Sun Ethernet Fabric Operating System

VRRPv3 Administration Guide

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Using This Documentation

- **Overview** – Describes basic and advanced configuration tasks of VRRP, which is an implementation of RFC 2338 specification. VRRP provides full support of the draft VRRP MIB specification and enables network load balancing.
- **Audience** – Users implementing VRRP with other protocols in the router stack
- **Required Knowledge** – Basic knowledge of the VRRP.

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
- http://www.oracle.com/goto/ES1-24/docs
- http://www.oracle.com/goto/sn-10gbE-72p/docs
- http://www.oracle.com/goto/sb6k-24p-10gbe/docs

Acronyms and Abbreviations

Acronym or Abbreviation	Explanation
CLI	Command-line interface
IP	Internet Protocol
LAN	Local area network
MAC	Media access control
MIB	Management information base
SEFOS	Sun Ethernet Fabric Operating System
VRID	Virtual router identifier
VRRP	Virtual Router Redundancy Protocol
VRRPv3	Virtual Router Redundancy Protocol Version 3

CLI Command Modes

The following table lists the configuration modes used in this document with their access and exit methods.

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Access SEFOS from Oracle ILOM with read-only rights (privilege level 1).	`SEFOS>`	Use logout or exit to return to the Oracle ILOM prompt.
Privileged EXEC	Access SEFOS from Oracle ILOM with full administrative rights (privilege level 15).	`SEFOS#`	Use the `logout` or `exit` command to return to the Oracle ILOM prompt.
Global Configuration	From User EXEC mode, use the `enable` command.	`SEFOS(config)#`	Use the `end` command to return to Privileged EXEC mode.
Interface Configuration	From Global Configuration mode, use the `interface interface-type interface-id` command.	`SEFOS(config-if)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.
VRRP Router Configuration	From Global Configuration mode, use the `router VRRP` command.	`SEFOS(config-vlan)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.
VRRP Interface Configuration	From VRRP Router Configuration mode, use the command `interface vlan vlan-id` command.	`SEFOS(config-vrrp-if)#`	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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VRRPv3 Overview

This section describes the VRRP version 3.

- "VRRPv3 Description" on page 9

VRRPv3 Description

VRRP is an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. This elected router is called the master router, and others are called backup routers. The master router is responsible for forwarding data packets received for the VRRP MAC address. Backup routers listen for the advertisement packet from the master router. If backup routers do not receive advertisement packets for a certain period, the backup routers elect a new master router. VRRP is designed to provide a highly available default first hop route for end-hosts on the LAN.

VRRP version 3 extends capability to IPv6 in addition to IPv4. Version 3 supports sub-second operation. It also supports `accept-mode` configuration.

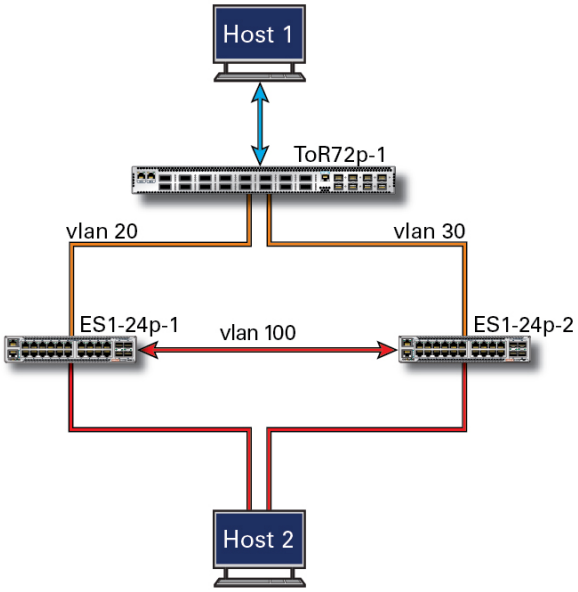
Configuring VRRP Version 3

These sections provide an example VRRPv3 configuration and describe how to configure VRRPv3.

- "Example VRRPv3 Configuration" on page 11
- "Configuring VRRPv3" on page 12

Example VRRPv3 Configuration

The following figure is an example of VRRPv3 configuration.



Configuring VRRPv3

These sections describe the VRRPv3 configuration.

- "Configure Switch TOR72p-1" on page 12
- "Configure Switch ES1-24p-1" on page 14
- "Configure Switch ES1-24p-2" on page 16
- "Master and Backup State Settlement" on page 18
- "Master Election Based on IP Address" on page 21
- "Master Election Based on Priority" on page 22
- "Configure `Accept-mode`" on page 22
- "Ping Between Hosts" on page 24
- "Ping Between Hosts Through Virtual IP When Master Fails" on page 24
- "Link-Track Feature" on page 25

▼ Configure Switch TOR72p-1

1. Start the configuration with all ports and the default VLAN shutdown.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# set gvrp disable
ToR72p-1 SEFOS(config)# set gmrp disable
ToR72p-1 SEFOS(config)# interface vlan 1
ToR72p-1 SEFOS(config-if)# shutdown
ToR72p-1 SEFOS(config-if)# no ip address
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)#  shutdown spanning-tree
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-1 SEFOS(config-if-range)# shutdown
ToR72p-1 SEFOS(config-if-range)# end
```

2. Configure VLANs manually.

You must add at least one port to the VLAN before you can assign the VLAN name.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# vlan 20
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/61 untagged extreme-ethernet
 0/61
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 30
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/63 untagged extreme-ethernet
 0/63
```

```
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 40
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 untagged extreme-ethernet
 0/66
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# end
```

3. Enable the ports and allow appropriate VLANs as untagged.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/61
ToR72p-1 SEFOS(config-if-range)# description "connected to ES1-24p-1"
ToR72p-1 SEFOS(config-if-range)# switchport acceptable-frame-type
 untaggedAndPrioritytagged
ToR72p-1 SEFOS(config-if-range)# switchport pvid 20
ToR72p-1 SEFOS(config-if-range)# no shutdown
ToR72p-1 SEFOS(config-if-range)# exit
ToR72p-1 SEFOS(config)#  interface range extreme-ethernet 0/63
ToR72p-1 SEFOS(config-if-range)# description "connected to ES1-24p-2"
ToR72p-1 SEFOS(config-if-range)# switchport acceptable-frame-type
 untaggedAndPrioritytagged
ToR72p-1 SEFOS(config-if-range)# switchport pvid 30
ToR72p-1 SEFOS(config-if-range)# no shutdown
ToR72p-1 SEFOS(config-if-range)# exit
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/66
ToR72p-1 SEFOS(config-if-range)# description "connected to Host-1"
ToR72p-1 SEFOS(config-if-range)# switchport pvid 40
ToR72p-1 SEFOS(config-if-range)# no shutdown
ToR72p-1 SEFOS(config-if-range)# exit
ToR72p-1 SEFOS(config)# end
```

4. Configure the L3 interface with IPv4 and IPv6 addresses for all the VLANs created previously.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface vlan 20
ToR72p-1 SEFOS(config-if)# ip address 192.168.20.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# ipv6 enable
ToR72p-1 SEFOS(config-if)# ipv6 address 2000::10 112 unicast
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 30
ToR72p-1 SEFOS(config-if)# ip address 192.168.30.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# ipv6 enable
ToR72p-1 SEFOS(config-if)# ipv6 address 3000::10 112 unicast
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 40
```

```
ToR72p-1 SEFOS(config-if)# ip address 192.168.40.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# ipv6 enable
ToR72p-1 SEFOS(config-if)# ipv6 address 4000::10 112 unicast
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

5. **Save the configuration.**

```
ToR72p-1 SEFOS# copy run start
Building configuration ...
[OK]
ToR72p-1 SEFOS#
```

▼ Configure Switch ES1-24p-1

1. **Start the configuration with all ports and the default VLAN shutdown.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)#  shutdown spanning-tree
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 20
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/23 untagged extreme-ethernet
 0/23
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 100
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/4,0/20 untagged extreme-
ethernet 0/4,0/20
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# end
```

3. Enable the ports and allow appropriate VLANs as untagged.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/4
ES1-24p-1 SEFOS(config-if)# description connected to Host-2 01”
ES1-24p-1 SEFOS(config-if)# switchport pvid 100
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/20
ES1-24p-1 SEFOS(config-if)# description connected to ES1-24p-2
ES1-24p-1 SEFOS(config-if)# switchport acceptable-frame-type untaggedAndPrioritytagged
ES1-24p-1 SEFOS(config-if)# switchport pvid 100
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on port61"
ES1-24p-1 SEFOS(config-if)# switchport acceptable-frame-type untaggedAndPrioritytagged
ES1-24p-1 SEFOS(config-if)# switchport pvid 20
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

4. Configure the L3 interface with IPv4 and IPv6 addresses for all the VLANs created previously.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 20
ES1-24p-1 SEFOS(config-if)# ip address 192.168.20.20 255.255.255.0
ES1-24p-1 SEFOS(config-if)# ipv6 enable
ES1-24p-1 SEFOS(config-if)# ipv6 address 2000::20 112 unicast
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# ip address 192.168.100.20 255.255.255.0
ES1-24p-1 SEFOS(config-if)# ip address 192.168.101.20 255.255.255.0 secondary
ES1-24p-1 SEFOS(config-if)# ip address 192.168.102.20 255.255.255.0 secondary
ES1-24p-1 SEFOS(config-if)# ipv6 enable
ES1-24p-1 SEFOS(config-if)# ipv6 address 1000::20 112 unicast
ES1-24p-1 SEFOS(config-if)# ipv6 address 1100::20 112 unicast
ES1-24p-1 SEFOS(config-if)# ipv6 address 1200::20 112 unicast
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. Configure VRRP version 3 with server facing VLANs to load balance traffic and avoid single point failure.

VRRP versions supported are V2 and V3. V2-V3 is an intermediate version used only to migrate from V2 to V3.

The following commands are explained with an example in “Master Election Based on IP Address” on page 21, “Master Election Based on Priority” on page 22, and “Configure `Accept-mode`” on page 22 sections.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# router vrrp
ES1-24p-1 SEFOS(config-vrrp)# vrrp version ?
VRRP commands :
  vrrp version { v2 | v2-v3 | v3 }
ES1-24p-1 SEFOS(config-vrrp)# vrrp version v3
ES1-24p-1 SEFOS(config-vrrp)# end
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv4 192.168.100.1
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv4 priority 200
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv4 timer msec 2000
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv4 accept-mode enable
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 fe80::210:e0ff:fe2c:fd21
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1000::5 secondary
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1100::5 secondary
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1200::5 secondary
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 priority 200
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 timer msec 2000
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 accept-mode enable
ES1-24p-1 SEFOS(config-vrrp-if)# end
```

6. **Save the configuration.**

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
```

▼ Configure Switch ES1-24p-2

1. **Start the configuration with all ports and the default VLAN shutdown.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# shutdown spanning-tree
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. Configure VLANs manually.

You must add at least one port to the VLAN before you can assign the VLAN name.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 30
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/23 untagged extreme-ethernet
 0/23
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 100
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/4,0/20 untagged extreme-
ethernet 0/4,0/20
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

3. Enable the ports and allow appropriate VLANs as untagged.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/4
ES1-24p-2 SEFOS(config-if)# description connected to Host-2
ES1-24p-2 SEFOS(config-if)# switchport access vlan 100
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/20
ES1-24p-2 SEFOS(config-if)# description connected to ES1-24p-1
ES1-24p-2 SEFOS(config-if)# switchport acceptable-frame-type untaggedAndPrioritytagged
ES1-24p-2 SEFOS(config-if)# switchport pvid 100
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description connected to ToR72p-1
ES1-24p-2 SEFOS(config-if)# switchport acceptable-frame-type untaggedAndPrioritytagged
ES1-24p-2 SEFOS(config-if)# switchport pvid 30
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)#
ES1-24p-2 SEFOS(config)# end
```

4. Configure the L3 interface with IPv4 and IPv6 addresses for all the VLANs created previously.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface vlan 30
ES1-24p-2 SEFOS(config-if)# ip address 192.168.30.20 255.255.255.0
ES1-24p-2 SEFOS(config-if)# ipv6 enable
ES1-24p-2 SEFOS(config-if)# ipv6 address 3000::20 112 unicast
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 100
```

```
ES1-24p-2 SEFOS(config-if)# ip address 192.168.100.10 255.255.255.0
ES1-24p-2 SEFOS(config-if)# ip address 192.168.101.10 255.255.255.0 secondary
ES1-24p-2 SEFOS(config-if)# ip address 192.168.102.10 255.255.255.0 secondary
ES1-24p-2 SEFOS(config-if)# ipv6 enable
ES1-24p-2 SEFOS(config-if)# ipv6 address 1000::10 112 unicast
ES1-24p-2 SEFOS(config-if)# ipv6 address 1100::10 112 unicast
ES1-24p-2 SEFOS(config-if)# ipv6 address 1200::10 112 unicast
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. **Configure VRRP version 3 with server facing VLANs to load balance traffic and avoid single point failure.**

   The following commands are explained with an example in "Master Election Based on IP Address" on page 21, "Master Election Based on Priority" on page 22, and "Configure `Accept-mode`" on page 22 sections.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# router vrrp
ES1-24p-2 SEFOS(config-vrrp)# vrrp version v3
ES1-24p-2 SEFOS(config-vrrp)# interface vlan 100
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv4 192.168.100.1
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv4 priority 100
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv4 timer msec 2000
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 fe80::210:e0ff:fe2c:fd21
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1000::5 secondary
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1100::5 secondary
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 1200::5 secondary
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 priority 150
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 timer msec 2000
ES1-24p-2 SEFOS(config-vrrp-if)# end
```

6. **Save the configuration.**

```
ES1-24p-2 SEFOS# copy run start
Building configuration ...
[OK]
```

▼ Master and Backup State Settlement

1. **Verify the VRRP configuration for the switch ES1-24p-1.**

```
ES1-24p-1 SEFOS# show vrrp

P indicates configured to preempt
```

```
Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    200  P Master 192.168.100.20            192.168.100.1

vlan100   1    200  P Master fe80::210:e0ff:fe2c:f21   fe80::210:e0ff:fe2c:fd21


ES1-24p-1 SEFOS# show vrrp detail

vlan100  - vrID 1
------------------
  State is Master
  Virtual IP address is 192.168.100.1
  Virtual MAC address is 00:00:5e:00:01:01
  Master router is 192.168.100.20
  Associated IPAddresses :
  ----------------------
  192.168.100.1
  Advertise time is 2000 milli secs
  Current priority is 200
  Configured priority is 200, may preempt
  Tracked Group is not configured
  Accept Mode is Enabled
  Time Since Virtual Router is UP is 01:17:18

vlan100  - vrID 1
------------------
  State is Master
  Virtual IP address is fe80::210:e0ff:fe2c:fd21
  Virtual MAC address is 00:00:5e:00:02:01
  Master router is fe80::210:e0ff:fe2c:f21
  Associated IpAddresses :
  ----------------------
  1000::5
  1100::5
  1200::5
  fe80::210:e0ff:fe2c:fd21
  Advertise time is 2000 milli secs
  Current priority is 200
  Configured priority is 200, may preempt
  Tracked Group is not configured
  Accept Mode is Enabled
  Time Since Virtual Router is UP is 01:17:18
```

2. Verify VRRP configuration for the switch ES1-24p-2.

```
ES1-24p-2 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address
```

```
--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    150  P Backup 192.168.100.20           192.168.100.1

vlan100   1    150  P Backup fe80::210:e0ff:fe2c:f21   fe80::210:e0ff:fe2c:fd21


ES1-24p-2 SEFOS# show vrrp detail

vlan100  - vrID 1
------------------
  State is Backup
  Virtual IP address is 192.168.100.1
  Virtual MAC address is 00:00:5e:00:01:01
  Master router is 192.168.100.20
  Associated IpAddresses :
  ----------------------
  192.168.100.1
  Advertise time is 2000 milli secs
  Current priority is 150
  Configured priority is 150, may preempt
  Tracked Group is not configured
  Accept Mode is Enabled
  Received Master Advertisement Interval is 2000 milli secs
  Computed Skew Time is 820 milli secs
  Computed Master Down Interval is 6820 milli secs
  Time Since Virtual Router is UP is 01:16:48

vlan100  - vrID 1
------------------
  State is Backup
  Virtual IP address is fe80::210:e0ff:fe2c:fd21
  Virtual MAC address is 00:00:5e:00:02:01
  Master router is fe80::210:e0ff:fe2c:f21
  Associated IpAddresses :
  ----------------------
  1000::5
  1100::5
  1200::5
  fe80::210:e0ff:fe2c:fd21
  Advertise time is 2000 milli secs
  Current priority is 150
  Configured priority is 150, may preempt
  Tracked Group is not configured
  Accept Mode is Enabled
  Received Master Advertisement Interval is 2000 milli secs
  Computed Skew Time is 820 milli secs
  Computed Master Down Interval is 6820 milli secs
  Time Since Virtual Router is UP is 01:16:48
```

Master Election Based on IP Address

When more than two switches run VRRP with equal priorities, the switch with higher IP address becomes the master. In this example, two switches are running VRRP and when the VLAN interface on the current master ES1-24p-1 is shutdown, ES1-24p-2 becomes the master. When the VLAN interface comes up again, the ES1-24p-1 state changes from `Init` to `Backup` and then becomes the master.

1. **Shut down the VLAN.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# end
ES1-24p-1 SEFOS#
```

2. **Verify the VRRP configuration.**

```
ES1-24p-1 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    200  P Init   -                        192.168.100.1

vlan100   1    200  P Init   -                        fe80::210:e0ff:fe2c:fd21


ES1-24p-2 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    150  P Master 192.168.100.10           192.168.100.1

vlan100   1    150  P Master fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21
```

Master Election Based on Priority

Switch with higher priority becomes the master. When you change the priority of the switch ES1-24p-2, which is the backup to a value higher than the current master ES1-24p-1, then ES1-24p-2 becomes the master.

1. **Change the priority on switch ES1-24p-2.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# router vrrp
ES1-24p-2 SEFOS(config-vrrp)# vrrp version v3
ES1-24p-2 SEFOS(config-vrrp)# interface vlan 100
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv4 priority 250
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 priority 250
ES1-24p-2 SEFOS(config-vrrp-if)# end
```

2. **Verify the VRRP configuration.**

```
ES1-24p-2 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------- -------------------------

vlan100   1    250  P Master 192.168.100.10            192.168.100.1

vlan100   1    250  P Master fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21


ES1-24p-1 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------- -------------------------

vlan100   1    200  P Backup 192.168.100.10            192.168.100.1

vlan100   1    200  P Backup fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21
```

Configure `Accept-mode`

Configure `accept-mode` to be able to respond to `ping`, `traceroute`, and `telnet` commands destined for virtual IPv4 and IPv6 address of VRRP.

1. **Shut down the VLAN interface on current master (ES1-24p-1).**

   The ES1-24p-2 switch, which is now the backup becomes the master.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# end

ES1-24p-2 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    150  P Master 192.168.100.10           192.168.100.1

vlan100   1    150  P Master fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21


ES1-24p-1 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------ ------------------------

vlan100   1    200  P Init   -                        192.168.100.1

vlan100   1    200  P Init   -                        fe80::210:e0ff:fe2c:fd21
```

2. **Ping from Host-2 to virtual IPv4 and IPv6 address of VRRP, the ping fails.**

```
Host-2# ping 1000::5
Host-2# ping 192.168.100.1
```

3. **Enable `accept-mode` on vlan 100 interface of ES1-24p-2.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# router vrrp
ES1-24p-2 SEFOS(config-vrrp)# vrrp version v3
ES1-24p-2 SEFOS(config-vrrp)# interface vlan 100
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv4 accept-mode enable
ES1-24p-2 SEFOS(config-vrrp-if)# vrrp 1 ipv6 accept-mode enable
ES1-24p-2 SEFOS(config-vrrp-if)# end
```

4. **Repeat step 2, the ping will be successful.**

Ping Between Hosts

1. **Configure static routes on all switches such that all networks are reachable from any switch.**

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# ip route 192.168.100.0 255.255.255.0 192.168.20.20
ToR72p-1 SEFOS(config)# ip route 192.168.100.0 255.255.255.0 192.168.30.20
ToR72p-1 SEFOS(config)# ipv6 route 1000:: 112 2000::20
ToR72p-1 SEFOS(config)# ipv6 route 1000:: 112 3000::20
ToR72p-1 SEFOS(config)# end

ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# ip route 192.168.40.0 255.255.255.0 192.168.20.10
ES1-24p-1 SEFOS(config)# ipv6 route 4000:: 112 2000::10
ES1-24p-1 SEFOS(config)# end

ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# ip route 192.168.40.0 255.255.255.0 192.168.30.10
ES1-24p-2 SEFOS(config)# ipv6 route 4000:: 112 3000::10
ES1-24p-2 SEFOS(config)# end
```

2. **Configure virtual IPv4 and IPv6 address as default gateway to ping each other on Host-1 and Host-2. The following pings to IPv4 and IPv6 addresses should be successful.**

```
Host-1# ping 192.168.100.50
Host-1# ping 1000::50

Host-2# ping 192.168.40.20
Host-2# ping 4000::20
```

Ping Between Hosts Through Virtual IP When Master Fails

If you shut down the VLAN interface on ES1-24p-1 when the `ping` command is running, then the ES1-24p-2 switch which is now the backup becomes the master and the `ping` should still continue to be uninterrupted.

1. **Shut down the VLAN interface.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 100
```

```
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# end
ES1-24p-1 SEFOS#
```

2. Verify the VRRP configuration.

```
ES1-24p-1 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------- -------------------------

vlan100   1    200  P Init   -                         192.168.100.1

vlan100   1    200  P Init   -                         fe80::210:e0ff:fe2c:fd21

ES1-24p-2 SEFOS# show vrrp

P indicates configured to preempt

Interface vrID Prio P State  Master Address            VRouter Address

--------- ---- ---- - -----  ------------------------- -------------------------

vlan100   1    150  P Master 192.168.100.10            192.168.100.1

vlan100   1    150  P Master fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21
```

▼ Link-Track Feature

Link-track feature is used when uplink on the master (ES1-24p-1) fails and the forwarding capability gets affected. If uplink on ES1-24p-1 goes down, a trigger is generated to decrement ES1-24p-1's current priority. The election process begins again with the new decremented priority and a new master is elected. The priority should be decremented such that it is less than the priority of the backup (ES1-24p-2). Hence, the backup (ES1-24p-2) becomes the master and forwarding capability is carried by ES1-24p-2. When the uplink on the ES1-24p-1 comes back, the reverse process occurs and the ES1-24p-1 advertises with original priority and after election process ES1-24p-1 again becomes the master.

1. Configure the VLAN interface (uplink) and number of links to track.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# track 1 interface vlan 20
ES1-24p-1 SEFOS(config)# track 1 links 1
ES1-24p-1 SEFOS(config)# end
```

2. **Configure the VLAN interface (VRRP) to decrement the priority to 100 for IPv4 and IPv6, incase the uplink goes down.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# router vrrp
ES1-24p-1 SEFOS(config-vrrp)# vrrp version v3
ES1-24p-1 SEFOS(config-vrrp)# interface vlan 100
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv4 track 1 decrement 100
ES1-24p-1 SEFOS(config-vrrp-if)# vrrp 1 ipv6 track 1 decrement 100
ES1-24p-1 SEFOS(config-vrrp-if)# end
```

3. **Shutdown the uplink.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 20
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# end
```

4. **Verify VRRP state changes.**

```
ES1-24p-1 SEFOS# show vrrp
P indicates configured to preempt
Interface vrID Prio P State  Master Address            VRouter Address
--------- ---- ---- - -----  ------------------------ ------------------------
vlan100   1    100  P Backup 192.168.100.10           192.168.100.1
vlan100   1    100  P Backup fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21

ES1-24p-2 SEFOS# show vrrp
P indicates configured to preempt
Interface vrID Prio P State  Master Address            VRouter Address
--------- ---- ---- - -----  ------------------------ ------------------------
vlan100   1    150  P Master 192.168.100.10           192.168.100.1
vlan100   1    150  P Master fe80::210:e0ff:fe2a:fd41  fe80::210:e0ff:fe2c:fd21
```

5. **Enable the uplink.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 20
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# end

ES1-24p-1 SEFOS# show vrrp
P indicates configured to preempt
Interface vrID Prio P State  Master Address            VRouter Address
--------- ---- ---- - -----  ------------------------ ------------------------
vlan100   1    200  P Master 192.168.100.20           192.168.100.1
vlan100   1    200  P Master fe80::210:e0ff:fe2c:f21   fe80::210:e0ff:fe2c:fd21
ES1-24p-2 SEFOS# show vrrp
P indicates configured to preempt
```

```
Interface vrID Prio P State  Master Address            VRouter Address
--------- ---- ---- - -----  ------------------------ ------------------------
vlan100   1    150  P Backup 192.168.100.20           192.168.100.1
vlan100   1    150  P Backup fe80::210:e0ff:fe2c:f21  fe80::210:e0ff:fe2c:fd21
```

Migration From Version 2 to Version 3

Oracle VRRP implementation provides an intermediate version v2-v3 to support migration from VRRP version 2 with IPv4 capability to VRRP version 3 with IPv4 and IPv6 capability. This version is an intermediate version used only during the transition phase from v2 to v3. This version is not a permanent version or a solution. The following section provides an example of migration from version 2 to version 3.

- "Migrating From Version 2 to Version 3" on page 29

Migrating From Version 2 to Version 3

Assuming the switches ES1-24p-1 and ES1-24p-2 in "Example VRRPv3 Configuration" on page 11 are running VRRP version 2 and need to be migrated to version 3, the following steps illustrates the migration from version 2 to version 3.

1. **On ES1-24p-1 (master) and ES1-24p-2 (backup), get to the VRRP configuration mode.**

2. **On ES1-24p-2, change the version to `v2-v3`.**

   This makes ES1-24p-2 to accept both v2 as well as v3 packets from ES1-24p-1. Since ES1-24p-1 is configured with v2, it will not transmit v3 packets.

3. **On ES1-24p-1, change the version to `v2-v3`.**

   This makes ES1-24p-1 to send both v2 as well as v3 packets to ES1-24p-2. Version 2 packets carry `Authentication` fields if authentication is set. `Authentication` is removed in version 3 RFC.

   ES1-24p-2 ignores v2 packets since it has received v3 packets from ES1-24p-1.

   Both ES1-24p-1 and ES1-24p-2 run VRRP version 3.

4. **Change the version to `v3` on ES1-24p-2 when the VRRP setup is stable.**

   This makes ES1-24p-2 to accept only V3 packets from ES1-24p-1. Version 2 packets from ES1-24p-1 are discarded and captured as `VERSION_ERROR`.

5. **On ES1-24p-1, change the version to `v3`.**

   This makes ES1-24p-1 to send only V3 packets to ES1-24p-2.

In v2-v3 mode, configurations are saved and restored through v3 format. So, authentication MIB objects are not restored in this mode. It is recommended to remove authentication capability before initiating the migration from v2 to v3 through v2-v3 because authentication fields are not filled in v3 packets and not supported by version 3.