03/27 17:09:21 OSPF: cspf_api_msg_established_process: Client = 2, lspid = 0x8000, metric = 0
```
**show debugging ipv6 cs pf**

Use this command to display the CSPF debugging options that are set.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

**Command Syntax**

- `show debugging ipv6 cs pf`

**Parameters**

None

**Command Mode**

Exec and Privileged Exec modes

**Example**

```
ZebOS#show debugging ipv6 cs pf

CSPF debugging status:
ZebOS#
```
show ip ospf te-database

Use this command to display the traffic engineering (TE) database contents for all OSPF instances. The alternate form of this command displays TE database for an OSPF instance. This form is enabled if OSPF virtual router is disabled.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ip ospf <0-65535> te-database
```

Parameter

```
<0-65535> Display the process ID number.
```

Command Mode

Exec and Privileged Exec modes

Example

Following is a sample output from the show ip ospf te-database command.

```
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 : 28
Router Address : 192.10.10.1
```

```
LS Age : 2
Options : 0x2
LS Type : 10 (Area-Local Opaque-LSA)
Opaque Type : 1
Instance : 0x3
Advertising Router : 192.10.10.1
LS Sequence Number : 0x8000002e
LS Checksum : 0x3ef
Length : 124
Link Type : Multiaccess
Link ID : 192.20.20.2
Local Interface Addresses : 192.20.20.1
Remote Interface Addresses : 192.20.20.2
Te Metric : 10
Max Bandwidth : 10000.000 Kbits/s
Max Reservable Bandwidth : 1000.000 Kbits/s
Available Bandwidth :
  Priority 0 : 1000.000 Kbits/s
  Priority 1 : 1000.000 Kbits/s
  Priority 2 : 1000.000 Kbits/s
  Priority 3 : 1000.000 Kbits/s
  Priority 4 : 1000.000 Kbits/s
  Priority 5 : 1000.000 Kbits/s
```
show ipv6 ospf te-database

Use this command to display the traffic engineering (TE) database contents for OSPFv3 instances. The alternate form of this command displays TE database for an OSPF instance. This form is enabled if OSPF virtual router is disabled.

To modify the lines displayed, use the | (output modifier token). To save the output to a file, use the > output redirection token.

Command Syntax

```
show ipv6 ospf (WORD) te-database
```

Parameter

- **WORD**: Display the process ID instance.

Command Mode

Privileged Exec mode

Example

Following is a sample output from the `show ipv6 ospf te-database` command.

```
ZebOS#show ipv6 ospf te-database
LS Age : 12
LS Type : 10 (Intra-Area-Te-LSA)
Instance : 0x3
Advertising Router : 4.4.4.4
LS Sequence Number : 0x8000004d
LS Checksum : 0xf58a
Length : 164
Router Address : 2001:5152::1
-----------------------------------------------------------------
LS Age : 12
LS Type : 10 (Intra-Area-Te-LSA)
Instance : 0x3
Advertising Router : 4.4.4.4
LS Sequence Number : 0x8000004d
LS Checksum : 0xf58a
Length : 164
Link Type : Multiaccess
Neighbor Interface ID : 135450284
Neighbor Router ID : 4.4.4.4
Local Interface Addresses : 3ffe:1::1
Remote Interface Addresses :
::
Te Metric : 0
Max Bandwidth : 100000.000 Kbits/s
Max Reservable Bandwidth : 100000.000 Kbits/s
Available Bandwidth :
Priority 0 : 100000.000 Kbits/s
Priority 1 : 100000.000 Kbits/s
Priority 2 : 100000.000 Kbits/s
Priority 3 : 100000.000 Kbits/s
Priority 4 : 100000.000 Kbits/s
Priority 5 : 100000.000 Kbits/s
Priority 6 : 100000.000 Kbits/s
Priority 7 : 100000.000 Kbits/s
```
**undebug cspf**

Use this command to disable CSPF events debugging option and hexdump debugging

**Command Syntax**

```
undebug cspf [events|hexdump]
```

**Parameters**

- `events` Disable debugging CSPF event information.
- `hexdump` Disable debugging CSPF message hexdump.

**Command Mode**

Privileged Exec mode

**Examples**

```
ZebOS#undebug cspf events
ZebOS#undebug cspf hexdump
```
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