

BIG-IP® Advanced Routing™

Bidirectional Forwarding Detection Command Line Interface Reference Guide

Version 7.10.6



Publication Date

This document was published on October 10, 2016.

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Preface

This document includes all of the ZebOS command line interface (CLI) commands that support the Bidirectional Forwarding Detection (BFD) product module. All commands in this document are for the current software release.

Note: None of the Internet Protocol (IP) addresses used in this document is an actual working address. Therefore, all command examples, including configuration illustrations and sample display outputs are for display purposes only. Any actual IP address used in this document is both unintentional and coincidental.

Intended Audience

This guide is intended for networking administrators and other professionals who will configure and manage the ZebOS Bidirectional Forwarding Detection (BFD) module.

Contents of this Guide

The following table describes the contents of each chapter in this guide.

Chapter	Contents
Chapter 1, <i>ZebOS Command Line Interface Environment</i>	Provides an overview of the command line interface.
Chapter 2, <i>Bidirectional Forwarding Commands</i>	Provides a description of BFD commands.
Chapter 3, <i>ZebOS Protocol Commands for BFD</i>	Provides a description of BFD protocol commands.
Chapter 4, <i>BFD Static Route Commands</i>	Provides a description of BFD static route commands.

Related Documents

The following guides are related to this document:

- ZebOS Bidirectional Forwarding Detection Developer Guide
- ZebOS Bidirectional Forwarding Detection Configuration Guide
- ZebOS Installation Guide

Note: All ZebOS technical manuals are available to licensed customers online (in PDF format) at the Customer Support Web site.

CHAPTER 1 ZebOS Command Line Interface Environment

Network administrators and application developers who configure the ZebOS® Network Platform use this command reference which includes the following information:

- An overview of the ZebOS Command Line Interface
- A complete reference of the Command Line Interface (CLI) used for Bidirectional Forwarding Detection (BFD) configurations

You can give the commands described in this manual locally from the console of a device running ZebOS or remotely from a terminal emulator such as `putty` or `xterm`.

Command Line Interface Overview

The ZebOS® Command Line Interface (CLI) is a text-based command interface. Each command is usually associated with a specific task. The commands can be used in scripts to automate configuration tasks.

Starting the Command Line Interface

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

1. Start your terminal emulator and connect to the device or go to the console of the device running ZebOS.
2. Connect to the directory where you installed the ZebOS executables.
3. Start the Network Services Manager (NSM).

```
# ./nsm -d
```

4. Start the protocol module daemons that your organization uses, such as `mstpd`, `ospf6d`, or `ripd`.

```
# ./mstpd -d
```

5. Start the Integrated Management Interface (IMI) daemon.

```
# ./imi -d
```

6. Start the IMI shell.

```
# ./imish
```

Note: Your organization may use a ZebOS build that does not include `imish`. If that is the case, you must connect to a port on which a protocol daemon is listening. For details, see the *ZebOS Network Platform Installation Guide*.

You can now begin using the CLI.

Command Line Interface Help

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

```
ZebOS> show ?
```

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

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

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

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

```
ZebOS> sh
```

Press the tab key. The CLI displays:

```
ZebOS> show
```

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

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

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

Command Abbreviations

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

```
sh in eth0
```

is an abbreviation for the `show interface` command.

Command Line Errors

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

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

When you press the Enter key after typing an invalid command, the CLI 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, the CLI 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 authent
ication-key 57393
```

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 and the negated form does not take a parameter.

Typographic Conventions

The following table describes the typographic conventions used in this reference.

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

Variable Placeholders

The command syntax use the following tokens to represent command line variables for which you supply a value:

Token	Description
WORD	A contiguous text string (excluding spaces), such as IFNAME for the name of an interface
LINE	A text string, including spaces; no other parameters can follow this parameter
A . B . C . D	IPv4 address
A . B . C . D / M	IPv4 address and mask/prefix
X : X : : X : X	IPv6 address
X : X : : X : X / M	IPv6 address and mask/prefix
HH : MM : SS	Time format
AA : NN	BGP community value
XX : XX : XX : XX : XX : XX	MAC address
<1-5> <1-65535> <0-2147483647> <0-4294967295>	Numeric range

Command Description Format

The following table explains the sections used to describe each command in this reference.

Section	Description
Command Name	The command, what the command does, and when should it be used
Command Syntax	The syntax of the command
Parameters	Parameters and options for the command
Default	The status before the command is executed
Command Mode	The name of the mode in which this command is used. Examples include Exec or Configure modes.
Example	An example of the command being executed

Keyboard Operations

You can perform these operations from the keyboard:

Key combination	Operation
Left arrow or Ctrl+b	Moves one character to the left. When a command extends beyond a single line, you can press left arrow or Ctrl+b repeatedly to scroll toward the beginning of the line, or you can press Ctrl+a to go directly to the beginning of the line.
Right arrow or Ctrl-f	Moves one character to the right. When a command extends beyond a single line, you can press right arrow or Ctrl+f repeatedly to scroll toward the end of the line, or you can press Ctrl+e to go directly to the end of the line.
Esc, b	Moves back one word
Esc, f	Moves forward one word
Ctrl+e	Moves to end of the line
Ctrl+a	Moves to the beginning of the line
Ctrl+u	Deletes the line
Ctrl+w	Deletes from the cursor to the previous whitespace
Alt+d	Deletes the current word
Ctrl+k	Deletes from the cursor to the end of line
Ctrl+y	Pastes text previously deleted with Ctrl+k, Alt+d, Ctrl+w, or Ctrl+u at the cursor
Ctrl+t	Transposes the current character with the previous character
Ctrl+c	Ignores the current line and redisplay the command prompt
Ctrl+z	Ends configuration mode and returns to exec mode
Ctrl+l	Clears the screen
Up Arrow or Ctrl+p	Scroll backward through command history
Down Arrow or Ctrl+n	Scroll forward through command history

Show Command Tokens

You 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

You 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 Modifier

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

```
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
```

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

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

...skipping
interface eth3
  shutdown
!
interface eth4
  shutdown
!
interface svlan0.1
  no shutdown
!
route-map myroute permit 3
!
route-map mymap1 permit 10
!
route-map rmap1 permit 3
!
line con 0
  login
line vty 0 4
  login
!
end
```

Include Modifier

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

```
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
```

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

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

Exclude Modifier

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

```
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
Administrative Group(s): None
DSTE Bandwidth Constraint Mode is MAM
inet6 fe80::204:75ff:fee6:5393/64
output packets 4438, bytes 394940, dropped 0
output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
collisions 0
```

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

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

Redirect Modifier

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

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

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

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

Common Command Modes

Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. The command modes common to all protocols are listed below.

Name	Description
Exec Mode	Also called the <code>View</code> mode, this the first mode to appear after logging in to the CLI. It is a base mode from where you can perform basic commands, such as <code>show</code> , <code>exit</code> , <code>quit</code> , <code>help</code> , <code>list</code> , and <code>enable</code> .
Privileged Exec Mode	Also called the <code>Enable</code> mode, this mode allows you to run additional basic commands, such as <code>debug</code> , <code>write</code> , and <code>show</code> .
Configure Mode	Also called <code>Configure Terminal</code> mode, this mode allows you to run configuration commands and to serve as a gateway into the <code>Interface</code> , <code>Router</code> , <code>Line</code> , <code>Route Map</code> , <code>Key Chain</code> , and <code>Address Family</code> modes.
Interface Mode	This mode is used to configure protocol-specific settings for a particular interface. Any attribute configured in this mode overrides an attribute configured in the <code>Router</code> mode.
Line Mode	This mode is used to make the <code>access-class</code> commands available.

Common Command Mode Tree

The diagram displays the common command mode tree.

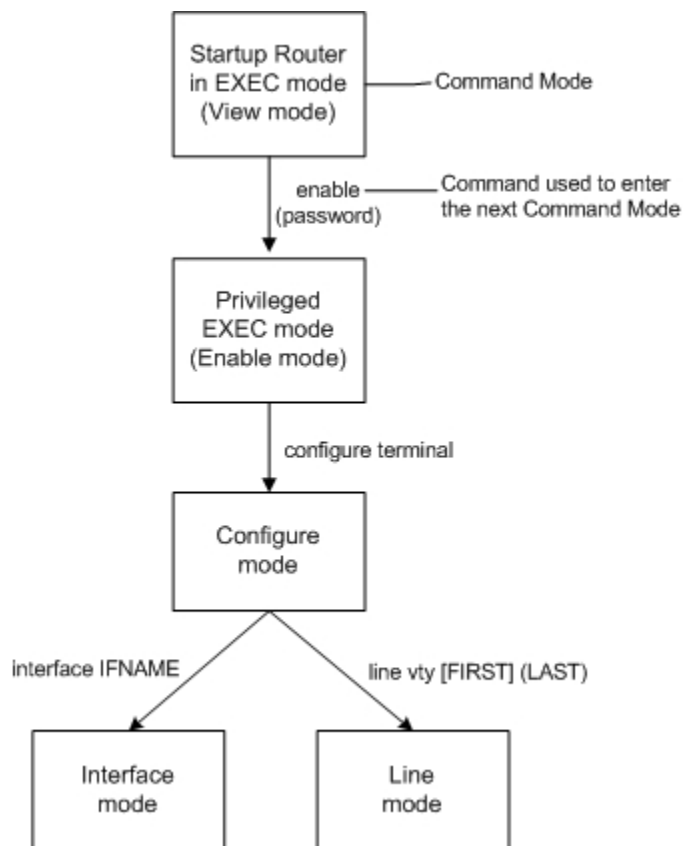


Figure 1: Common Command Mode Tree

To change modes:

1. Enter Privileged Executive Mode by typing `enable` from the Executive mode.
2. Enter Configure mode by typing `configuration terminal` from the Privileged Executive mode.

See the *ZebOS Network Platform NSM Command Line Interface Reference Guide* for information about command modes.

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

CHAPTER 2 Bidirectional Forwarding Commands

This chapter includes the commands used to configure and manage the BFD base module in a network. It includes the following commands:

- [bfd disable on page 18](#)
- [bfd gtsm on page 19](#)
- [bfd gtsm ttl on page 20](#)
- [bfd interval on page 21](#)
- [bfd multihop-peer on page 22](#)
- [bfd multihop-peer A.B.C.D on page 24](#)
- [bfd multihop-peer X:X::X:X on page 25](#)
- [bfd notification on page 26](#)
- [bfd session on page 27](#)
- [bfd slow-timer on page 29](#)
- [debug bfd on page 30](#)
- [show bfd on page 31](#)
- [show bfd interface on page 32](#)
- [show bfd session on page 33](#)
- [show bfd session A.B.C.D on page 34](#)
- [show bfd session ipv6 on page 35](#)
- [show debugging bfd on page 36](#)

bfd disable

Use this command to disable all the BFD sessions on this interface.

Command Syntax

```
bfd disable
```

Parameters

None

Command Mode

Interface mode

Example

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#bfd disable
```

bfd gtsm

Use this command to enable or disable BFD GTSM (Generalized TTL Security Mechanism) protection.

Command Syntax

```
bfd gtsm (enable | disable)
```

Parameters

disable	Disable GTSM protection.
enable	Enable GTSM protection.

Command Mode

Configure mode

Examples

```
ZebOS#configure terminal  
ZebOS(config)#bfd gtsm enable
```

bfd gtsm ttl

Use this command sets a BFD GTSM TTL (time to live) value.

Command Syntax

```
bfd gtsm ttl <1-255>
```

Parameters

<1-255> Allowed range for TTL

Command Mode

Configure mode

Examples

```
ZebOS#configure terminal  
ZebOS(config)#bfd gtsm ttl 123
```

bfd interval

Use this command to configure BFD transmit and receive intervals, and the value of Hello Multiplier.

Use the `no` form of the command to set the intervals and multiplier back to their default values.

Command Syntax

```
bfd interval <1-4294967> minrx <1-4294967> multiplier <1-255>
no bfd interval <1-4294967> minrx <1-4294967> multiplier <1-255>
```

Parameters

<code><1-4294967></code>	Transmit interval in milliseconds.
<code>minrx</code>	Indicate the minrx parameter.
<code><1-4294967></code>	Specify the actual reception interval in milliseconds.
<code>multiplier</code>	Indicate the multiplier parameter.
<code><1-255></code>	Specify the actual hello multiplier value.

Command Mode

Interface mode

Example

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#bfd interval 100 minrx 100 multiplier 5
ZebOS(config-if)#
```

bfd multihop-peer

Use this command to enable authentication over either a multihop IPv4 or IPv6 session

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

Command Syntax

```
bfd multihop-peer (A.B.C.D | X:X::X:X) auth type (simple | keyed-md5 | meticulous-  
keyed-md5 | keyed-sha1 | meticulous-keyed-sha1) key-id <0-255> key LINE | key-  
chain LINE)
```

```
no bfd multihop-peer (A.B.C.D | X:X::X:X) auth type (simple | keyed-md5 |  
meticulous-keyed-md5 | keyed-sha1 | meticulous-keyed-sha1) key-id <0-255> key  
LINE | key-chain LINE)
```

Parameters

A.B.C.D	Specify an IPv4 address.
X:X::X:X	Specify an IPv6 address.
auth type	Specify an authentication type.
simple	Specify a simple authentication type.
keyed-md5	Specify a keyed message digest authentication type.
meticulous-keyed-md5	Specify a meticulous keyed message digest authentication type.
keyed-sha1	Specify a keyed secure hashing algorithm authentication type.
meticulous-keyed-sha1	Specify an authentication key Meticulous Keyed Secure hashing algorithm authentication type.
key-id	Indicate the <code>key-id</code> keyword.
<0-255>	Specify the key ID value.
key	Indicate the <code>key</code> keyword.
LINE	Specify the authentication key name.
key-chain	Indicate the <code>key-chain</code> keyword.
LINE	Specify the authentication key-chain name.

Command Mode

Interface mode

Example

Do the following to configure a single-key support:

```
ZebOS#configure terminal  
ZebOS(config)#interface eth1  
ZebOS(config-if)#bfd multihop-peer 123.12.1.2 auth-type simple key-id 14 key  
ipi-zebos
```


Do the following to configure a multiple-key support:

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#bfd multihop-peer 123.12.1.2 auth-type key-chain bfd-auth
ZebOS(config-if)#exit
ZebOS(config)#key chain bfd-chain
ZebOS(config-keychain)#key 14
ZebOS(config-keychain-key)#key-string ipi-zebos
```

bfd multihop-peer A.B.C.D

Use this command to configure IPv4 BFD multihop peer timer values.

Use the `no` form of the command to reset the IPv4 multihop peer timer value.

Command Syntax

```
bfd multihop-peer A.B.C.D interval <1-4294967> minrx <1-4294967> multiplier <1-255>
no bfd multihop-peer A.B.C.D interval <1-4294967> minrx <1-4294967> multiplier <1-255>
```

Parameters

<code>interval</code>	Indicate the interval parameter.
<code><1-4294967></code>	Specify the actual transmit interval in milliseconds.
<code>minrx</code>	Indicate the minrx parameter.
<code><1-4294967></code>	Specify the actual reception interval in milliseconds.
<code>multiplier</code>	Indicate the multiplier parameter.
<code><1-255></code>	Specify the actual hello multiplier value.

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#bfd multihop-peer 10.1.1.67 interval 100 minrx 100 multiplier 3
ZebOS(config)#
```

bfd multihop-peer X:X::X:X

Use this command to configure an IPv6 BFD multihop peer timer values.

Use the `no` form of the command to reset the IPv6 multihop peer timer values.

Command Syntax

```
bfd multihop-peer X:X::X:X interval <1-4294967> minrx <1-4294967> multiplier <1-255>
```

```
no bfd multihop-peer X:X::X:X interval <1-4294967> minrx <1-4294967> multiplier <1-255>
```

Parameters

<code>interval</code>	Indicate the interval parameter.
<code><1-4294967></code>	Specify the actual transmit interval in milliseconds.
<code>minrx</code>	Indicate the minrx parameter.
<code><1-4294967></code>	Specify the actual reception interval in milliseconds.
<code>multiplier</code>	Indicate the multiplier parameter.
<code><1-255></code>	Specify the actual hello multiplier value.

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#bfd multihop-peer 10.1.1.1 interval 100 minrx 100 multiplier 3
```

bfd notification

Use this command to enable or disable BFD notification.

Command Syntax

```
bfd notification (enable | disable)
```

Parameters

disable	Disable BFD notification.
enable	Enable BFD notification.

Command Mode

Configure mode

Examples

```
ZebOS#configure terminal
ZebOS(config)#bfd notification enable

ZebOS(config)#bfd notification disable
```

bfd session

Use this command to configure a BFD session.

You can configure a BFD session without any existing BFD application (such as OSPF or static routes) using this command. This can be useful in scenarios where the peer has a BFD application and requires the device under test (DUT) to sustain a BFD session.

Use the no parameter with this command to remove this BFD session.

Command Syntax

IPv4 without MPLS-TP:

```
bfd session A.B.C.D A.B.C.D (multihop|) (demand-mode|) (non-persistent|) (admin-
down|)
no bfd session A.B.C.D A.B.C.D (multihop|) (demand-mode|) (non-persistent|) (admin-
down|)
```

IPv6 without MPLS-TP:

```
bfd session X:X::X:X X:X::X:X (multihop|) (demand-mode|) (non-persistent|) (admin-
down|)
no bfd session X:X::X:X X:X::X:X (multihop|) (demand-mode|) (non-persistent|)
(admin-down|)
```

IPv4 and IPv6 with MPLS-TP:

```
bfd session (data-link-oam (mac-address MAC|) | X:X::X:X X:X::X:X (multihop|)
(demand-mode|) (non-persistent|) (admin-down|))
no bfd session (data-link-oam (mac-address MAC|) | X:X::X:X X:X::X:X (multihop|)
(demand-mode|) (non-persistent|) (admin-down|))
```

Syntax

A.B.C.D	Source IPv4 address.
A.B.C.D	Destination IPv4 address.
X:X::X:X	Source IPv6 address.
X:X::X:X	Destination IPv6 address.
non-persistent	Not a persistent session.
admin-down	Session admin down.
demand-mode	Demand mode session.
mac-address	Indicate the mac-address parameter.
MAC	Specify the actual destination MAC address.

Command Mode

Interface mode

Examples

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
```

```
ZebOS(config-if)#bfd session 1:1::1:1 1:1::1:1 non-persistent admin-down  
ZebOS(config-if)#no bfd session 1.2.3.4 1.2.3.5 non-persistent admin-down  
  
ZebOS#configure terminal  
ZebOS(config)#interface eth1  
ZebOS(config-if)#bfd session data-link-oam mac-address 1:1::1:1  
  
ZebOS(config-if)#no bfd session data-link-oam mac-address 1:1::1:1
```

bfd slow-timer

Use this command to set a BFD slow timer interval.

Use the `no` form of the command to reset the timer to default values.

Command Syntax

```
bfd slow-timer <1-4294967>
no bfd slow-timer <1-4294967>
```

Parameter

`<1-4294967>` Interval for the slow-timer in milliseconds

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#bfd slow-timer 1500
ZebOS(config)#
```

debug bfd

Use this command to enable debugging for BFD.

Use the `no` form of the command to disable all debugging for BFD.

Command Syntax

```
debug bfd (all|)
debug bfd (event|ipc-error|ipc-event|nsm|packet|session)
no debug bfd (all|)
no debug all
no debug all bfd
no debug bfd (event|ipc-error|ipc-event|nsm|packet|session)
```

Parameters

<code>all</code>	Enable all debugging.
<code>event</code>	Enable BFD event debugging.
<code>ipc-error</code>	Enable BFD IPC-error debugging.
<code>ipc-event</code>	Enable BFD IPC-event debugging.
<code>nsm</code>	Enable BFD NSM debugging.
<code>packet</code>	Enable BFD packet debugging.
<code>session</code>	Enable BFD session debugging.

Command Mode

Exec, Privileged Exec and Configure Mode

Examples

```
ZebOS#debug bfd all
ZebOS#no debug bfd all
ZebOS#debug bfd event
ZebOS#debug bfd ipc-error
ZebOS#debug bfd ipc-event
ZebOS#debug bfd nsm
ZebOS#debug bfd packet
ZebOS#debug bfd session
```

show bfd

Use this command to display information about the BFD process.

Command Syntax

```
show bfd
```

Parameters

None

Command Mode

Exec mode and Privilege Exec mode

Example

The example below displays the command syntax and sample output from the command.

```
ZebOS#show bfd
BFD ID: 00          Start Time:Fri May 1 09:55:06 2009
Number of Sessions: 1
Slow Timer: 1000   Image type: MONOLITHIC
Echo Mode: Disabled Next Session Discriminator: 2
ZebOS#
```

show bfd interface

Use this command to display details for an interface running BFD or for all interfaces configured for BFD.

Command Syntax

```
show bfd interface (ifindex <0-4294967295>|all|)
```

Parameters

all	Display all interfaces.
ifindex <0-4294967295>	Display an interface index. Display an ID of an interface in this range.

Command Mode

Exec mode and Privilege Exec mode

Example

The example below displays the command syntax and sample output from the command.

```
ZebOS#show bfd interface all
Interface:          lo ifindex: 1 state:  UP
Interface level configuration: NO ECHO, NO SLOW TMR
Timers in Milliseconds
Min Tx: 20 Min Rx: 20 Multiplier: 5

Interface:          eth0 ifindex: 2 state:  UP
Interface level configuration: NO ECHO, NO SLOW TMR
Timers in Milliseconds
Min Tx: 20 Min Rx: 20 Multiplier: 5

Interface:          eth1 ifindex: 3 state:  DOWN
Interface level configuration: NO ECHO, NO SLOW TMR
Timers in Milliseconds
Min Tx: 20 Min Rx: 20 Multiplier: 5

Interface:          sit0 ifindex: 4 state:  DOWN
Interface level configuration: NO ECHO, NO SLOW TMR
Timers in Milliseconds
Min Tx: 20 Min Rx: 20 Multiplier: 5

Interface:          gre0 ifindex: 5 state:  DOWN
Interface level configuration: NO ECHO, NO SLOW TMR
Timers in Milliseconds
Min Tx: 20 Min Rx: 20 Multiplier: 5
```

show bfd session

Use this command to display all BFD sessions.

Command Syntax

```
show bfd session (detail|)
```

Parameters

detail Display session details.

Command Mode

Exec mode and Privilege Exec mode

Example

The example below displays the command syntax and sample output from the command using the `detail` parameter.

```
ZebOS#show bfd session detail
Session Interface Index : 3                Session Index : 1
Lower Layer : IPv4                        Version : 1
Session Type : Single Hop                 Session State : Down
Local Discriminator : 1                   Local Address : 19.19.19.2/32
Remote Discriminator : 0                  Remote Address : 19.19.19.1/32
Local Port : 49152                        Remote Port : 3784
Options :

Diagnostics: None

Timers in Milliseconds :
Min Tx: 20                               Min Rx: 20           Multiplier: 5
Neg Tx: 0                                 Neg Rx: 0            Neg detect mult: 0
Min echo Tx: 20                           Min echo Rx: 10     Neg echo intrvl: 0
Storage type: 2
Sess down time: 00:00:00
Sess discontinue time : 00:00:00
Bfd GTSM Disabled
Auth: Enabled | Disabled
Auth-Type: Simple | (Keyed | Meticulous-keyed) MD5 | SHA1
Auth-Key-Id: <0-255>

Counters values:
Pkt In : 0000000000000000                Pkt Out : 0000000000000011
Echo Out : 0000000000000000              IPv6 Echo Out : 0000000000000000
IPv6 Pkt In : 0000000000000000           IPv6 Pkt Out : 0000000000000000
UP Count : 0                              UPTIME : 00:00:00

Protocol Client Info:
BFD-> Client ID: 28      Flags: 4
-----
Number of Sessions:    1
ZebOS#
```

show bfd session A.B.C.D

Use this command to display information about an IPv4 BFD session neighbor.

Command Syntax

```
show bfd session A.B.C.D A.B.C.D (detail|)
show bfd session A.B.C.D A.B.C.D <0-4294967295> (detail|)
```

Parameters

A.B.C.D	Display the local IPv4 address.
A.B.C.D	Display the neighbor IPv4 address.
<0-4294967295>	Display the interface index of the address.
detail	Display detailed information.

Command Mode

Exec mode and Privilege Exec mode

Example

The example below displays the command syntax and sample output from the command.

```
ZebOS#show bfd session 10.1.1.66 10.1.1.67 3
Session Interface Index: 3      Session Index: 1
Lower Layer: IPv4      Single Hop
Session State: Up
Local Discriminator: 1 Remote Discriminator: 163
Local Address: 10.1.1.66/32    Remote Address: 10.1.1.67/32
Local Port: 49152      Remote Port: 3784
Timers in Milliseconds
Min Tx: 1000 Min Rx: 1000 Multiplier: 4
UP Count: 1 UPTIME: 00:10:08
```

show bfd session ipv6

Use this command to display information about an IPv6 BFD session neighbor.

Command Syntax

```
show bfd session ipv6 X:X::X:X X:X::X:X (detail|)
show bfd session ipv6 X:X::X:X X:X::X:X <0-4294967295> (detail|)
```

Parameters

X:X::X:X	Display the local IPv6 address.
X:X::X:X	Display the neighbor IPv6 address.
<0-4294967295>	Display the interface index of the address.
detail	Display detailed information.

Command Mode

Exec mode and Privileged Exec mode

Example

The example below displays the command syntax and sample output from the command.

```
ZebOS#show bfd session 2001::1222 2001::1223 3
Session Interface Index : 3      Session Index: 1
Lower Layer: IPv6      Single Hop
Session State : Up
Local Discriminator : 1 Remote Discriminator: 163
Local Address : 2001::1222/128   Remote Address: 2001::1223/128
Local Port : 49152      Remote Port: 3784
Timers in Milliseconds
Min Tx: 1000 Min Rx: 1000 Multiplier: 4
UP Count: 1 UPTIME: 00:06:03
```

show debugging bfd

Use this command to display debugging information for BFD processes.

Command Syntax

```
show debugging bfd
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

The example below displays the bfd command syntax and sample output from the command.

```
ZebOS#show debugging bfd
BFD debugging status:
BFD events debugging is on
BFD packet debugging is on
BFD ipc-error debugging is on
BFD ipc-event debugging is on
BFD session debugging is on
BFD nsm debugging is on
ZebOS#
```

CHAPTER 3 ZebOS Protocol Commands for BFD

The chapter describes the commands used to manage BFD functionality for the OSPF, IS-IS and BGP protocol modules. It includes the following commands:

- [area virtual-link on page 38](#)
- [bfd all-interfaces on page 39](#)
- [debug bgp bfd on page 40](#)
- [debug isis bfd on page 41](#)
- [debug ospf bfd on page 42](#)
- [debug rip bfd on page 43](#)
- [ip ospf bfd on page 44](#)
- [isis bfd on page 45](#)
- [neighbor fall-over bfd \(BGP\) on page 46](#)
- [neighbor fall-over bfd \(RIP\) on page 47](#)

area virtual-link

Use this command to enable the BFD option for a specified virtual-link neighbor.

Use the `no` form of the command to disable BFD on a virtual-link neighbor.

Command Syntax

```
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 {fall-over bfd}
```

Parameters

A.B.C.D	Indicate an area IP address
<0-429467295>	Indicate an area ID in integer format
virtual-link	Indicate a virtual link and its parameters
A.B.C.D	Indicate the IP address of the virtual link
fall-over	Indicate fall-over detection
bfd	Specify the Bidirectional Forwarding Detection (BFD)

Command Mode

Router mode

Example

```
ZebOS#configure terminal
ZebOS(config)#router ospf
ZebOS(config-router)#area 1 virtual-link 192.168.0.1 fall-over bfd
```


bfd all-interfaces

Use this command to enable BFD for all neighbors maintained by an OSPF or RIP process, or an ISIS instance.

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

Note: This command does not apply BFD to virtual-link neighbors.

Command Syntax

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

Parameters

None

Command Mode

Configure router mode

Example

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

```
ZebOS#configure terminal
ZebOS(config)#router isis
ZebOS(config-router)#bfd all-interfaces
```

```
ZebOS#configure terminal
ZebOS(config)#router rip
ZebOS(config-router)#bfd all-interfaces
```

debug bgp bfd

Use this command to debug BFD processes in BGP.

Use the `no` form of the command to stop debugging.

Command Syntax

```
debug bgp bfd
no bgp debug bfd
undebug bgp bfd
```

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#debug bgp bfd
```

debug isis bfd

Use this command to debug BFD processes in IS-IS.

Use the `no` form of the command to stop debugging.

Command Syntax

```
debug isis bfd
no debug isis bfd
undebug isis bfd
```

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#debug isis bfd
```

debug ospf bfd

Use this command to debug BFD processes in OSPF.

Use the `no` form of the command to stop debugging.

Command Syntax

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

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#debug ospf bfd
```

debug rip bfd

Use this command to debug BFD processes in RIP.

Use the `no` form of the command to stop debugging.

Command Syntax

```
debug rip bfd
no debug rip bfd
```

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#debug rip bfd
```

ip ospf bfd

Use this command to enable the BFD option for OSPF neighbors on an interface. Use the `no` form of the command to disable the BFD option for OSPF neighbors on an interface.

Command Syntax

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

Parameter

<code>disable</code>	Disable the BFD option for neighbors on an interface
----------------------	--

Command Mode

Interface mode

Example

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#ip ospf bfd
```

isis bfd

Use this command to enable the BFD option for IS-IS neighbors on an interface. Use the `no` form of the command to disable the BFD option for neighbors on an interface.

Command Syntax

```
isis bfd (disable|)
no isis bfd (disable|)
```

Parameter

<code>disable</code>	Used to disable the BFD option for neighbors on an interface
----------------------	--

Command Mode

Interface mode

Example

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#isis bfd disable
```

neighbor fall-over bfd (BGP)

Use this command to enable the BFD option on an IPv4 or IPv6 BGP peer.

Use the `no` form of the command to disable the BFD option on a BGP peer.

Command Syntax

```
neighbor (A.B.C.D|X:X::X:X) fall-over bfd (multihop|)
no neighbor (A.B.C.D|X:X::X:X) fall-over bfd (multihop|)
```

Parameters

A.B.C.D	Peer address in an IPv4 format
X:X::X:X	Peer address in an IPv6 format
multihop	Enable multihop

Command Mode

Router mode

Example

```
ZebOS(config)#router bgp
ZebOS(config-router)#neighbor 10.10.0.1 fall-over bfd
```

neighbor fall-over bfd (RIP)

Use this command to enable the BFD option on an IPv4 RIP peer.

Use the `no` form of the command to disable the BFD option on an IPv4 RIP peer.

Command Syntax

```
neighbor A.B.C.D fall-over bfd
no neighbor A.B.C.D fall-over bfd
```

Parameters

A.B.C.D Peer address in an IPv4 format

Command Mode

Router mode

Example

```
ZebOS(config)#router rip
ZebOS(config-router)#neighbor 10.10.2.9 fall-over bfd
```


CHAPTER 4 BFD Static Route Commands

Bidirectional Forwarding Detection (BFD) support for static routes can be configured on a static route basis, interface basis, or on a global level:

- When BFD is configured for an IPv4 or IPv6 static route, BFD provides the next-hop reachability detection for the given static route.
- When BFD is configured for an interface, BFD provides the data plane next-hop reachability information for any IPv4 or IPv6 static route configured through the given interface.
- When BFD is configured globally, BFD is applied on all interfaces with a single command. In all these cases, the BFD session update for NSM governs the state of the static routes.

This chapter includes the following commands:

- [ip bfd static all-interfaces on page 50](#)
- [ip static fall-over bfd on page 51](#)
- [ip static bfd on page 52](#)
- [ipv6 static all-interfaces on page 53](#)
- [ipv6 static fall-over bfd on page 54](#)
- [ipv6 static bfd on page 55](#)

ip bfd static all-interfaces

Use this command to enable BFD support for IPv4 static routes configured on all interfaces.

Use the `no` option with this command to disable BFD support for IPv4 static routes configured on all interfaces.

Command Syntax

```
ip bfd static all-interfaces
no ip bfd static all-interfaces
```

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS#configure terminal
ZebOS(config)#ip bfd static all-interfaces
```

ip static fall-over bfd

Use this command to enable or disable BFD support for a specific IPv4 static route.

Use the `no` form of the command to disable the BFD support for a specific IPv4 static route.

Command Syntax

```
ip static A.B.C.D/M A.B.C.D fall-over bfd (disable|)
no ip static A.B.C.D/M A.B.C.D fall-over bfd (disable|)
```

Parameters

A.B.C.D/M	The IPv4 destination prefix and mask length.
A.B.C.D	The IPv4 gateway address.
disable	Specify to disable BFD.

Command Mode

Configure mode

Example

```
ZebOS #configure terminal
ZebOS(config)#ip static 4.4.4.4/32 20.0.10.82 fall-over bfd
```

ip static bfd

Use this command to enable or disable BFD support for IPv4 static route(s) configured on an interface.

Use the `no` option with this command to reset BFD support for IPv4 static route(s) configured on an interface.

Command Syntax

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

Parameters

None

Command Mode

Interface mode

Default

By default, BFD static route support is disabled at all levels.

Example

```
ZebOS #configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#ip static bfd disable

ZebOS(config)#interface eth1
ZebOS(config-if)#ip static bfd
```

ipv6 static all-interfaces

Use this command to enable or disable BFD support for IPv6 static routes configured on all interfaces.

Use the `no` option with this command to disable BFD support for IPv6 static routes configured on all interfaces.

Command Syntax

```
ipv6 bfd static all-interfaces
no ipv6 bfd static all-interfaces
```

Parameters

None

Command Mode

Configure mode

Example

```
ZebOS #configure terminal
ZebOS(config)#ipv6 bfd static all-interfaces
```

ipv6 static fall-over bfd

Use this command to enable or disable BFD support for a specific IPv6 static route.

Use the `no` option with this command to disable BFD support for a specific IPv6 static route.

Command Syntax

```
ipv6 static X:X::X:X/M X:X::X:X fall-over bfd (disable|)
no ipv6 static X:X::X:X/M X:X::X:X fall-over bfd (disable|)
```

Parameters

X:X::X:X/M	The IPv6 destination prefix and mask length.
X:X::X:X	The IPv6 gateway address.
disable	Specify to disable BFD.

Command Mode

Configure mode

Examples

```
ZebOS #configure terminal
ZebOS(config)#ipv6 static 2345:6::0:1/28 2345:6::0:2 fall-over bfd

ZebOS#configure terminal
ZebOS(config)#ipv6 static 2345:12::1/64 2345:12::2 fall-over bfd disable
```


ipv6 static bfd

Use this command to disable BFD support for IPv6 static route(s) configured on an interface.

Use the `no` option with this command to reset BFD support for IPv6 static route(s) configured on an interface.

Command Syntax

```
ipv6 static bfd (disable|)
no ipv6 static bfd (disable|)
```

Parameters

None

Command Mode

Interface mode

Example

```
ZebOS#configure terminal
ZebOS(config)#interface eth1
ZebOS(config-if)#ipv6 static bfd disable
```


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