Sun Ethernet Fabric Operating System BFD Administration Guide

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Contents

Using This Documentation

- **Overview** – Includes the description of BFD protocol and instructions to configure it
- **Audience** – Users implementing BFD protocol with other protocols in the router stack
- **Required knowledge** – Working knowledge of the protocol

Product Documentation Library

Documentation and resources for this product and related products are available at http://www.oracle.com/goto/es2-72_es2-64/docs.

Acronyms and Abbreviations

Terms	Explanation
Active	Conceptual row is available for use by the managed device.
CreateAndGo	A management station wanting to create a new instance of a conceptual row and to have its status automatically set to active, making it available for use by the managed device, supplies this row status value.
CreateAndWait	A management station wanting to create a new instance of conceptual row (but not making it available for use by the managed device) supplies this rowstatus value.
Destroy	A management station wishing to delete all of the instances associated with an existing conceptual row supplies this rowstatus value.
NotInService	Conceptual row exists in the agent, but is unavailable for use by the managed device.
NotReady	Conceptual row exists in the agent, but some more information is necessary to make it available for use by the managed device.
BFD	Bidirectional Forwarding Detection
CC	Continuity check
CV	Connection verification
FRR	Fast-Re-Route
GACH	Generic associated channel header
GAL	Generalized alert label
LER	Label edge router
LSP	Label switched path

Terms	Explanation
LSR	Label switch router
ME	Maintenance entity
MEG	Maintenance entity group
MEP	Maintenance entity group end point
MIP	Maintenance entity group intermediate point
MPLS-OAM	MPLS operations, administration, and maintenance
MPLS-TP	MPLS transport profile
MPLS-TP LSP	Unidirectional or bidirectional label switched path
OID	Object identifier
OSPF	Open shortest path first
P2P	Point-to-point
PDU	Packet data unit
PW	Pseudowire
RDI	Remote defect indication
SLA	Service level agreement
SPME	Subpath maintenance element
TTL	Time to live
VCCV	Virtual circuit connectivity verification

CLI Command Modes

This table lists the various command modes used in this document with their access and exit methods.

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Initial mode for starting a session.	`SEFOS>`	Use the `logout` command to return to the Oracle ILOM prompt.
Privileged EXEC	From User EXEC mode, use the `enable` command.	`SEFOS#`	Use the `disable` command to return to the User EXEC mode.
Global Configuration	From Privileged EXEC mode, use the `configure terminal` command.	`SEFOS(config)#`	Use the `exit` or `end` command to exit to the Privileged EXEC mode.
Interface Configuration	From Global Configuration	`SEFOS(config-`	Use the `exit` command to

Command Mode	Access Method	Prompt	Exit Method
	mode, use the `interface-type` *interface-id* command.	`if)#`	return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.
Switch Configuration	From Global Configuration mode, use the `switch` *switch-name* command.	`SEFOS(config-switch)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.
BFD Session Configuration	From Global Configuration mode, use the `bfd session` *session-index* command.	`SEFOS(config-bfdsess)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.

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Provide feedback about this documentation at http://www.oracle.com/goto/docfeedback.

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BFD Overview

BFD Protocol Description

Oracle BFD implements the Bidirectional Forwarding Detection described in the RFC 5880. BFD is a detection protocol designed to provide fast forwarding-path failure detection times for media types, encapsulations, topologies, and routing protocols. BFD detects forwarding path failures at a uniform rate, rather than the variable rates for different protocol hello mechanisms. BFD makes network profiling and planning easier and reconvergence time consistent and predictable. BFD provides subsecond failure detection between two adjacent devices and can be less CPU-intensive than protocol hello messages, because some of the BFD load can be distributed to the data plane on supported modules.

Oracle BFD supports path monitoring for the following protocols:

- Static IPv4 & IPv6
- BGP
- OSPF
- MPLS

Linux IP support for BFD is provided and the configurations are same as mentioned in this document. The supported protocols for BFD in Linux IP are static route, OSPF, and BGP in IPv4, and static route and BGP in IPv6. This document describes how to configure Oracle BFD running as a part of Sun Ethernet Fabric Operating System (SEFOS).

BFD is configurable and managed by CLI. For more information about the command modes of CLI, see CLI Command Modes.

Default Configurations

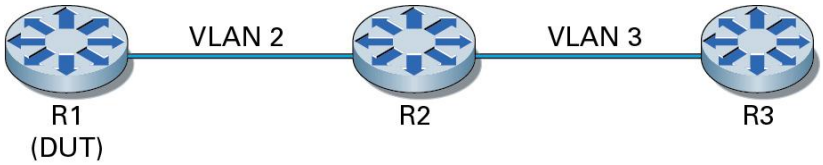
The following table lists the default values assigned to several BFD parameters, during the start-up of the router.

Parameter	Default Setting
BFD Administrative System Control Status	Start
BFD Global Operational Mode	Asynchronous mode without echo function.
BFD Global Minimum Transmit Interval	1 second
BFD Global Minimum Reception Interval	1 second
BFD Global Detection Time Multiplier	3 seconds
BFD Global Slow Transmission Interval	1 second
BFD Session Role	Active
BFD Session Mode	CC (Continuity Check)

Parameter	Default Setting
BFD Session Timer Negotiation	Enabled
BFD Session Offloading	Disabled
BFD Trap Notifications	Session UP and DOWN notifications enabled
BFD Session Admin Status	Enabled
BFD Version Number	BFD Version 1 (RFC5880)
BFD Session State	DOWN
BFD Demand Mode	Disabled
BFD Control Plane Independency	Disabled
BFD Generalized TTL Security Mechanism (GTSM)	Disabled
BFD Session Authentication	Disabled

BFD Topology Example

The following figure is an example of BFD configuration.



The figure depicts the components used in the topology, which are described as follows:

- R1, R2, and R3 represent routers in which SEFOS is installed.
- VLAN2 and VLAN3 represent the VLAN interfaces of the SEFOS routers.
- Each SEFOS switch has a router ID.

This table lists the IPv4 and IPv6 addresses of the interfaces and hosts provided in the figure.

Router / Host	Interface	Slot	IPv4 Address / Mask	IPv6 Address / Prefix Length
R1	VLAN2	0/2	20.0.0.1 / 255.0.0.0	fec0::2222:0:1 / 96, 2222::1/96
R2	VLAN2	0/2	20.0.0.2 / 255.0.0.0	fec0::2222:0:2 / 96, 2222::2/96
	VLAN3	0/3	30.0.0.2 / 255.0.0.0	fec0::3333:0:2 / 96, 3333::2/96
R3	VLAN3	0/2	30.0.0.3 / 255.0.0.0	fec0::3333:0:3 / 96, 3333::3/96

Configuring BFD

The Oracle BFD software is designed in accordance with the FSAP2 (Flexible Software Architecture for Portability) to ensure a high level of portability

This chapter describes the preliminary configurations and the configurations for the topologies of Oracle BFD. You can configure the Oracle BFD feature by accessing Global Configuration mode or Interface Configuration mode. The configuration steps described in this document begin with accessing one or both of these modes.

This chapter describes the configuration of the Oracle BFD features using CLI.

- Configuring BFD over Static IPv4 & IPv6 paths
- Configuring BFD over OSPF
- Configuring BFD over BGP

Configure SEFOS1 in Topology for Testing Oracle BFD

The figure in the BFD Topology Example depicts the topology setup for this configuration.

Note: For the enterprise package, ports are automatically mapped to default switch.

1. **Type the following commands to configure SEFOS1 in Topology for Testing Oracle BFD.**

```
SEFOS# configure terminal
SEFOS(config)# interface vlan 1
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 12.0.0.1 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 1
```

```
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/1
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# switchport pvid 1
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface vlan 2
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 20.0.0.1 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 2
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/2
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# switchport pvid 2
SEFOS(config-if)# end
```

2. **Verify the VLAN configurations.**

```
SEFOS# show ip interface
  Vlan1 is up, line protocol is up
```

```
Internet Address is 12.0.0.1/8
Broadcast Address 12.255.255.255

Vlan2 is up, line protocol is up
Internet Address is 20.0.0.1/8
Broadcast Address 20.255.255.255
```

Configure SEFOS2 in Topology for Testing Oracle BFD

The figure in the BFD Topology Example depicts the topology setup for this configuration.

1. **Type the following commands to configure SEFOS2 in BFD Topology Example.**

```
SEFOS# configure terminal
SEFOS(config)# interface vlan 1
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 12.0.0.2 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 1
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/1
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# switchport pvid 1
```

```
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface vlan 2
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 20.0.0.2 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 2
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/2
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# switchport pvid 2
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface vlan 3
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 30.0.0.2 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
```

```
SEFOS(config)# interface extreme-ethernet 0/3
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 3
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/3
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/3
SEFOS(config-if)# switchport pvid 3
SEFOS(config-if)# end
```

2. **Verify the VLAN configurations.**

```
SEFOS# show ip interface
Vlan1 is up, line protocol is up
Internet Address is 12.0.0.2/8
Broadcast Address 12.255.255.255
Vlan2 is up, line protocol is up
Internet Address is 20.0.0.2/8
Broadcast Address 20.255.255.255
Vlan3 is up, line protocol is up
Internet Address is 30.0.0.2/8
Broadcast Address 30.255.255.255
```

Configure SEFOS3 in Topology for Testing Aricent BFD

The figure in the BFD Topology Example depicts the topology setup for this configuration.

1. **Type the following commands to configure SEFOS3 in topology for testing Oracle BFD.**

```
SEFOS# configure terminal
SEFOS(config)# interface vlan 1
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 12.0.0.3 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# map switch default
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 1
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/1
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# switchport pvid 1
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface vlan 3
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 30.0.0.3 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# map switch default
```

```
SEFOS(config-if)# no shutdown
SEFOS(config-if)# end

SEFOS# configure terminal
SEFOS(config-switch)# vlan 3
SEFOS(config-switch-vlan)# ports extreme-ethernet 0/2
SEFOS(config-switch-vlan)# end
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/2
SEFOS(config-if)# switchport pvid 3
SEFOS(config-if)# end
```

2. Verify the VLAN configurations.

```
SEFOS# show ip interface
Vlan1 is up, line protocol is up
Internet Address is 12.0.0.3/8
Broadcast Address 12.255.255.255
Vlan3 is up, line protocol is up
Internet Address is 30.0.0.3/8
Broadcast Address 30.255.255.255
```

BFD Over Static IP Path Configuration

This feature enables you to monitor IP neighbor reachability by using BFD. You can configure the neighbor statically. IP moves static routes (with next hop as neighbor) to pending state when BFD notifies that the neighbor is not reachable.

BFD Over Static IPv6 Path Configuration

This feature enables you to monitor IPv6 neighbor reachability using BFD. You can configure the neighbor statically. IPv6 moves static routes (with next hop as neighbor) to pending state when BFD notifies the neighbor is not reachable. Refer to the *Sun Ethernet Fabric Operating System IPv6 Administration Guide* for static configurations.

BFD Over OSPF Configuration

This feature enables OSPF to detect its neighbor unreachable faster. BFD reports neighbor unreachable to OSPF as soon as it detects BFD packet failure. This speeds up convergence.

BFD Over OSPFv3 Configuration

This feature enables OSPFv3 to detect its IPv6 neighbor unreachable faster. BFD reports neighbor unreachable to OSPFv3 as soon as it detects BFD packet failure. This speeds up convergence. Refer to the *Sun Ethernet Fabric Operating System OSPFv3 Administration Guide* for detailed configuration.

BFD Monitoring for BGP Configuration

This feature enables BGP to detect its IPv4 and IPv6 remote neighbor unreachable faster. BFD reports neighbor unreachable to BGP as soon as it detects BFD packet failure. This speeds up convergence. Refer to the *Sun Ethernet Fabric Operating System BGP administration Guide* for detailed configuration.